PROVANCHERIA

5

Mémoires de l'Herbier Louis-Marie
Faculté d'Agriculture, Université Laval

FLORA
OF THE
PRAIRIE PROVINCES

by

BERNARD BOIVIN

Part IV

Reprinted from PHYTOLOGIA vol. 42-43
1979

PROVANCHERIA

5

Mémoires de l'Herbier Louis-Marie

Faculté d'Agriculture, Université Laval

FLORA

OF THE

PRAIRIE PROVINCES

A HANDBOOK

TO THE FLORA OF THE PROVINCES OF

MANITOBA, SASKATCHEWAN AND ALBERTA

by

BERNARD BOIVIN

Herbier Louis-Marie, Université Laval

and Department of Agriculture, Ottawa

Part IV

Monopsida

1979

FLORA

OF THE PRAIRIE PROVINCES

Bernard Boivin

Part IV -- MONOPSIDA

Class 7. MONOPSIDA MONOPSIDS, MONOCOTS

Always herbs, always devoid of a taproot, without bark. Leaves nearly always simple, sessile, and entire with parallel nervation. Flowers mostly trimerous, but often much reduced.

The more obvious difference between the Dicopsids and Monopsids is in the basic leaf type. The normal leaf is made up of a blade and petiole; it is present is nearly all Dicopsids. The Monopsid leaf appears to have lost its blade and is reduced to a petiole. When this Monopsid petiole is flattened out into a blade, as frequently happens, it may take on the general appearance of a Dicopsid leaf, yet the nervation is still recognizably that of a petiole with its parallel and non branching nerves. The two types of leaves may be compared as follows.

Dicopsida. A typical leaf comprises 3 readily identifiable elements: a dilated blade, an elongated petiole, and a pair of stipules. The stipules are very variable in size, colour and shape; often they are absent; commonly they are borne at the base of the blade and have the aspect of a pair of small leaflets. The petiole is a thin elongated structure supporting a blade and it is prolonged into the blade in the form of a simple or branching midnerve. The blade is the flat and green terminal part of the structure. The central or main nerve of the leaf is termed the midnerve and the other nerves arise as branches of it. The branches arising directly from the midnerve are termed primary nerves, these in turn may also produce lesser branches which are termed secundary nerves. Commonly the midnerve and primary nerves will end in the marginal teeth or they may turn ± halfway around and connect with one another or they may merely fade out towards the margin. The midnerve may give rise to the primary nerves successively, in the manner of the barbs of a feather (i.e. pinnately). Or the midnerve may branch off at the base of the blade and produce a group of primary nerves diverging in the manner of the fingers of a spreadout hand (i.e. palmately). Less commonly two (sometimes more) of the primary nerves will arise from near the base of the blade and will be almost as long and almost as strong as the midnerve; often such a leaf will described as parallel-nerved if the stronger primary nerves run somewhat halfway between the midnerve

and the margin, but this terminology is clearly an exageration although a convenient one. Dicopsids present numerous variations on their basic leaf pattern and some of them may resemble a Monopsid leaf: the leaf may be very narrow and its nervation may be reduced to the midnerve (e.g. Hippuris, Callitriche), or the nervation may be in the form of divergent rather than branching primary nerves (e.g. Plantago).

Monopsida. The leaf may be reduced to a filiform and elongated petiole with a single midnerve, as exemplified by the submersed leaves of many species of Potamogeton, but usually the petiole is broadened into a limb. The stipules are nearly always present and may be free or variously modified, but commonly they are very much elongated and fused to the edge or to the ventral face of the petiole; they are then distinguishable mainly as membranous marginal expansions which will often enclose the stem into a structure termed sheath. The tip of the stipules may remain free and form structures called auricles or a ligule. Commonly the petiole will not be readily recognized as such, but will be flattened out into a green expense similar to the leaf of the Dicopsids and similarly called a leaf despite its petiolar origin. The usual type of leaf as seen in the Grasses and Sedges, is a sessile and much elongated or ribbon-like structure with a few truly parallel nerves running the whole length of the limb. The central nerve is usually a bit stronger than the others and is termed the midnerve. The primary nerves do not branch off the midnerve, but are already distinct at the very base of the limb; they may converge at the tip of the limb without actually joining. Secondary nerves are sometimes sent in the form of finer nerves crossing the intervals between the primary nerves. All nerves are simple or they may be joined by fine interconnections. Broader leaves also occur (e.g. many Liliaceae); they still fit the description above except that their primary nerves are somewhat curved and not truly parallel, although they are still said to be parallel as a matter of convenience. More rarely (e.g.: Smilax or the floating leaves of Potamogeton) the petiole will remain narrow and petiole-like in the lower part, but will be dilated into a blade in the upper part. Only very exceptionally will a Monopsid leaf be atypical (e.g. Trillium, Arisaema) to be point of similarity to a Dicopsid leaf.

Two keys are provided for the Monopsids. The first is a natural key based primarily on floral characteristics.

A second and purely artificial key will be found at the end of the Monopsids.

a. Ovary of free and many-seeded carpels, or more commonly the carpels fused into a compound ovary, sometimes reduced to a single achene .... Folliculidae
aa. Carpels free and reduced to one-seeded achenes, sometimes reduced to a single carpel .... Achenidae p.

Sub-class 3. FOLLICULIDAE

Ovary of 3-6 carpels and compound, or the carpels free and many-seeded, maturing into a capsule, a group of follicles or a berry, etc., sometimes an achene-like fruit reduced from a compound ovary.

a. Perianth much reduced or absent.
b. No spathe.
c. Stem solid; each floret with only one bract or the bracts not opposite .... 71. Cyperales, p. 808
cc. Stem hollow; each floret subtended by a pair of opposite bracts .... 72. Graminales, p. 879
bb. Spathe present, subtending the inflorescence.
d. Fruit a berry ..... 73. Arales, p. 976
dd. Fruit achene ..... 74. Typhales, p. 980
aa. Perianth present and functional.
e. Ovules scattered all over the wall of the carpel ..... 61. Butomales, p. 758
ee. Ovules borne along the edge only.
f. Carpels free or nearly so.
g. Carpels borne around a central column ..... 64. Juncaginales, p. 762
gg. No central column .... 62. Scheuchzeriales, p. 761
ff. Carpels fused into a compound ovary...Group A

Group A

Perianth present; carpels fused.

a. Ovary superior.
b. Flower plainly differentiated into sepals and petals ..... 63. Commelinales, p. 761
bb. Petals and sepals very similar or nearly identical and usually concolour.
c. Perianth small and chaff-like .... 70. Juncales, p. 797
cc. Perianth petaloid.
d. Leaves normal; roots system herbaceous or fleshy .... 65. Liliales, p. 763
dd. Leaves strongly fibrous, rigid, sharp-pointed; rhizome or stem ± woody ... . 67. Agavales, p. 782

aa. Ovary inferior.
e. Flower zygomorphic ..... 69. Orchidales, p. 783
ee. Regular.
f. Leaves equitant ..... 66. Iridales, p. 780
ff. Leaves normal ..... 68. Haemodorales, p. 783

Sub-class 3. FOLLICULIDAE

Order 61. BUTOMALES

Ovules borne all over the inner wall of the carpel.
a. Ovary superior ..... 114. Butomaceae, p. 758
aa. Inferior ..... 115. Hydrocharitaceae, p. 759

114. BUTOMACEAE FLOWERING RUSH FAMILY

A typical Monopsid, resembling the Liliaceae, but for the placentation and the carpels free or nearly so.

1. BUTOMUS L. FLOWERING RUSH

Flowers umbellate. Petals persistent.

1. B. UMBELLATUS L. -- Flowering Rush (Jonc fleuri, Flûteau) -- Flowers purplish pink in a showy umbel on a tall scape. Leaves all basal, ensiform and triangular in cross section, nearly as tall as the scape, the latter often 1 m high or more. Early to mid summer. Cultivated and rarely escaping or introduced to shores of receding waters: Netley Creek. -- NS-PEI, Q-Man, US, Eur.

Some gardeners, nature lovers or naturalists may attempt to introduce plants into native habitats; they rarely meet with success. Indeed the failure rate might be of the order of 99%, while most successful introductions seem to be essentially unpremeditated. Attempts at introductions in the wild are relatively uncommon in our area, yet not completely absent. The local history of Butomus offers interesting insights in the matter.

In 1948 a business firm in Chatham, Ontario, sent 11,000 corms to the Manitoba Government for trial plantings. There may have been also some later shipments to a few individuals. Most, if not all, corms must have died, since the first collection of Butomus in the wild was not made until 16 years later and, after such a long interval, one may wonder if the two are events are causally related.

We have tried in this flora to distinguish between deliberate introductions in the wild and actual naturalisations; the first are ignored, the others are keyed out and described. Unfortunately label data are often inadequate to our purposes and introduce a margin of error; no doubt some of our inclusions are not fully justified, some omissions were unwarranted. Time will tell: cultivated plants almost invariably regress and wither if

they are denied the care and attention of an interested gardener, hence the lack of repeat collections over the long term for nearly all deliberate introductions.

115. HYDROCHARITACEAE FROG'S BIT FAMILY

Ovary inferior. Aquatic plants ± submerged.
a. Leaves opposite or in whorls ..... 1. Elodea
aa. All basal ..... 2. Vallisneria

1. ELODEA Richard WATERWEED

Flower arising singly from a long tubular sheath. Pistillate flower borne inside the sheath, but the perianth-tube elongating greatly and simulating a long, thin pedicel, and eventually reaching the surface of the water. Our species rarely seen in flower.
a. Middle and upper leaves in 3's ..... 1. E. canadensis
aa. Opposite ..... 2. E. longivaginata

1. E. canadensis Mx. (Anacharis canadensis (Mx.) Planchon) -- Waterweed, Ditch-Moss (Peste des eaux) -- Submerged and nearly always sterile herb with numerous small leaves verticillate in 3's. Leaves ligulate, about 1 cm long, about 2 mm wide. Late summer. Shallows in slow flowing freshwater streams, from lake La Ronge eastward. -- NS, NB-S, BC, US, Bur.

2. E. longivaginata St. John (E. canadensis AA.; E. laevivaginata sphalm.; Anacharis Nuttallii AA.) -- Quite like the first, but all the leaves opposite and commonly about 2 cm long. Leaves very finely scabrous-serrulate towards the tip. Early summer. Alkaline sloughs, rare or overlooked. --swS-sAlta, US.

Not to be confused with the habitally similar Callitriche, the latter has entire leaves, or (C. hermaphroditica) shallowly emarginate and minutely bidentate at tip.

2. VALLISNERIA L. TAPEGRASS

Leaves all in a basal rosette. Perianth tube elongating as in Elodea, only more so. Male flowers not stipitate, but released from a basal spathe to become free floating on the surface of the stream.

1. V. americana Mx. (V. spiralis AA.) Wild Celery, Eelgrass (Herbe à la barbotte, Herbe aux anguilles) -- Tufted submerged herb with very long, narrow and ribbon-like leaves, very flaccid and their tip coming to float on the surface of the water. Leaves with transverse or diagonal lines of darker or purplish dots. Perianth tube becoming coiled after anthesis. Mid summer. Slow moving waters, usually less than 1 m deep. -- NS, NB-seMan, US.

When sterile likely to be confused with other ribbon-like aquatics such as Sparganium, but these lack the lines of purple dots and usually have much larger cells.

Order 62. SCHEUCHZERIALES

Carpels free or nearly so and maturing into many-seeded follicules. Similar to the Butomales, but the seeds borne along the carpel margin only.

116. SCHEUCHZERIACEAE
SCHEUCHZERIA FAMILY

Leaves sheathing and ligulate like a Grass.

1. SCHEUCHZERIA L.

Monotypic.

1. S. palustris L. -- (Petit jonc fleuri) -- Fruit of 3 horizontally spreading follicles. Habitally much like a Juncus but the 3 carpels nearly free. Flowers small and inconspicuous, the tepals only 2-3 mm long, the plant therefore nearly always collected in fruit. Early summer. Wetter parts of bogs and rare, or perhaps merely inaccessible. --Mack-Aka, L-NF, NS, NB-BC, US.

North American specimens are reported to have a slightly longer seed and the mature capsule should have a slightly higher beak, they have been accordingly segregated as var. americana Fern. But specimens at hand failed to conform to the expected morphological pattern.

Order 63. COMMELINALES

Perianth clearly differenciated into a corolla and a green calyx. Otherwise similar to the Liliaceae.

117. COMMELINACEAE SPIDERWORT FAMILY

Ovary 2-3 locular. Leaves sheating at base.

1. TRADESCANTIA L. SPIDERWORT

Corolla regular. Flowers in cymes.

1. T. occidentalis (Britton) Smyth -- Showy flower with 3 large blue petals and much smaller green sepals, the petals deliquescent and often leaving nothing but a blue smear on the herbarium sheet. Leaves broadly sheating at base, the limb very long and very narrow, falcate to somewhat coiled at tip. Glandular-pilose in the inflorescence; herbage otherwise glabrous. First half of summer. Light sands; local: Melita, Routledge. -- swMan, US, (CA).

Order 64. JUNCAGINALES

Flowers bractless as in the Achenidae, but the perianth normal, trimerous.

118. JUNCAGINACEAE ARROWGRASS FAMILY

Single family.

1. TRIGLOCHIN L. ARROWGRASS

Fruit a group of carpels attached to a central column.

a. Tepals broadly rounded at summit; fruit oblong .. .. 1. T. maritimum
aa. Sepals acuminate; fruit narrowly oblanceolate ... . 2. T. palustre

1. T. maritimum L. -- (Herbe soelting, Faux Jonc) -- Inflorescence a bractless raceme. Otherwise habitally similar to an Onion. Leaves all basal, narrow and elongate, sheating at base. Carpels and styles 6. Fruit 3-5 mm long. Early summer. Frequent in marshes and sloughs -- seK-Aka, L-SPM, NS-BC, US, (CA, SA), Eur, (Afr).

2. T. palustre L. -- (Faux Jonc) -- Closely similar but smaller and with much finer foliage. Carpels and styles 3. Fruit 6-9 mm long. First half of summer. Bogs, shores and sloughs. --G, K-Aka, L-SPM, NS-BC, US, (SA), Eur.

Order 65. LILIALES

The typical family of Monopsids with flowers regular, the floral parts in 3's and all free, except the carpels.

119. LILIACEAE LILY FAMILY

Ovary superior.

a. Climbing by tendrils ..... 21. Smilax
aa. Non-climber.
  b. At least the upper leaves opposite or verticillate ..... Group A
  bb. Alternate or all basal.
    c. Leaves all or mainly basal ..... Group B
    cc. Stem leafy.
      d. Inflorescence terminal ..... Group C
      dd. Flowers axillary ..... Group D

Group A

At least some of the leaves opposite or verticillate.

a. Leaves numerous, the upper verticillate, the middle and lower ones alternate ..... 8. Lilium
aa. Leaves (2)-3-(4).
  b. Leaves broadly ovate ..... 20. Trillium
  bb. Lanceolate to long linear.

c. Leaves isomegueth, borne near the middle of the stem ..... 9. Fritillaria
cc. Dimegueth, the basal one many times longer than the two opposite upper leaves ..... 11. Calochortus

Group B

Leaves all or mainly basal.

a. Flower solitary or in an umbel.
b. Flowers very numerous ..... 7. Allium
bb. Only 1-6 flowers; leaves large.
c. Glabrous ..... 10. Erythronium
cc. Leaves ciliate or villous ..... 14. Clintonia
aa. Flowers in a raceme or panicle.
d. Flowers small, sessile ..... 1. Tofieldia
dd. Much larger and on long peduncles.
e. Leaves strongly scabrous above..... ..... 2. Xerophyllum
ee. Smooth.
f. Flowers blue; bracts longer than the peduncles ..... 12. Camassia
ff. Flowers white or yellow to purplish; bracts mostly shorter.
g. Flowers 1-4 .....10. Erythronium
gg. Much more numerous.
h. Flower tubular; leaves enlarging to 2-3 cm in fruit.. ..... 3. Stenanthium
hh. Tepals spreading; leaves less than 1 cm wide .... 4. Zygadenus

Group C

Leaves alternate; inflorescence terminal.

a. One-flowered.
b. Flower or fruit longer than its peduncle .. .. 6. Uvularia
bb. Peduncle many times longer ..... 9. Fritillaria
aa. Flowers numerous.
c. Leaves very narrow, ensiform, strongly scabrous above ..... 2. Xerophyllum
cc. Broader, ovate to lanceolate.
d. Leaves cordate at base, the lower short petiolate ..... 16. Maianthemum
dd. Cuneate to broadly rounded at base and sessile to clasping.
e. Flowers 1-3 at the end of each branch .. .. 17. Disporum
ee. Flowers in a single terminal raceme or panicle.

f. Flowers greenish; herbage soft pubescent throughout..... 5. Veratrum
ff. Flowers whitish; herbage glabrous or nearly so .... 15. Smilacina

Group D

Stem leafy; flowers axillary.

a. Leaves filiform, borne in clusters .... 13. Asparagus
aa. Leaves alternate and much larger.
b. Flowers in 2's ..... 19. Polygonatum
bb. Solitary.
c. Single-flowered plant ..... 6. Uvularia
cc. Flowers many ..... 18. Streptopus

1. TOFIELDIA Hudson FALSE ASPHODEL

Leaves equitant, that is folded longitudinally with the two halves of the upper face fused together, thus only the lower face is visible and the leaf appears to be inserted edgewise to the base of the stem. Leaves distichous. Flowers in a spiciform raceme.

a. Stem densely glandular ..... 2. T. glutinosa
aa. Glabrous.
b. Stem green, leafless ..... 1. T. pusilla
bb. Reddish purple and bearing a small leaf halfway up ..... 3. T. coccinea

1. T. pusilla (Mx.) Pers. (T. palustris AA.) -- Scotch Asphodel -- Small scapose herb with a flabelliform rosette of equitant leaves. Glabrous, the stem 1-2 dm high. Inflorescence short and fairly dense, the flowers mostly only 5-7, nearly sessile and verticillate. About the middle of summer. Along subarctic and mountain creeks. -- G-Aka, L-NF, Q-nwS-BC, (US, Eur).

A report by Lowe 1943 of T. palustris from McCreary along the eastern edge of the Riding Mountain was repeated by Hultén 1962. But it was ignored by Scoggan and probably rightly so as the locality has never been confirmed and seems rather unlikely for a subarctic species.

2. T. glutinosa (Mx.) Pers. var. glutinosa -- Stem copiously dotted in red with sessile glands. A larger plant, 2-4 dm, with the longer basal leaves 1-2 dm long. Flowers, etc. larger. Pubescence dimorphic, the rachis and pedicells glandular-puberulent in yellow. Seed brown, the seed-coat tight. Early summer. Bogs and open, wet places. --K-Aka, (L)-NF-SPM, NS, NB-BC, US -- Var. intermedia (Rydb.) Boivin (ssp. brevistyla (Rydb.) C.L. Hitchc.) -- Seeds straw-coloured with the paler outer seed-coat loose and the brown seed free inside. Pu-

bescence as above. -- seAka, swAlta-BC, US -- Var. montana (C.L. Hitchc.) R.J. Davis -- Stem glandular-puberulent in the manner of the inflorescence. Seed type intermediate, brown with a partly loose seed-coat. Waterton--swAlta, wUS.

Tye type (NY) of T. intermedia Rydb. comes from southeastern Alaska an area where two varieties occur; as it is in flower it cannot be identified positively as to variety. However traditional usage, as pointed out by Hitchcock 1944, has more or less restricted this name to the pale-coloured seed type and we have felt justified to continue in the same vein as the name is not otherwise ambiguous.

3. T. coccinea Rich. var. coccinea -- Small and glandless like T. pusilla, but the stem deep purple and bearing 1-(2) leaves. Stem rarely over 1 dm high. Flowers becoming pedicellate, at least the lower ones alternate. Early summer. High alpine, usually in limestone areas. -- G-Aka, (Q, Alta)-BC, (Eur).

A number of other varieties (not studied) have been reported from Eastern Asia.

2. XEROPHYLLUM Mx. BEAR GRASS

Herbs with a woody rhizome and the general habit of a Yucca or Agave. Flowers unspecialized and typical of the family. Styles 3, free.

1. X. tenax (Pursh) Nutt. -- Bear-Grass -- Showy raceme of very numerous white flowers on a tall stem arising from the center of a dense clump of very long leaves. Leaves very rough, the basal ones 2-7 dm long, stiff and very narrow. Raceme large and dense. First half of summer. Locally abundant in open montane woods: Waterton. --swAlta-seBC, US.

3. STENANTHIUM Kunth

Closely similar to the next, but the glandless tepals adnate to the base of the ovary, the fruit therefore somewhat semi-inferior. Otherwise a typical Liliaceous plant.

1. S. occidentale Gray -- Mountain-Bells, Bronze Bells -- Flowers tubular and drooping in a more or less secund raceme. Rosette leaves linear-lanceolate, the stem leaves few and much smaller. Inflorescence sometimes slightly branched towards the base. Flowers mostly purplish green. Fruit erect. First half of summer. Moist, open montane woods. --swAlta-BC, US, (Eur).

4. ZYGADENUS Mx. CAMASS

Tepals with 1-2 glandular spots towards the base. Ovary superior to semi-inferior. Flower otherwise typical of the family.

Z. paniculatus (Nutt.) Watson has been reported repeatedly from Western Canada. An earlier report by Watson for Saskatchewan is repeated by Macoun 1888. Henry 1915 includes Alberta in its range and Bastham 1947 quotes some B.C. locations. None of these reports were ever confirmed and only one was eventually traced (and doubtfully at that) to an herbarium specimen (CAN, DAO). The latter has been revised to Z. venenosus and a similar disposition is presumably the correct one for the other reports.

a. Tepals 8-12 mm long ..... 1. Z. elegans
aa. Tepals smaller, 4-7 mm long; inflorescence always a raceme ..... 2. Z. venenosus

1. Z. elegans Pursh (Z. chloranthus Rich.; Anticlea elegans Rich.) -- White Camass, Alkali-Grass -- Ovary soon becoming semi-inferior. Onion-like in habit and arising from on onion. Stem leaves few and much reduced. Inflorescence a raceme or more commonly a panicle. Flowers yellow and greenish with large, darker, glandular patches towards the base. First half of summer. Common in prairies. --Mack-Aka, NB-BC, US.

2. Z. venenosus Watson (var. gramineus (Rydb.) Walsh; Toxiscordion gramineum Rydb.) -- Poison-Camass, Hog's Potato -- Tepals unguiculate, yellowish-white. Flowers smaller in a denser and simple raceme. Ovary and capsule superior. Late spring and early summer. Frequent in low spots in prairies and steppes. -- sS-BC, US.

5. VERATRUM L. FALSE HELLEBORE

Seeds winged, borne in a capsule. Styles 3 and free, the flowers otherwise typical of the family.

1. V. Eschscholtzii Gray var. Eschscholtzii -- A rather coarse herb with broad, ovate leaves 1-2 mm wide and short-sheating at base. Perennial 1-2 m high, the herbage puberulent to somewhat arachnoid. Inflorescence a narrow raceme of secund and recurved racemes. Tepals 8-11 mm long. Mid summer. Light and wet or marshy woods. --wMack-Aka, Alta-BC, (US) -- var. incriminatum Boivin -- Smaller, only 1 m high or less. Leaves narrower, only 5-8 cm wide. Tepals shorter, 5-8 mm long. Branches spreading rather than recurved. Low alpine -- swAlta-BC.

6. UVULARIA L. BELLWORT

Only 1 style, but trifid. Single-flowered herbs with alternate leaves and unusual branching arrangements.

1. U. sessilifolia L. (Oakesia sessilifolia (L.) Watson) -- Wild Oats -- At first simple and circinate with a single terminal flower, soon producing a single branch while the fertile one elongates and the single flower or fruit becomes borne opposite the lowermost leaf of the fertile branch. Fruit fairly-large, pedunculate and abruptly contracted into an obvious stipe. Late spring. Local in deciduous woods: Roseisle, Sandilands. -- NS, NB-sMan, US.

7. ALLIUM L. ONION

The Onion proper, that is an herb arising from a bulb of tubular sheaths, with a rosette of elongate leaves, a stem scapose or leafy towards the base only, and a terminal umbel of flowers. Flowers typical for the family.

a. Leaves 1-7 cm wide, absent at flowering time... ..... 6. A. tricoccum
aa. Leaves narrower and present throughout the season.
b. Most flowers changed to bulblets; stem leafy below the middle ..... 1. A. sativum
bb. Flowers normally present and bulblets absent.
c. Leaves terete; perianth 10-12 mm high.. .....5. A. Schoenoprasum
cc. Leaves flat; tepals 8 mm long or less.
d. Outer bulb sheaths disintegrating to a fibrous reticulum; stamens included ..... 4. A. Geyeri
dd. Outer sheaths remaining membranous; stamens more or less exserted.
e. Umbels usually nodding; sepals obtuse or rounded at summit .. .. 2. A. cernuum
ee. Umbels typically erect; sepals short mucronate ..... 3. A. stellatum

1. A. SATIVUM L. -- Garlic (Ail) -- Umbell mostly of bulblets. Leaves flat, 5-10 mm wide, clothing the stem in the lower half. Umbel subtended by, and half enclosed into, a large bract prolonged into a beak up to 1 dm long. Early summer. Cultivated and rarely spreading to fencerows, wasteland or dumps: Otterburne. -- swO-seMan, (US, Eur).

2. A. cernuum Roth -- Wild Onion -- Inflorescence nodding, the scape being strongly recurved just below the

umbel. Scape 2-4 dm high and usually tinted pink towards the base. Main leaves 2-4 mm wide. Stamens 1½ times as long as the perianth. Mid summer; chernozems. --swO, S-BC, US.

Despite a variety of earlier reports from Manitoba, all specimens under this name at CAN, DAO, MT, MTMG, QK and TRT have erect inflorescences, mucronate sepals and barely exserted stamens. All have been revised accordingly to A. stellatum.

3. A. stellatum Fraser -- Wild Onion -- Like the last and the outer layers of the bulb similarly membranous, but the umbel typically erect. Scape 3-6 dm high, not red-tinted. Leaves not over 2 mm wide. Stamens barely exserted. Mid summer, chernozems. --wO-S, US.

The many reports for further west in Alberta (CAN, DAO) and B.C. (DAO, QK, V) were based on specimens since revised to A. cernuum.

4. A. Geyeri Watson var. Geyeri -- Wild Onion -- Outer bulb coats reduced to a gray, fibrous reticulum. Mostly 2-5 dm high. Flowers pink, fading white. Perianth 6-8 mm high. Sepals linear-lanceolate, largest towards the base, long attenuate. Late spring. Foothill prairies. --S-BC, US -- F. tenerum (M.E. Jones) Boivin (A. rubrum Osterh.) -- Flowers all or mostly replaced by bulblets. Rare: Waterton. --swAlta-(sBC), US -- Var. textile (Nelson & Macbr.) Boivin (A. reticulatum Fraser; A. textile Nelson & Macbr.)-- Generally smaller, with smaller and whitish flowers. Mostly 1-2 dm high. Perianth 4-6 mm high. Sepals lanceolate, broadest towards the middle, obtuse to subacute at summit. Late spring and early summer. Common in prairies. --Man-Alta, US.

5. A. Schoenoprasum L. (var. sibiricum (L.) Hartm.) -- Chives (Ciboulette, Oignon sauvage) -- Flowers largest, 1 cm long or more. Tufted. Stem with 1-2 leaves. Flowers commonly pink. First half of summer. Infrequent on shores; also cultivated and sometimes persistent. --Mack-Aka, L-NF, NS, NB-O-(Man)-S-BC, US, Eur.

Most current floras will distinguish between var. Schoenoprasum, native in the Old World but an occasional escape in North America, and one or more native variants. We have found the supposed diagnostic criteria to be neither realistic nor constant and we have been unable to distinguish clearly the introduced plant on criteria other than its habitat.

6. A. tricoccum Aiton -- Wild Leek, Ramp -- (Ail des bois, Ail sauvage) -- Leaves flat and quite lar-

ge, disappearing before anthesis. Flowers in an umbel on a leafless scape. Perianth short, whitish. Early summer. Deciduous woods: Morden. --(NS), NB-sMan, US.

8. LILIUM L. LILY

Basic type of the Family and of the Monopsids. A large flower with 6 petaloid tepals, 6 stamens and a 3-carpellate ovary. Stem leafy. Anthers attached dorsally, towards the middle. Bulb of fleshy scales. Fruit a 3-locular capsule.

1. L. philadelphicum L. var. philadelphicum -- Wood-Lily, Freckled Lily -- Flower very large and showy, of 6 red orange tepals, the latter unguiculate and coarsely punctate in deep purple. Leaves narrow, mostly verticillate. Flowers often 2 or 3, but more commonly only one. Typically the stem is 4-8 dm high; the leaves are 5-10 mm wide and about half of them are alternate, the others form two verticils, one median, one terminal; the tepals are about 7 cm long, the claws 1.5-2.0 cm long. First half of summer. Prairies and light woods. -- Q-Man, US -- Grades into the more common and mainly western var. andinum (Nutt.) Ker. (L. umbellatum Pursh) -- Prairie Lily -- Uppermost leaves forming a single verticil, the other leaves all or mostly alternate. Often a somewhat smaller plant. Typically 3-4 dm high; the leaves less than 5 mm wide; the tepals about 6 cm long, the claws 1.0-1.5 cm long. --O-CB -- F. immaculatum Raup -- Flowers yellow and spotless or the spots rather weak. -- (Man-S)--Alta.

Intermediates are frequent throughout the range of the species, more so in Ontario. In accordance with our general practice, we have placed all such intermediates with the locally prevalent type. On the basis of a sorting of some 200 sheets, the length of the claw would seem to be more clearly restricted geographically than most other characters.

9. FRITILLARIA L. FRITILLARY

Anthers attached at the end, otherwise as in Lilium.

1. F. pudica (Pursh) Sprengel -- Mission-Bell, Yellow Bell -- A single, showy, yellow, drooping flower of 6 oblanceolate tepals. 1-2-(4) dm high. Leaves 2-5, variously arranged, typically the upper 2 are opposite and the lower 3 alternate. Early to mid summer. Foothill prairies. --Alta-BC, US.

10. ERYTHRONIUM L. DOG-TOOTH-VIOLET

Leaves all basal, usually 2. Bulb solid. Otherwise like Fritillaria.

1. E. grandiflorum Pursh var. grandiflorum (var. pallidum St. John) -- Adam and Eve, Chamise-Lily -- Flowers 1-(3), large, showy, yellow, on a leafless scape. Leaves broadly lanceolate. Tepals lanceolate, recurved. Anthers purple or pale yellow. Mid spring to early summer. Montane to low alpine. --swAlta-BC, US.

In a more southern var. chrysandrum (Applegate) stat. n., ssp. chrysandrum Applegate, Contr. Dudley Herb. 1: 190. 1933, the anthers are golden yellow.

The related genus Lloydia occurs west of us and L. serotina (L.) Reich. var. serotina has been reported by Hultén 1943 and Hitchcock 1969 as occurring in Alberta, querried by Boivin 1967. We know of no justifying specimen; none could be located at S in 1968, or at WTU in 1969.

11. CALOCHORTUS Pursh MARIPOSA-LILY

Resembles the last 3, but the sepals are strongly differenciated although petaloid.

1. C. apiculatus Baker -- Three-Spot-Lily -- With 3 -(4) leaves, of which one is basal and nearly reaches the flower level, the other 2 are many times shorter, opposite, and borne in the upper part of the stem. Flowers 1-(3), yellow, large and showy. Petals unguiculate with a purple spot at the summit of the claw and a suborbicular blade. Sepals smaller, sessile, lanceolate. Early summer. Mountain slopes. --Alta-BC, US.

12. CAMASSIA Lindley BLUE CAMASS

As in Lilium, but the leaves all basal and the inflorescence a raceme.

1. C. Quamash (Pursh) Greene var. Quamash -- Quamash, Soap-Root-Plant (Camace, Quamash) -- A showy raceme of large blue flowers. Leaves linear. Tepals narrowly oblanceolate, 3-5 mm wide, with 3 nerves. Early summer. Foothill prairies, locally abundant. --swAlta-BC, US.

A more western var. maxima (Gould) Boivin has a more showy flower, the tepals being 5-10 mm wide and lined with 5-(9) nerves, although the sepals may rarely have only 3 nerves.

13. ASPARAGUS L. ASPARAGUS

Flowers all or mostly solitary, axillary. True leaves very small and inconspicuous, functionally replaced by ± filiform pseudo-leaves which represent reduced branches.

1. A. OFFICINALIS L. -- Asparagus (Asperge)-- Tall, feathery herb, over 1 m high, growing in loose

colonies. Pseudo-leaves filiform, borne in small fascicles. Flowers yellow. Fruit red, turning black. Early summer. Cultivated and long persisting or even spreading to ditches and river planes or bluffs. -- NS-(PEI)-NB-BC, US, Eur.

14. CLINTONIA Raf. CLINTONIA

Similar to Lilium, but the leaves all basal and the fruit a berry.

a. Flowers yellow, mostly 3-5 ..... 1. C. borealis
aa. White and solitary ..... 2. C. uniflora

1. C. borealis (Aiton) Raf. -- Poison-Berry, Blue-bead-Lily (Lis sauvage de la vallée) -- Herb with 2-3 large basal leaves and a few yellow flowers in an umbel. Inflorescence mostly of 3-5 flowers, sometimes with 1-2 additional flowers borne lower on the scape. Fruit blue. Late spring and early summer. Coniferous woods. --L-SPM, NS-seMan, US.

2. C. uniflora (Schultes) Kunth -- Queen's Cup -- Similar to the last, an herb with a single white flower on a scape shorter than the 2-3 large basal leaves. Herbage villous, especially the scape. Early summer. Coniferous woods: Waterton. --(Aka), swAlta-BC, US.

15. SMILACINA Desf.
FALSE SOLOMON'S SEAL

Fruit a berry in a terminal raceme or panicle. Stem leafy, simple.

a. Inflorescence a panicle ..... 1. S. racemosa
aa. Inflorescence simpler, a terminal raceme.
b. With 5-10 stem leaves ..... 2. S. stellata
bb. Stem leaves fewer, usually only 3 .....
..... 3. S. trifolia

1. S. racemosa (L.) Desf. var. racemosa -- Job's Tears (Raisinette) -- A simple herb with many large distichous leaves and a terminal panicle of white flowers or red berries. Leaves + lanceolate, 3-4 times as long as wide and acuminate. Anthers 0.5-1.0 mm long, ovoid. Style 0.2-0.7 mm long, not elongating in fruit. Berry 5-7 mm across, solid red. Early summer. Woods, mainly Aspen groves; rare: Shoal Lake. -- (NF), NS-seMan -- Var. amplexicaulis (Nutt.) Watson (S. amplexicaulis Nutt.) -- Anthers smaller, 0.3-0.5 mm, globular. Style longer, 0.5-1.3 mm long, elongating to 1 mm or more in fruit. Berry smaller and paler, 4-5 mm across and punctate or pale red. -- (Aka), wAlta-BC, US -- Var. Jenkinsii Boivin (S. amplexicaulis Nutt. var. ovata Boivin) -- Leaves broader, suborbicular to narrowly elliptic, less than 3 times as long as wide; acutish to obtuse at tip. --swS-Alta.

2. S. stellata (L.) Desf. -- Wood-Lily -- Similar to the above, but the inflorescence simple and the larger fruit marked by 6 dark purple stripes. Late spring and early summer. Wet places and Aspen groves. --(seK)-Mack-Aka, sL-SPM, NS-BC, US, (Eur).

3. S. trifolia (L.) Desf. -- Tobacco-Berries, Scent-Bottle -- Leaves only (2)-3-(5) per plant. Flowers in a terminal spike. Fruit small, bright red. First half of summer. Frequent in bogs. --seK-Y, L-SPM, NS-BC, US, Eur.

16. MAIANTHEMUM Weber
WILD LILY-OF-THE-VALLEY

Floral parts in 2's. Otherwise similar to Smilacina.

1. M. canadense Desf. var. canadense -- Lily, Wild Lily-of-the-Valley (Muguet, Petit Muguet) -- A small stoloniferous herb with numerous solitary and sterile cordate leaves, and less numerous stems bearing 2 oblong leaves and a terminal raceme of small white flowers. Herbage glabrous. Early summer. Woods. --L-SPM, NS-seMan, US -- Var. interius Fern. -- Herbage pubescent. -- Mack, O-BC, US.

17. DISPORUM Sal.

Fruit a berry, etc., as in Smilacina, but the flower solitary and terminal, or in a small terminal cluster of 2-3 flowers.

a. Leaves glabrous above, acute to subacuminate .. .. 1. D. trachycarpum
aa. Scabrous-puberulent above, abruptly acuminate-caudate ..... 2. D. Hookeri

1. D. trachycarpum (Watson) B.& A. -- Fairy-Bells -- A branched herb with 1-(2) flowers at the end of each branch. Leaves cordate, subsessile. Ovary and fruit densely papillose, the latter orange-red. Second half of spring. Woods. --nO-BC,US.

2. D. Hookeri (Torrey) Britton var. oreganum (Watson) Q. Jones (D. oreganum (Watson) B. & H.) -- Much like the first. Leaves narrower, mostly oblong. Ovary and fruit not papillose, but usually pubescent. Second half of spring. Mountain woods in Waterton. -- swAlta-BC, nwUS.

The anthers are clearly exserted in our var. oreganum and the style and ovary are commonly lanate. The stamens are included in the more southern typical phase and its style and ovary are usually glabrous.

18. STREPTOPUS Mx. TWISTED STALK

Flowers axillary and solitary or in 2's, but the peduncule twisted around the leaf-base, so that the flower appears to be borne under the leaf. Fruit a berry.

a. Flower rotate ..... 1. S. streptopoides
aa. Campanulate; plants larger.
b. Leaves sessile to subamplexicaul.... 2. S. roseus
bb. Deeply cordate at base ..... 3. S. amplexifolius

1. S. streptopoides (Led.) Frye & Rigg var. brevipes (Baker) Fassett -- Flower small, greenish with a purple center and 6 large white stamens. Glabrous, (0.5) -1.0-(2.0) dm high. Leaves sessile to nearly clasping. Peduncle at first straight, becoming geniculate. All spring to mid summer. Dense and wettish coniferous woods; rare: Swan Hills. --Aka, wcAlta-BC, (US).

In the typical phase from eastern Eurasia the leaves are ciliate. In ours they are eciliate and seemingly entire, but under an enlargement of about x 30 they will prove to be minutely crenulate-serrate because the marginal cells are strongly convex on their outer face.

2. S. roseus Mx. var. perspectus Fassett -- Caribou-Berry, Wild Cucumber (Rognons de coq) -- Herb once or twice dichotomously divided and bearing its flowers hidden under the leaves. Herbage ± hirsute. Leaves ciliate, more or less clasping. Peduncles recurved and somewhat hirsute. Late spring. Wet woods. --Aka, L-SPM, NS-Man, wAlta(Kakwa R.)-BC,US.

The peduncles are glabrous in the more southern var. roseus.

3. S. amplexifolius (L.) DC, var. americanus Schultes (var. denticulatus Fassett) -- Like the last, but glabrous and the peduncles strongly geniculate. Stem sometimes coarsely pilose on the 3 lowermost internodes. Leaves entire or more or less denticulate, deeply clasping. Flowers longer. Early summer. Wet woods. -G, swMack-(Y)-Aka, L-NF-(SPM), NS-O, S-BC, US, (Eur).

In southern British Columbia southward one may find a var. chalazatus Fassett in which the leaves are minutely papillose beneath.

It was pointed out by N.C. Fassett, Rhodora 37: 98-99. 1935 the correct name for the plants coarsely pilose on the lower stem internodes below the first branch is var. papillatus Ohwi. He adds: "such plants may occur anywhere throughout the range." When the large supply of Ontario sheets at TRT was sorted out according to leaf

ciliation, stem pubescence and their permutations, the four resulting piles were of about equal thickness. There was no evidence that either character could delimit a geographical variant. And obviously they were not linked.

Recently, Hitchcock 1969 has extended the range of chalazatus to Alberta and Alaska, but these extensions are discounted on the basis that var. chalazatus had been defined primarily in the sense of the earlier var. papillatus. There was no corresponding Alberta sheet at WTU and the two Alaska sheets (Kincaid on St. Paul and Hardy on Attu) have since been revised to var. americanus.

19. POLYGONATUM Miller SOLOMON'S SEAL

Tepals fused for over half their length. Plant otherwise typical of the family. Fruit a berry.

1. P. biflorum (Walter) Ell. (P. canaliculatum (Muhl.) Pursh; P. commutatum (R. & S.) Dietr.) -- Conquer-John -- Simple herb with broad leaves and drooping axillary umbels of (1)-2-(3) flowers. Flowers tubular, whitish, drooping, borne on a recurved peduncle. Early spring. Forests, usually Oak forests. --O-sMan-seS, US.

20. TRILLIUM L. WAKE-ROBIN

Leaves in a single verticil of 3. Flower single, typical of the family, but the sepals green. Fruit a berry.

1. T. cernuum L. (var. macranthum Eames & Wieg.) Sugarberry. -- Herb with a single verticil of 3 large squarrish-rhomboid leaves. Flower white, borne on a long deflexed peduncle and more or less hidden under the leaves. Berry red. Early summer. Low, deciduous woods. --NF-SPM, NS-ecS, US.

Because Trillium flowers keep on enlarging after opening, it has not been possible to delimit clearly and recognized readily a reputedly larger-flowered and more western var. macranthum.

Becomes quite rare in Saskatchewan where it is known from Hudson Bay Junction, Mistatim, Runnymede and Yorkton. A collection reported from further west at Fort Carlton (GH) has never been confirmed and is to be taken with a grain of salt. A Richardson collection labelled Mackenzie River (GH) is undoubtedly incorrect. Both of the latter were quoted by Macoun 1888 (as T. erectum var. declinatum) and in Rhodora 25: 191. 1923. Repeated by Porsild 1968.

T. ovatum Pursh was reported by Moss 1959 for Waterton, querried by Boivin 1967, repeated by Hitchcock

1969. The basis for the report is a photograph (ALTA) labelled "Found by R.H. Riggall, 1915, in Watertown Lakes Park, a small colony in deep shade. Pine-willow-aspen association, never found since." This has never been confirmed either as to locality or as to spontaneousness of occurrence. There is no voucher to check. The label data is not inconsistent with a deliberate introduction into the wild.

It has been our experience with unusual records that start as photographic evidence only, that they generally failed to progress from an initial preliminary report to a fully confirmed report. Hence our continued spepticism in all such cases.

A series of specimens at MTMG, including one of Trillium undulatum W., was collected in 1871 by I.S. Hargrave, supposedly at "St. Remi, Man." But the Saint Remi series does not to-day carry Hargrave's original labels and it comprises a number of other unlikely records; we speculate that they more likely came from "Saint-Rémi, Québec" and that the abbreviation "Man." may have been a speculative editorial accretion. Other series of Hargrave collections from Manitoba seem reliable as to location.

21. SMILAX L. GREEN BRIER

Dioecious climber by means of stipules modified into tendrils.

1. S. herbacea L. var. herbacea -- Carrion-Flower, Jacob's Ladder (Raisin de Couleuvre) -- Climber, 1-2 dm high, with paired tendrils. Leaves broadly cordate, glabrous, glaucous below. Flowers green in a long-pedunculate umbel. Peduncle overtopping the subtending leaf. Fruit deep blue with a glaucous bloom. Early summer. Woods, rare: Tompkins, Hudson Bay Junction. --NB-sO, S, US -- Var. pulverulenta (Mx.) Gray -- Lower face of the leaves green and shiny, often pubescent. Peduncles elongate as above. Fruit black. Very local: Big Muddy Lake. --wO, scS, (US) -- Var. lasioneuron (Hooker) A. DC. (var. lasioneura sphalm.; S. lasioneuron Hooker; Nemexia lasioneuron (Hooker) Rydb.) -- Densely pubescent below on the nerves with thick whitish hairs. Peduncle not longer than the subtending leaf. Fruit glaucous. Frequent in deciduous woods. --O-S, US.

The common variety is var. lasioneuron. The latter is the original spelling of the name and apparently represents a name in apposition; many authors have altered it to the adjectival form lasioneura, but we are not convinced that such a correction was called for.

Of the other two varieties, var. herbacea is generally more eastern in its distribution, while var. pulverulenta is generally more southern. Both varieties are highly isolated in our area and both are associated with some of the more outstanding physiographic features (see Boivin 1953) within our area.

The two known localities for var. herbacea, Tompkins and Hudson Bay Junction, are located respectively on the Coteau Boisé and the Coteau de Prairie. Both Coteaus are not so well known as the Missouri Coteau, but both are similar and outstanding physiographic features of the Prairie. Undoubtedly all tree Coteaus have played an important role in the history of the development of the vegetation of our area in postglacial times.

The Boisé Coteau arises in northeastern Montana near Plentywood, follows the Big Muddy Valley along its western side, enters Canada at Big Muddy, veers West-North-West towards Swift Current, then West-South-West towards the Bullshead Butte in southeastern Alberta. From east to west this Coteau stands out gradually more and more above the surrounding country, being about 200 feet high at the eastern end and about 2000 at its western end. Various sectors of the Coteau Boisé have received individual names such as Little Woody, Wood Mountain, Pinto Butte, Cypress Hill and Bullshead Butte. The Coteau is well know for its fairly rich Rocky Mountain element and this aspect was the object of a special study by Breitung 1954. But it also harbors a more limited eastern flora that finds its western limit of range among the numerous wooded gullies that cut into this Coteau. Such as Ulmus americana and the typical variety of Smilax herbacea. These wooded gullies are like so many ecological islands in a otherwise steppic environment and their alighment along the Boisé Coteau offer a natural migration path for eastern forest types.

The Prairie Coteau runs almost parallel to the Red River and somewhat to the west of it. It is quite in evidence in the U.S.A. at least as far south as Big Stone Lake. Its various Canadian elements have received individual names such as the Pembina Hills, Agassiz Delta, Riding Mountain, Duck Mountain, Porcupine Mountain and Pasquia Hills. Its role as a south-north migration path is briefly mentioned under Milium effusum. If these two Coteaus have, as we postulate, played a role in the westward and northward expansion of var. herbacea, one can reasonably expect to find additional isolated colonies of this variety at other spots along either or both Coteaus.

Var. pulverulenta is known in our area only from two collections within the Big Muddy Valley, one at Big

Muddy itself, at the southern end of the Big Muddy Lake, the other due south of Bengough, at the western end of the lake. Both came from small wooded ravines, and it is not clear whether this variety belongs here phytogeographically with the Hudson Coulee or with the Coteau Boisé as in this sector the Coteau Boisé follows closely the coulée, merely adding an extra 200 feet or so to the height or the western (or southern) escarpment of the coulée. The Hudson Coulée is a glacial drainage system located between the crest of the Missouri Coteau and the foot of the Coteau Boisé. South of Big Muddy, the Hudson Coulée is a simple channel which coincides with the valley of the Big Muddy River. But north of Big Muddy it forms an interconnecting dendritic pattern of fossil valleys occupied by a series of saline lakes, each forming the heart of an inland drainage basin, with Lake Chaplin at the northermost end of the chain. The role of these fossil coulées in the history of our vegetegion is still to be worked out in detail, with Sarcobatus vermiculatus as perhaps the most obvious coincident botanical element.

Incidentally, each of the 3 known Canadian specimens of var. pulverulenta is sterile.

Also worth mentioning is an old collection from Dufferin (TRT) made during the boundary survey of 1873. One sheet is typical of var. lasioneuron, but a second sheet is in intermediate, the leaves being glabrous as in var. herbacea while the peduncles are short as in var. lasioneuron.

Order 66. IRIDALES

As in the Liliales, but the ovary inferior.

120. IRIDACEAE IRIS FAMILY

Single family. Leaves equitant, that is folded longitudinally and the 2 upper halves fused face to face. Thus only the lower leaf face is visible, the leaves appear inserted edgewise on the stem and the rosette is conspicuously fan-like.

a. Petaloid appendages 9; flowers very large.... 1. Iris
aa. Appendages a normal 6; flowers much smaller...
..... 2. Sisyrinchium

1. IRIS L. IRIS

Flower with 9 petaloid appendages: 3 sepals, 3 petals and 3 enlarged styles.

a. Flowers yellow ..... 3. I. pseudacorus
aa. Blue.
b. Leaves over 1 cm wide ..... 1. I. versicolor
bb. Narrower ..... 2. I. missouriensis

1. I. versicolor L. var. versicolor -- Flag, Boats (Clajeux, Glaïeul de marais) -- Herb with very large blue flowers and leaves inserted edgewise. Up to 1 m high. Leaves ensiform, 1-2 cm wide, up to 3-7 dm long. Tepals up to 5-6 cm long. Early summer. Very wet places. -- seK, L-SPM, NS-seMan, US.

The typical phase found in our area is segragated by its ovary 1-2 cm long, elongating to 3-6 cm in fruit and a yellowish and finely papillose patch on the sepals. Grades into the more southern var. Shrevei (Small) Boivin with a longer ovary, 1.8-3.5 cm long, elongating to 5-10 cm in fruit and the yellow patch pubescent and more vividly contrasted.

2. I. missouriensis Nutt. -- Like the last but the leaves stiffer and norrower, their bases deep brown, marcescent and very crowded. 3-6 dm high. Leaves 1-4 dm high, 3-8 mm wide. Inflorescence bracts pale, often whitish. Early summer. Marshes and shores, rare: Carway, Whiskey Gap. --sAlta-wBC, US.

Seems native with us, but more likely to be an introduction in B.C.

3. I. PSEUDACORUS L. -- Water-Flag, Yellow Flag (Fleur de Lis, Flambe d'eau) -- Flowers yellow and very showy. Leaves 1-3 cm wide. Fruits drooping, much tapered at both ends. Early summer. Cultivated and possibly escaped to ditches in Saint-François-Xavier. --(NF), NS-PEI, Q-Man, BC, (US), Bur.

The only Manitoba locality could not be confirmed as to occurrence.

2. SISYRINCHIUM L. BLUE-EYED GRASS

Like a diminutive version of Iris, but the corrolla-like parts only 6 in number, the styles not being petaloid.

1. S. Bermudiana L. Var. Bermudiana (S. angustifolium AA.; S. campestre Bickn.; S. montanum Greene; S. mucronatum AA.; S. sarmentosum Suksd.; S. septentrionale Bickn.) -- Grass-Flower, Blue-eyed Grass (Bermudienne) -- A Grass-like herb with blue flowers. Tufted. Stems flattened and produced into a pair of opposite wings. Tepals blue, about 1 cm long, mucronate. Capsule light green to light brown or straw-coloured. Early summer. Wettish meadows. -- G, Mack-Y-(Aka), L-SPM, NS-BC, US-- F. albiflorum (J.W. Moore) Boivin -- Flowers white. -- (Man)-S-Alta, US.

Grades eastward into a var. crebrum (Fern.) Boivin, a more intensely coloured plant that tends to darken in

drying; bracts and spathes commonly purplish, at least at margin; capsule green, often blackening in drying.

The rejection of Sisyrinchium Bermudiana by Bicknell in 1896 does not seem to conform to our current Rules of Botanical Nomenclature. The linnean type, an excellent Kalm collection (LINN), is inscribed "Bermudiana 1 K", and clearly represents the typical phase of the linnean concept of the species. It is a specimen of what current manuals call S. montanum.

There is also much confusion between S. Bermudiana (or S. montanum) and S. angustifolium Miller; the latter a larger plant frequent around the Gulf of St. Lawrence. Some authors will apply S. Bermudiana to S. angustifolium or even to either species indifferently. Other authors will use S. angustifolium to designate S. Bermudiana. Our usage is coherent with Fernald 1950.

Order 67. AGAVALES

Root (or stem) woody. Tepals partly fused. Leaves all basal, long and very stiff, bayonet-like. Otherwise much as in the Liliales.

121. AGAVACEAE AGAVE FAMILY

Tepals fleshy and petaloid.

1. YUCCA L. SPANISH BAYONET

Tepals free. Coarse herbs of a rather distinctive habit.

1. Y. glauca Nutt. var. glauca -- Yucca, Soapweed -- Numerous Bayonet-like leaves in a basal hemispheric tuft, overtopped by the tall stem bearing bract-like leaves and a raceme of large yellow flowers. Stem about 1 m high. Leaves about 4 dm long, very stiff and very sharp-pointed. Early summer. Eroded steppes, local: Lost River Canyon in Onefour. -- scAlta, US.

In a more southern var. mollis Eng. the leaves are not so stiff, but more pliable, less involute and often a bit broader.

Order 68. HAEMODORALES

Resembles Liliales and Iridales, but the ovary is ± inferior and the perianth is partly fused into a single tube which is more or less pubescent on the outside.

122. HYPOXIDACEAE STARGRASS FAMILY

Leaves all basal, pubescent.

1. HYPOXIS L. STARGRASS

Anthers attached dorsally.

1. H. hirsuta (L.) Cov. -- Stargrass -- Small grass-like herb, pubescent, the yellow flowers pubescent on the outside. Perennial from a corm. Flowers few, umbellate or racemose, overtopped by the leaves. Early summer. Low meadows. -- swO-S, US.

FLORA

OF THE PRAIRIE PROVINCES

Bernard Boivin

Part IV -- MONOPSIDA

(continued)

ORCHIDACEAE-JUNCACEAE

Order 69. ORCHIDALES

Flower strongly zygomorphic. Ovary inferior. Stamens only 1-2. Pollen aggregated in pollinia.

123. ORCHIDACEAE ORCHID FAMILY

Single family. Style and anthers fused into a complex organ termed gynostegium. Stamen(s) usually not obvious.

a. Flower single, or exceptional individuals with 2-(3) flowers.
  b. Leaves 2 or more and in most cases cauli-nary..... 1. Cypripedium
  bb. Only one leaf.
    c. Leaf long linear and developing tardi-ly..... 4. Arethusa
    cc. Leaf ovate ..... 12. Calypso
aa. Inflorescence a raceme.
  d. Leaves 2, opposite..... 6. Listera
  dd. Alternate or all basal.
    e. Lower petal spurred.
      f. Flower cruciform, the upper 3 ap-pendages overlapping; leaf only one, basal, ± obovate ..... 2. Orchis
      ff. Flower stelliform, the appendages divergent ..... 3. Habenaria
    ee. No spur. Sometimes obscurely spurred in Corallorhiza.
      g. Leaves numerous.
        h. No rosette, all leaves cauline and bract-like ..... 9. Corallorhiza
        hh. Leaves dimegueth, the main ones basal and large, the cauline much reduced and bract-like.
          i. Lip flattish; rosette leaves lanceolate to linear..... ..... 5. Spiranthes

ii. Lip becoming ± hemispheric towards the base; rosette leaves ± ovate... ..... 7. Goodyera

gg. Leaves only 1-2. Scape bractless.

j. Flowers 4-5 mm wide and greenish ..... 10. Malaxis

jj. Larger, 1-4 cm across.

k. Leaves 2 ..... 11. Liparis

kk. Only 1 .....8. Calopogon

1. CYPRIPEDIUM L. LADY'S SLIPPER

Flowers large and very showy with the lip inflated and mostly egg-shaped. Stamens 2 (only 1 in our other genera).

a. Leaves only 2, basal..... 3. C. acaule

aa. Stem leafy.

b. Flower with a lip and 5 other appendages; lip odd-shaped..... 1. C. arietinum

bb. Only 4 other appendages due to the fusion of the lower 2 sepals; lip ± egg-shaped.

c. Lip white or yellow.

d. Lip white, 1.8-2.5 cm long..... ..... 5. C. candidum

dd. Yellow, 2-5 cm long.....4. C. Calceolus

cc. Pink or purple or at least spotted or striped in pink or purple.

e. Lip ± 18 mm long, the other appendages shorter..... 6. C. passerinum

ee. Flower larger, the lip 2-5 cm long, the other appendages 2.5-7.0 cm.

f. Other appendages white, flat .. .. 2. C. reginae

ff. Deep green to purple brown and twisted ..... 7. C. montanum

1. C. arietinum Br. (Criosanthes arietina (Br.) House) -- Ram's Head -- Lip whitish, heavily veined in purple, mostly 1.5 cm long and ± conical or pyramidal. Leaves 3-4-(5), borne in the upper half of the plant, lanceolate to broadly linear. Herbage thinly pubescent, eglandular. Early summer. Woods; rare and highly localized from Prince Albert eastward. --NS, Q-cS, US, (Eur).

2. C. reginae Walter (C. hirsutum AA.) -- Lady's Slipper, Showy Lady's Slipper -- A large and most handsome white flower with a pink, egg-shaped lip. Leaves 5-10, elliptic. Herbage soft hirsute. Lip 2.5-5.0 cm long, with pink-red dots and wide stripes on a whitish base. Other appendages not twisted. Early summer. Wooded bogs. --NF, NS-Man, US.

3. C. acaule Aiton (Fissipes acaulis (Aiton) Small) -- Lady's Slipper, Mocassin-Flower (Sabot de la Vierge) -- Herb with two large basal leaves and a single, large, reddish flower. Lip 4-6 cm long, irregularly egg-shaped, with a closed cleft along the upper side. Other appendages not twisted. Early summer. Sandy Coniferous woods. --NF-SPM, NS-Alta, US.

It is customary to extend the range north to Mackenzie on the basis of a Richardson collection labelled Great Bear Lake (GH). But this has never been confirmed and it now looks like the locality could have been in error.

4. C. Calceolus L. var. parviflorum (Sal.) Fern. (C. parviflorum Sal.) -- Lady's Slipper, Yellow Lady's Slipper (Sabot de la Vierge) -- Lip yellow, the other appendages brownish and twisted. Stem leaves 3-6, ovate. Herbage glandular-pubescent. Lip 2-3 cm long. Upper sepal 2.5-4.0 cm long. Twisted petals 3-5 cm long. Fruit on a stipe 0.7-0.8 cm long. Early summer. Moist woods or prairies. --Mack-(Y), NF-SPM, NS, NB-BC, US -- Var. pubescens (W.) Correll -- Larger throughout. Lip 3-5 cm long. Upper sepal 4-7 cm long. Twisted petals 5-9 cm long. --NS-sMan, US.

Despite a number of reports to the contrary, var. pubescens does not seem to extend west of Manitoba and all more western specimens examined proved to belong to var. parviflorum.

4X. C. Andrewsii A.M. Fuller -- Hybrid with the next. Lip yellowish. Floral appendages intermediate in size, mostly around 3 cm long. Rare: Brandon. --swO-swMan.

5. C. candidum Muhl. -- Lip white to lightly mauve-tinged, 2 cm long. Herb 2-4 dm high and glandular-pubescent. Other appendages green, + brown-tinged. Upper sepal 2-3 cm long, lanceolate. Twisted petals 2.5-3.5 cm long. Fruit on a stipe 1.5-2.0 cm long. Early summer. Wet prairies, very rare: Woodlands, Brandon, Aweme, Indian Head. --swO-seS, US.

6. C. passerinum Rich. var. passerinum -- Lip creamy-white with large magenta dots. Herbage villous-pubescent, not glandular. Upper sepal 1.5-2.0 cm long, ovate, pale green; lower sepals slightly shorter and nearly completely fused. Lateral petals 1.0-1.5 cm long, flat, whitish. Fruit on a stipe 1.5-2.0 cm long. First half of summer. Wet places, especially flood-plain forests, in northern and low arctic woods. -- (K)-Mack-Aka, O-BC.

In an eastern endemic of Mingania, var. minganense Vict., the calyx is shorter, the upper sepal only 9-13 mm long and the lower appendage (or fused sepals) 7-10 mm long.

7. C. montanum Douglas -- Much like C. Calceolus, but the lip white with purple veins. Herbage glandular-pubescent. Flowers (1)-2-(3). Lip ± 2.5 cm long. Other appendages 3.5-7.0 cm long. Terminal fruit on a stipe usually less than 1 cm long. Late spring to early summer. Wet mountain woods: Waterton. --(Aka, swAlta)-BC, US.

2. ORCHIS L. ORCHIS

Like the next, with a spurred lip, but the upper appendages connivent or connate, the flower thus cruciform. Translators hidden in a small receptacle.

1. O. rotundifolia Banks -- Flower cruciform, mauve in bud, becoming white, with the lip dotted in purple. Leaf only one, orbicular to elliptic. Lip 8-11 mm long, emarginate to bilobed at tip, with a pair of small lobes near the base; other appendages white. First half of summer. Wet woods. --(G, K)-Mack-Aka, NF, NB-BC, US -- F. lineata (H. Mousley) E.G. Voss -- Dots on the lip much larger and confluent into a pair of longitudinal lines. Local: Cypress Hills. --wO, seAlta -- F. Beckettiae Boivin -- Lip white and dotless. Local: Churchill. --Man.

F. Beckettiae was also reported for Jasper by Moss 1959, querried by Boivin 1967. In 1971 there was no such albino on file at ALTA.

3. HABENARIA W. FRINGED ORCHIS

Lip prolonged at base into a spur. Perianth parts 6, mostly radially disposed.

a. Leaves all basal.
  b. Only one leaf. (See also Orchis)...8. H. obtusata
  bb. 2 or more leaves.
    c. Leaves linear-spatulate to oblanceolate.....5. H. unalascensis
    cc. Broader, orbicular to broadly oblong.
      d. Scape bearing many bracts .... 7. H. orbiculata
      dd. With only 1 bract or none..... ..... 6. H. Hookeri
aa. At least 1 stem-leaf present.
  e. Spur short; lip bidentate at tip... 1. H. viridis
  ee. Spur nearly as long as the lip, the latter entire at tip.
    f. Flowers white; lip abruptly broadened at base..... 4. H. dilatata

ff. Flower greenish; lip linear or gradually tapered at base.
g. Spur of uniform thickness..... ..... 2. H. hyperborea
gg. Spur 2-3 times thicker toward the tip than at base..... 3. H. saccata

1. H. viridis (L.) Br. var. bracteata (Muhl.) Gray (H. bracteata (Muhl.) Br.; Coeloglossum bracteatum (Muhl.) Parl.) -- Frog-Orchid -- Flowers all or mostly overtopped by a subtending bract. Stem leafy, the leaves + lanceolate. Flower greenish, the lip darker. Spur 2-3 mm long, somewhat less than half as long as the ligulate lip. Early summer. Wettish woods. --seK-Mack-(Y)-Aka, NF, NS, NB-BC, US, (Eur).

Also the lower bracts are 2-6 times longer the flowers and the lip is bidentate at tip. By way of contrast, the alaskan and paleogean typical var. viridis has a tridentate lip and shorter bracts, the upper and middle bracts being shorter than the flowers while the lower bracts are less than twice as long as the flowers.

There is no morphological gap between these two varieties and intermediates will turn up here and there throughout the range. Such intermediates are often called var. interjecta Fern. if neogean, or var. Vaillantii (Ten.) Fern. if paleogean.

2. H. hyperborea (L.) Br. (var. huronensis (Nutt.) Farw.; Limnorchis viridiflora AA.) -- Marsh-Lily, Smelling Bottles -- Similar to the first, but the bracts shorter and the spur longer. Bracts overtopped by the flowers, or the lower slightly longer. Flower greenish, including the lip, the latter lanceolate, entire, somewhat longer than the curved spur. Early summer. Very wet places. -- G,K-Aka, L-SPM, NS-BC, US, Eur.

3. H. saccata Greene var. saccata -- Spur much thicker towards the tip. Otherwise quite similar to the last. Perianth two-toned or bicolour, the sepals light green, the petals paler or purplish. Lip linear, entire. Spike usually laxer than in the first two species. First half of summer. Boggy places and subalpine meadows in Waterton and Carbondale River --Aka, swAlta-BC, US.

The alaskan var. gracilis (Lindley) Boivin has a thinner spur, almost filiform, and not thickened toward the tip.

4. H. dilatata (Pursh) Hooker var. dilatata (var. albiflora (Cham.) Correll; Limnorchis dilatata (Pursh) Rydb.) -- Bog-Lily, Perfume-Willow (Vanille) --

Flower white, otherwise similar to the first 3. Spur filiform, 4-10 mm long, commonly about as long as the lip, the latter lanceolate from a broad base. Mid summer. Wet meadows and bogs. --(G), seK-(Mack)-Y-Aka, L-SPM, NS-BC, US, (Eur).

Commonly subdivided into three varieties, mainly on a size basis, and especially of the length of the spur. The typical phase is average and its spur is about as long as the lip. Var. albiflora is a smaller plant, smaller flowered, the spur only 5 mm long or less. In the other extreme, var. leucostachys (Lindley) Ames, the spur is 1-2 cm long and 1½-2 times longer than the lip. All three varieties have been reported to range from western U.S.A. north to Alaska.

Var. albiflora is an uncommon type of sporadic occurence and appears to be of no particular significance; we have submerged it.

Var. leucostachys appears to be better defined and is probably restricted geographically to the western U.S.A. and adjacent B.C. Alaskan reports were discounted by Hultén 1943 and with this we concur as all specimens at DAO, CAN (in 1966) and WTU (in 1969) were revised to var. dilatata. Similarly most B.C. reports are to be discounted, but three (V) of the numerous collections examined did prove referable to var. leucostachys. In many of the specimens examined the lip was quite short, 5-6 mm only and the spur much longer, 8-11 mm long; we have placed all such specimen in dilatata despite the relative proportions of the spur and the lip. We have restricted the use of var. leucostachys to those specimens where the spur not only averaged clearly over 1 cm, but also was much longer than the lip. It is only when both criteria are applied together that var. leucostachys becomes a significant segregate of limited range.

5. H. unalascensis (Sprengel) Watson var. unalascensis -- Like the previous 4 but the leaves all basal and the stem merely bracteolate. Flowers small. Perianth segments 2-4 mm long. Spur from nearly as long to almost twice as long as the lip. Mid summer. Mountain woods. -- Aka, (Q)-O, (Alta)-BC, US, (CA).

In the more western var. elata (Jepson) Correll the spur is commonly 1.0-1.5 cm long and at least twice as long as the lip.

6. H. Hookeri Torrey var. Hookeri -- Solomon's Plaster -- With two large suborbicular basal leaves. Scape naked or nearly so. Basal leaves 5-10 cm long.

Spur 1.5-2.5 cm long and longer than the ovary. Lip 8-12 mm long. Ovary and fruit short stipitate. Sepals glabrous, the upper ovate-lanceolate, somewhat attenuate at tip. Early summer. Wettish woods. --SPM, NS-seMan, US.

The newfoundlander var. abbreviata Fern. is a generally smaller plant, its spur only 0.9-1.5 cm long.

7. H. orbiculata (Pursh) Torrey var. orbiculata (Plantanthera orbiculata (Pursh) Lindley) -- Heal-all -- Quite similar to the last but larger throughout and the upper sepal deltoid-ovate. Basal leaves usually 10-15 cm long, suborbicular, lying flat on the ground. Spur 1.5-3.0 cm long. Ovary and fruit on a stipe at least 5 mm long. Lip 10-15 mm long. Lateral sepals densely papillose or puberulent on the inner side. Early summer. Coniferous woods; uncommon.--Mack, (Aka, L)-NF-SPM, NS-nS-nAlta-BC, US.

The three known Alberta collections are from Faust and Whitecourt (ALTA). These specimens are somewhat smaller than the average for the species and thus somewhat intermediate to the eastern var. Lehorsii Fern. The latter, a Newfoundland and Saint-Pierre & Miquelon endemic, is a generally smaller plant, the stipe shorter, 2-4 mm in flower, spur only 0.8-1.5 cm long. In another eastern variant, var. macrophylla (Goldie) Boivin, the plant is generally larger and the spur 3-5 cm long.

The range of var. orbiculata was extended to Yukon by Correll 1950, repeated by Szczawinski 1959, Hitchcock 1969, querried by Boivin 1967, ignored by Hultén 1943 and 1968. No justifying sheet could be located in the Ames herbarium or at V, UBC, WTU or elsewhere.

8. H. obtusata (Banks) Rich. var. obtusata (var. collecteana Fern.; Lysiella obtusata (Pursh) Rydb.) -- With a single leaf, basal and broadly oblanceolate. Scape 1-3 dm high, bractless. Floral bracts shorter than the flowers. First half of summer. Mossy woods and bogs. --sK-Aka, L-SPM, NS-(PEI)-NB-BC, US.

The eurasian vicariant, var. oligantha (Turcz.) stat. n., Platanthera oligantha Turcz., Fl. Baic, Dah. 2,2: 182. 1856, is usually a smaller plant with a shorter lip, only 3.0-3.5 mm long.

Previous reports of H. psychodes in southeastern Manitoba were discounted by Scoggan 1957. We have also seen a photograph (DAO), reportedly from the Whiteshell Forest Reverve, of what might be the white form of H. psychodes. However the photo does not lend itself to posi-

tive identification and we consider the occurrence of this species in our area is not yet conclusively demonstrated. See also our comment about photographs under Trillium ovatum.

4. ARETHUSA L. ARETHUSA

Lip partly adnate to the petaloid column. Sepals petaloid and quite similar to the lateral petals.

1. A. bulbosa L. -- Snakehead, Swamp-Pink -- A small herb almost reduced to its single, large showy, deep pink flower. Stem 1-4 dm high, bearing 2-4 bladeless sheaths, at first leafless, later developing a single grass-like leaf. Flower 4-6 cm long, zygomorphic, arched to one side. Lip spotted in purple. First half of summer. Bogs; rare. --L-SPM, NS-S, US.

5. SPIRANTHES Richard LADIES'TRESSES

Resembles Goodyera, but the lip flat and entire. Flowers borne in vertical rows, the inflorescence a ± twisted spiciform raceme.

a. Flowers in a single vertical row..... 1. S. lacera
aa. Flowers larger and in 3 rows.....2. S. Romanzoffiana

1. S. lacera Raf. var. lacera (S. gracilis (Big.) Beck) -- Twisted Stalk -- Flowers spreading horizontally and conspicuously disposed in a single, twisted, vertical row. Herbage glabrous or nearly so. Leaves all basal, ± ovate. A very gracile herb. Stem thin and elongate, merely bracted. Perianth about 4 mm long, white but with a green stripe down, the center of the lip. Mid summer. Uncommon in sandy places. --NS-cS, US.

Two other varieties occur further south. Var. brevilabris (Lindley) stat. n., Spiranthes brevilabris Lindley, Gen. Sp. Orch. Pl. 471, 1840, is quite pubescent, especially so in the inflorescence, the rachis withish pubescent. And in var. floridana (Wherry) stat. n., Ibidium floridanum Wherry, Journ. Wash. Ac. Sc. 21: 49. 1931, the raceme is not twisted or only slightly so, and the stripe on the lip is yellow.

2. S. Romanzoffiana Cham. var. Romanzoffiana -- (Réséda sauvage) -- A conspicuously twisted spike of white flowers. Much coarser than the first. Basal leaves narrowly lanceolate to linear. Stem leaves similar but smaller. Flowers crowded. Perianth 8-12 mm long. Mid summer. Bogs and sandy places. --Mack-Aka, L-SPM, NS-BC, (US, Eur).

The typical phase is glandular-pubescent at least in the inflorescence, as contrasted with var. porrifolia

(Lindley) Ames & Correll of western U.S.A., a glabrous plant with a more clearly panduriform lip, the terminal segment being about as large as the basal ones.

6. LISTERA Br. TWAYBLADE

Leaves 2, opposite. Lip bifid at tip.

a. Plant glabrous at least in the inflorescence .. .. 1. L. cordata
aa. Glandular-pubescent, at least above.
b. Lip entire or barely emarginate at tip ... . 4. L. caurina
bb. Obviously bilobed to bifid.
c. Lip narrowed to a sessile base .... 3. L. convallarioides
cc. Cordate-clasping at base ..... 2. L. borealis

1. L. cordata (L.) Br. var. cordata -- Tway-Blade -- Flower smallest, the lip 3-5 mm long and bifid for about half its length. Leaves deltoid-ovate, often subcordate. Flower greenish and more or less purplish-tinged, especially the lip, the latter with narrowly lanceolate terminal lobes. Early summer. Boggy woods. --G, seK-swMack-Aka, L-SPM, NS-BC, US, Eur.

In a more western variant the flower is merely pale green, not at all tinged in red: var. nephrophylla (Rydb.) Hultén.

2. L. borealis Morong -- A delicate herb with a pair of opposite leaves and a terminal raceme of greenish flowers. Leaves ovate to narrowly elliptic. Rechis glandular-pubescent; pedicels and ovaries glabrous or nearly so. Lip 8-12 mm long, with a pair of terminal lobes about as wide as long. Early summer. Moist Spruce forests. --(K)-Mack-Y-(Aka, NF), seQ-neO-nMan-BC, wUS.

3. L. convallarioides (Sw.) Torrey -- Much like the last, but the lip long cuneate at base. Leaves orbicular to broadly ovate. Rachis pedicels and ovaries densely glandular-puberulent. Lip 8-12 mm long, with a pair of terminal lobes about as long as wide. First half of summer. Boggy coniferous woods. --(Aka), NF-SPM, NS-O, (Alta)-CB, US, (Eur).

The correct bibliographic reference for this name is Torrey, Comp. Fl. N. Midl. States 320. 1826. In an earlier usage by Nuttall, Gen. N. Am. Pl. 2: 191. 1818, it was only a nomen nudum.

4. L. caurina Piper -- Resembles the last two, but the lip shorter. Leaves ± ovate. Rachis and pedicels glandular-puberulent; ovary glabrous or nearly so. Lip 5-6 mm long, dilated above the middle into a ± obo-

vate or flabellate upper half. First half of summer. Shaded coniferous woods in Waterton --seAka, swAlta-BC, US.

7. GOODYERA Br. RATTLESNAKE-PLANTAIN

Lip deeply concave in the lower half.

a. Perianth 3.5-4.0 mm long..... 1. G. repens
aa. Herb larger throughout, the perianth 6.5-8.0 mm long..... 2. G. oblongifolia

1. G. repens (L.) Br. var. repens (Epipactis repens (L.) Crantz) -- Adder's Tongue (Herbe écartante)-- Small herb with a basal rosette, a bracteate scape and a secund spike of white flowers. 1-3 dm high. Leaves ovate, 1-3 cm long, without white markings. Mid summer. Spruce woods. --Mack-Aka, Man-BC, Eur -- Var. ophioides Fern. (G. ophioides(Fern.) Rydb.) -- Lateral nerves outlined with a double white line. --Aka, L-SPM, NS-ne Alta-BC, US.

Most Alberta specimens are clearly var. repens; a few transitional collections also come from the northeast section. One collection, Dumais & Anderson 3833, Ft. McMurray (ALTA), is clearly referable to var. ophioides and is the only one of its kind that we have seen from Alberta. We have been unable to confirm any of the earlier Alberta reports of var. ophioides.

From repens to ophioides the transition is gradual and occurs over a rather wide area. Ours is the area of transition. East of us the white lines are obvious and all specimens are referable to var. ophioides. West and north of us, nearly all specimens have solid green leaves. But a few collections from B.C. and Alaska are just as strongly lined in white as the average eastern plant and are indubitably to be filed with var. ophioides. The Mackenzie collections are essentially referably to var. repens, but in the more southern reaches (such as Port Smith or Le Grand Détour) one may find the odd individuals or single leaves weakly lined in white; these could justifiably be regarded as transitional to var. ophioides.

Despite a number of reports, it seems doubtful that var. ophioides occurs in Yukon as all specimens seen belonged to var. repens. At S five sheets turned up under var. ophioides, but were all revised to var. repens. Two of the five sheets were duplicates distributed from Harvard, which may account for the report by Correll 1950, while the other three were among the specimens cited by Porsild 1951, which may account for the latter's report.

G. tesselata Lodd. as reported for Manitoba by Dugle 1969 was based on a collection of G. repens var. repens from Pine Point (PINAWA).

Repeated reports of G. tesselata from our area are no doubt partly related to the poor quality of the morphological discontinuity between G. repens and G. tesselata. This was briefly commented upon by Correll 1950, who noted the existence of intermediates in the Great Lakes area. Case 1964 regarded these as hybrids and remarked "numerous intermediate forms were present in nearly every station where I have found the two together". Returning from an expedition to the Tusket islands, J.S. Erskine (in litt.) reported that "a large patch of Goodyera will yield specimens that vary from repens to tesselata".

Reviewing the material at hand, quite a few specimens cannot be assigned clearly to either taxon and the odd sheet will bear a mixture of both taxa, confirming the observations of Case and Erskine. Checking each diagnostic character, all fail equally. Therefore a realistic reappraisal of their taxonomy calls for the following subordination of G. tesselata to G. repens.

Var. repens. 1-2 dm high. Rosette leaves typically ovate or broadly ovate, (1)-2-(3) cm long, (0.7)-1.2-(1.8) cm wide, the midnerve not outlined in white. Raceme strongly secund. Perianth 3.5-4.0 mm long, the tepals becoming more or less squarrose at tip. Lip strongly gibbose at base, the gibbosity tending to be deeper than wide, abruptly contracted into a point which at first is spreading horizontally, soon becoming strongly reflexed. Ovary somewhat longer than the perianth in flower, elongating to 5-7 mm in fruit. -- From Labrador west to Alaska, south to North Carolina, regularly intergrading with the next in their area of sympatry.

Var. tesselata (Lodd.) stat.n., G. tesselata Lodd., Bot. Cab. 10: pl. 952, 1824. Averaging larger throught, 1.5-3.5 dm high. Leaves typically ovate-lanceolate, 2.0-4.5 cm long, 1-2 cm wide, the midnerve weakly and interruptedly outlined in white. Raceme varying from barely secund to strongly so. Perianth 4-5 mm long, the tips of the tepals remaining parallel, or the lateral sepals becoming sometimes squarrose. Lip less strongly gibbose, the gibbosity mostly somewhat longer than deep, the acumen straight and remaining so. Ovary 7-10 mm long in flower or in fruit. -- From Newfoundland to Ingolf in Western Ontario, south to New York State and, interruptedly, to Maryland.

Var. tesselata being known from Ingolf (DAO) just across from our borders, it is to be expected in adjacent Manitoba.

2. G. oblongifolia Raf. var. oblongifolia (G. decipiens (Hooker) Hubbard; Epipactis decipiens (Hooker) Ames) -- Rosette leaves with a heavy, double white line along the midnerve. Stem 2-4 dm high. Leaves 3.5-7.0 cm long, oblong to oblong-lanceolate, without white markings along the lateral nerves. Raceme less secund. Mid summer. Montane Pine woods: Cypress Hills and Rockies. -- (Aka), NS, (NB)-Q-O, swS-BC, US.

A remarquably disjunct species.

On Vancouver Island and adjacent Oregon one may find var. reticulata Boivin, a generally taller plant, 3.5-6.5 dm high, its basal leaves decorated with a fine reticulum in white.

8. CALOPOGON Br.

Lip borne uppermost, as if the flower was inverted.

1. C. tuberosus (L.) BSP. var. tuberosus (C. pulchellus (Sal.) Br.) -- Grass-Pink, Swamp-Pink -- Scapose herb with about 3 large, showy, red flowers and a single, grass-like, basal leaf. 2-5 dm high. Perianth parts 1.5-2.0 cm long. Lip with a conspicuous yellow beard. First half of summer. Wet bogs: Vivian. -- NF-SPM, NS-seMan, US.

In our typical phase the leaf is ± linear and overtopped by the stem. Var. latifolius (St. John) Boivin is a somewhat smaller plant, not over 2 dm high, bearing a relatively larger leaf, the latter rather lanceolate and equalling or overtopping the stem. It is a highly restricted costal plain variant barely surviving on two insular emergences, Sable Is. and Magdalen Is., of the largely submerged northern costal plain.

Current fashion favors Calopogon pulchellus as the scientific name of the "Grass-Pink", apparently in disregard of the International Code of Botanical Nomenclature. This was clearly pointed out by K.K. Mackenzie in Rhodora 27: 193-6. 1925. Briefly, the synonymy and argument are as follows.

Calopogon pulchellus Br. 1813 is based on Cymbidium pulchellum W. 1805, which is based on Limodorum pulchellum Sal. 1796, which is based on Limodorum tuberosum L. 1753.

Because Salisbury changed the epithet from tuberosum to pulchellum without valid reason, Limodorum pulchellum is an illegitimate name (Art. 63). By the same article Cymbidium pulchellum and Calopogon pulchellus are also illegitimate because their authors failed to adopt the earlier epithet of which they were obviously aware. Being illegitimate, neither of these three names can be used as the correct name of the "Grass-Pink" or anything else. Having now eliminated Calopogon pulchellus, what is the correct name of the "Grass-Pink"?

The synonymy given by Correll 1950 and many others implies that Limodorum tuberosum does not refer to the "Grass-Pink". If this were true then neither would Calopogon pulchellus refer to the "Grass-Pink", since the one name is ultimately based on the other. Article 7 covers this case: "an epithet which was nomenclaturally superfluous when published is automatically typified by the type of the epitbet which ought to have been adopted". Hence Correll's synonymy is not tenable in any case. The two other names involved are mere transfers.

And what about this apparently prevailing view that Limodorum tuberosum does not refer to the "Grass-Pink"? Is it justified?

The linnean protologue of L. tuberosum encompasses two taxa; namely the "Grass-Pink" and a West Indian species of Bletia. Such heterogeneity is not in itself grounds for rejecting a name. The Code provides criteria and procedures by which the application of such names can be restricted to a single element and a proper type selected. And the present case is a relatively simple one.

Mackenzie demonstrated conclusively that the main element of the linnean protologue is obviously the "Grass-Pink". The other element is out of range, contributed little if anything to the linnean descriptions, and is only superficially similar to the "Grass-Pink". This is unambiguously corroborated by the Linnean herbarium where only two sheets are to be found under Limodorum. A photograph of the first one, number 1058.1, is before me. It is a Kalm specimen inscribed "tuberosum I" in Linné's script; it is a characteristic specimen of the "Grass-Pink" in flower.

The other specimen, number 1058.2, is inscribed Limodorum altum in Linné's script and is referable to a species published in 1767 in the 12th edition of the Systema. It is a species of Bletia and not obviously relevant to the typification of the "Grass-Pink".

Since only sheet 1058.1 fits the linnaean protologue, it should undoubtedly be regarded as the type of

the species and tuberosus is the correct epithet to use for the "Grass-Pink".

We are not aware that Mackenzie's paper provoked any kind of reaction, except perhaps a faintly disparaging comment by Weatherby in Rhodora 28: 139. 1926. After discussing the typification of some Solidago Weatherby added: "In the similar case of Limodorum tuberosum Mr. Mackenzie chooses what corresponds to the former alternative; in this instance he adopts the latter -- without, as it appeared to me, arriving at any conclusive results." But Weatherby did not actually try to counter Mackenzie's argument or find fault with his premisses. Nor has anybody else tried to do so, to our knowledge. Mackenzie's argument seems quite sound and in accord with our present Code; we know of no valid reason not to accept his conclusions.

9. CORALLORHIZA Châtelain CORAL-ROOT

Parasitic herbs with the leaves reduced to bladeless sheaths.

a. Tepals heavily lined in purple..... 3. C. striata
aa. Flowers smaller and merely spotted in purple.
b. Plant and flowers greenish..... 1. C. trifida
bb. Purplish..... 2. C. maculata

1. C. trifida Châtelain -- Coral-Root -- Greenish and smaller-flowered than the next two. Sometimes somewhat tinged in purple. Lip 4-5 mm long, white, usually dotted in purple, not spurred. Capsule 8-12 mm long, drooping. Early summer. Parasitic on roots of woody plants. --G, K-Aka, L-NF-(SPM), NS-BC, US, Eur.

2. C. maculata Raf. -- Dragon's Claws -- A simple purplish herb, leafless, with a raceme of purplish flowers. Lip 6-8 mm long, white, punctate in purple, with an inconspicuous spur 1-3 mm long, partly adnate to the ovary. Capsule 15-25 mm long. Early summer. Aspen and Pine Woods. --NF-(SPM), NS-BC, US, (CA).

Near the Pacific coast it is largely replaced by var. occidentalis (Lindley) Cockerell, a variant with a more open flower, ± rotate, the lower tepals descending or reflexed; the column longer, barely shorter than the lip; the spur more obvious being only partly imbedded in the ovary tisue and proeminent by ± 1 mm.

3. C. striata Lindley -- All perianth parts heavily lined longitudinally in purple. Tepals 10-14 mm long, the lip more deeply coloured. No spur. Capsule 12-20 mm long. Early summer. Rich woods. --Q-BC, US -- F. fulva Fern. (C. ochroleuca AA.) -- Herbage and perianth yellowish. Cypress Hills. -- (seQ, swS)-seAlta.

The albino f. fulva may be identical with Rydberg's C. ochroleuca, but this point needs a close check as Rydberg's description indicates a plant rather similar to the more southern C. Wisteriana Conrad. However, conflicting opinions on the subject do not affect the correct name of our plant; only its geographical range remains in doubt.

10. MALAXIS Sw. ADDER'S MOUTH

Lateral petals narrow, nearly filiform. Habitally similar to Listera, but glabrous and the leaves all basal or only one. Lip elongate.

a. Leaves 2 or 3, all basal..... 1. M. paludosa
aa. Leaf solitary, cauline.
b. Lip acute, entire..... 2. M. monophyllos
bb. Deeply bifid at tip..... 3. M. unifolia

1. M. paludosa (L.) Sw. -- Bog-Orchid -- Small herb with 2-3 basal leaves and a scape bearing a raceme of greenish and erect flowers. Flowers small. Sepals 2-3 mm long, lanceolate. Lip 1.5 mm long, entire. Mid summer. Rare in Black Spruce bogs: McKague, Glenevis. -- Mack, Aka, wO, cS-cBC, (ncUS), Eur.

2. M. monophyllos (L.) Sw. var. brachypoda (Gray) F. Morris (M. brachypoda (Gray) Fern.) -- Similar to the first, the leaf solitary and appearing cauline because of a long sheathing base. Pedicels nearly erect. Lip 2-3 mm long, entire, deltoid-orbicular and contracted into a long, lanceolate tip. First half of summer. Boggy woods, rare or overlooked. --(Aka, NF), NS, (NB)-Q-wBC, US, (Eur).

The first known Saskatchewan sheet comes from Lake Waskesiu (SASK). It was originally identified as M. unifolia and was the source of the incorrect entries under this name in the earlier provincial lists.

In the Orchids the larger petal, termed lip, arises uppermost but is normally borne lowermost as a result of a half twist of the ovary and pedicel. Our var. brachypoda exhibits this normal torsion, but the alaskan and typical phase of the species lacks any such twist and the lip is then borne uppermost.

3. M. unifolia Mx. (Microstylis unifolia (Mx.) BSP.) -- Raceme lax below, becoming very dense at the tip. Pedicels widely spreading. Lip about 2 mm long, nearly squarrish, deeply bifid. Mid summer. Wet woods, rare. --L-NF-(SPM), NS-O-(Man), US.

11. LIPARIS Richard TWAYBLADE

Similar to Malaxis, lateral petals narrow, etc., but the lip broad, squarrish to oblong. Leaves 2, basal.

1. L. Loeselii (L.) Richard -- Fen-Orchid -- Small herb with 2 basal leaves and a raceme on a short scape. Leaves broadly lanceolate. Flower pale green. Early summer. Springy places and bogs, uncommon. --NS-O-(Man)-cS, US, Eur.

12. CALYPSO Sal. CALYPSO

Lip very strongly differentiated, the other appendages petaloid and not obviously differentiated into sepals and petals. Flower solitary.

1. C. bulbosa (L.) Oakes var. bulbosa (Cytherea bulbosa (L.) House) -- Venus' Slipper -- Single-leaved herb with a single, large and very showy red flower. Leaf ovate. Lip about 2 cm long, vaguely shoe-shaped, whitish with abundant purple veining, yellowish at tip and with 3 rows of yellow hairs. Other appendages 1.5-2.0 cm long, pink, lanceolate. Late spring and early summer. Bogs and wet coniferous woods, infrequent. -K-Aka,(NF, NS), NB-BC, US, Eur.

In the more western var. occidentalis (Holz.) Boivin the lip is bearded in white.

Aplectrum hyemale (Muhl.) Torrey was reported (as A. spicatum BSP.) from Norway House to Cumberland House by Hooker 1839, repeated by various later authors, but discounted by Scoggan 1957 and Breitung 1957. The justifying sheet (K) is labelled: Dr[ummond], between N[ew] Y[ork] and C[umberland] H[ouse]. In all likelihood this specimen came from the more eastern part of the stated region of collection, and Norway House may be a misreading of the abbreviation NY.

Order 70. JUNCALES

Basically as in the Liliales, but the perianth reduced to chaff-like bracts. Flowers 3-merous. Grass-like in habit.

124. JUNCACEAE RUSH FAMILY

The basic and unreduced type of the order.

a. Seeds numerous; plants glabrous..... 1. Juncus
aa. Seeds 3; plants mostly pubescent..... 2. Luzula

1. JUNCUS L. RUSH

Grass-like plants with bract-like floral parts; otherwise as in the Liliaceae, with 6 perianth parts, 3/6 stamens and a single 3-carpellate ovary. Each carpel

with many seeds. Stamens marcescent and available even when in fruit.

a. Flower subtended by a pair of bractlets besides the usual bract at the base of the pedicel.
  b. Inflorescence terminal..... Group A
  bb. Inflorescence lateral ..... Group B
aa. Flowers without accessory bractlets, only the usual bract at the base of each pedicel.
  c. Leaves not septate..... Group C
  cc. Leaves hollow and clearly septate with transversal plates..... Group D

Group A

Flower subtended by 3 bracts, one of which is at the base of the pedicel, the other two at the base of the perianth and are much shorter than the parianth parts. Inflorescence terminal, lax or diffuse, subtended by leafy bracts that are obviously distinct from the stem. Leaves not septate-nodulose.

a. Annual; inflorescence tending to be half the height of the plant ..... 1. J. bufonius
aa. Perennial; stem many times the length of the inflorescence.
  b. Stem leafy, with at least one leaf borne at or above the middle..... 2. J. compressus
  bb. Stem leafless; all leaves basal or involucral.
    c. Leaves terete; capsule exserted.....
      ..... 4. J. Greenei
    cc. Leaves flattened but usually involute..
      ..... 3. J. tenuis

Group B

As in group A, but the inflorescence lateral, the stem being prolonged by one of the bracts which quite simulates the upper part of a stem.

a. Flowers few, 1-3, the perianth mostly over 6 mm long; densely tufted herbs.
  b. Capsule light brown, acute at tip... 7. J. Parryi
  bb. Dark purple and ± retuse..... 6. J. Drummondii
aa. Flowers many; perianth shorter; rhizomatous.
  c. Inflorescence borne towards the middle of the stem..... 5. J. filiformis
  cc. Inflorescence borne in the upper quarter..
    ..... 8. J. arcticus

Group C

Flowers lacking the accessory pair of bractlets. Leaves not septate-nodulose, mostly flat.

a. Glomerules of 3 or more flowers.
b. Capsule 7-9 mm long.....12. J. castaneus
bb. Shorter 4-5 mm long..... 13. J. longistylis
aa. Flowers less numerous, 1-3-(4) per glomerule.
c. Leaves all basal; stem with a single terminal glomerule.
d. Glomerule 2-flowered, purple-black...
.....11. J. biglumis
dd. Glomerule 3-(4)-flowered, pale coloured ..... 10. J. albescens
cc. Stem with 1-2 leaves and mostly 2 glomerules.
e. Tufted; glomerules of 1-2 flowers ...
..... 9. J. stygius
ee. Stoloniferous, glomerules of (2)-3-(4) flowers..... 12. J. castaneus

Group D

Flowers lacking the accessory pair of bractlets. Leaves hollow, cylindric, nodulose with regularly spaced cross-partitions, somewhat in the manner of a stem of Grass or Equisetum; the cross-partitions becoming slightly proeminent in drying.

a. Flowers in small and few-flowered glomerules, these less than hemispheric.
b. Sepals somewhat shorter than the petals; tufted plants.....19. J. brachycephalus
bb. Sepals obviously longer and narrower than the petals; stems borne singly along the rhizome.
c. Anthers 0.3-0.5 mm long. Perianth 2.0-2.5 mm high.....20. J. alpinoarticulatus
cc. Anthers about 1.0 mm long; perianth 3-4 mm high.
d. Leaves equitant and mostly 3-4 mm wide..... 16. J. ensifolius
dd. Leaves roundish to somewhat flattened and norrower, usually less than 2 mm wide..... 17. J. nevadensis
aa. Glomerules dense, hemispheric to globose.
e. Heads purple-black.
f. Head usually solitary.....18. J. Mertensianus
ff. Heads typically 3, leaves wider....
..... 16. J. ensifolius
ee. Heads greenish brown to reddish brown.
g. Heads 1 cm wide or less..... 14. J. nodosus
gg. Heads wider, mostly 1.5 cm wide....
..... 15. J. Torreyi

1. J. bufonius L. (var. halophilus Buch. & Fern.) -- Toad-Rush (Herbe à Crapauds) -- Annual, tufted, the flowers mostly solitary and scattered on the branches.

Up to 2 dm high. Tepals rather variable in length and shape, pale green, with wide membranous margins. Mid to late summer. Shores, sometimes weedy. --G, seK-Aka, L-SPM, NS-BC, US, Eur.

2. J. COMPRESSUS Jacq. -- Like the following, but the stem leafy and the flowers smaller. Forming a dense carpet. Perianth 2 mm long or less, shorter than the capsule, the sepals cucullate at tip. Early summer. Rare introduction of grassy places: Brandon, Duck Bay. --NF, (NS-PEI), Q-Man, US, Eur.

There is a dot at the mouth of the Nelson River on a distribution map of J. Gerardii Lois. by Hultén 1958. We are not aware of any corresponding herbarium specimen..

3. J. tenuis W. var. tenuis (J. confusus Coville; J. macer S.F. Gay; J. oronensis AA.) -- Path-Rush, Poverty-Grass (Herbe de misère) -- Inflorescence terminal, subtended by long leafy bracts, the flowers scattered on the branches, not clustered. Stiffly erect, wiry stems mostly 3-5 dm high. Sheaths of the basal leaves ending in thin, membranous and usually triangular to lanceolate auricles. Sepals 3-4 mm long, as long as, or longer than, the capsule. Early summer. Common in wet places. -- (Aka), L-SPM, NS-BC, US, (SA), Eur, (Afr, Oc) -- Var. uniflorus Farw. (J. Dudleyi Wieg.) -- Auricles thick, hard, opaque, straw-coloured, rounded. Perianth often somewhat longer. --Y, (NF), NS-BC, US, (CA).

The more eastern plants are often subdivided into three varieties, with the taller and more loosely flowered plants being placed in var. anthelatus Wieg., while the smaller plants with crowded flowers on more widely divergent branches are placed in var. Williamsii Fern. Similar phenotypes occur in our area, but they do not seem to have ever been varietally distinguished, nor do they seem to be in any way significant.

The capsule may be completely (=J. confusus) or incompletely (=J. tenuis) divided in three locules by the placentae more or less projecting inward. The variation is continuous and not clearly linked to any other character; the distinction, when implemented taxonomically, seems arbitrary.

J. tenuis W. var. secundus (Beauv.) Eng. was reported as "occasionally met with between Edmonton and Little Slave Lake". The corresponding specimen (CAN) was long ago revised by F.V. Coville to the next species.

4. J. Greenei Oakes & Tuck. var. Vaseyi (Eng.) Boivin (J. Vaseyi Eng.) -- Similar but the fruit exceeding

the tepals. Perianth 3-4 mm long, the capsule 5-6 mm long. Inflorescence more congested, the flowers more crowded. Leaves quite terete, slightly channeled on the ventral side. Early summer. Wet open places. -Mack, L, NS, NB-BC, US.

The floral parts are smaller in the more eastern var. Greenei: perianth 2.5-3.0 mm, capsule, 3-4 mm long and the seeds also only half as long, mostly ± 0.5 mm.

5. J. filiformis L. -- Seemingly leafless herb, reduced to a wiry stem, 2-4 dm high, and bearing a small inflorescence halfway up. Basal leaves reduced to a sheath ending in a vestigial blade, filiform, not over 1 mm long. What appears to be the upper half of the stem is actually a long involucral leaf. Flowers greenish. Early summer. Wet places northward, apparently rare. -- G, K-Aka, L-SPM, NS-nS-BC, US, (SA), Eur.

6. J. Drummondii E. Meyer (var. subtriflorus (E. Meyer) Hitchc.) -- Smaller than the similar J. balticus and the inflorescence reduced to (1)-2-3 pedicellate flowers, usually dark purple. In compact tufts only 1-2-(4) dm high. Involucral bract merely 1-2 cm long. Early summer. Moraines and alpine prairies. -- swMack-Aka, swAlta-BC, US.

The tepals vary in length from 4 to 7 mm and the capsule from 4 to 7.5 mm. The amplitude of variation is apparently the same throughout the range, but the frequency is not. Most plants from the Rockies (var. subtriflorus) have tepals and capsule 6-7 mm long. Further west most plants have the tepals 4-6 mm long and the capsule will most often overtop the perianth. But if those criteria are applied coldly, both phenotypes will prove to have essentially the same range. Hence we contend var. subtriflorus does not denote a particular population, it merely designates a statistical concentration of particular individuals exhibiting a certain arbitrarily delimited morphology. At most, var. subtriflorus could refer to a frequency pattern of a certain morphological type.

Throughout this flora we have refrained from naming or recognizing variations justified statistically. But we are fully aware that many other biologists, especially zoologists, have a different philosophy and will recognize statistically definable populations as varieties or subspecies or even species. The recognition of statistical variants requires the support of a large collection. Amateurs, ecologists and others who do not normally have access to representation in depth cannot be convinced and recognize such variants, they

can only name them on the basis of the locality, or ignore them, or accept the work of the specialist on faith. The latter is not particularly commendable as a scientific attitude and we are not inclined to impose such a choice upon our readers.

7. J. Parryi Eng. -- Flowers typically 3, large, straw-coloured to pale reddish-brown. Resembles the preceeding, but the involucral bract about twice the length of the inflorescence. Capsule narrowly acute at tip. Mid summer. Open montane and alpine slopes. -- swAlta-BC, US.

8. J. arcticus W. var. arcticus--Like J. filiformis, a wiry and seemingly scapose herb with a secund inflorescence borne toward the upper fifth. Mostly 2-4 dm high and growing in conspicuous lines of stiff stems strung along the nearly simple rhizome. Inflorescence purple black, short, and few-flowered, usually around 1 cm long, and of (1)-3-5-(8) flowers. Outer tegules acute to acuminate, the inner ones less sharply so or ± rounded at tip. Filament 1-2 times as long as the anther. Capsule ellipsoid, varying from included to exserted by 1-(2) mm. Early summer. Shores and wet tundra. --G-Aka, L, Q-nMan, Bur -- Var. littoralis (Eng.) Boivin (J. ater Rydb.; J. balticus W. var. littoralis Eng., var. montanus Eng., var. vallicola Rydb.) -- Inflorescence not so dark-coloured, more open and more heavily flowered, the branches very uneven, the longer ones mostly up to 2-3 cm long. Tegules 4-6 mm long, typically bicolour and mainly purplish, but with a broad median green zone, acute to acuminate at tip. Filament commonly only half as long as the anther. Capsule ellipsoid, ± included. First half of summer. Shores and wet ground; common and often pioneering. -- (G), seK-(Mack)-Y-(Aka), L-(NF-SPM, NS-PEI)-NB-BC, US.

Var. littoralis (Eng.) stat. n., J. balticus W. var. littoralis Eng., Trans. Ac. Sc. St. Louis 2: 433. 1866.

Many botanist have experienced difficulties in distinguishing J. arcticus and J. balticus. In the southern Mackenzie basin Raup 1947 found all his material to be intermediate and he placed it under J. balticus sensu amplo, although J. arcticus was an earlier name. We have similarly been unable to establish a clear discontinuity between these two taxa and consequently we regard them as geographical variants of a single species. Phenotypes with petals a bit shorter, broader, less acute and more widely margined (= var. montanus, var. vallicola) will be found to occur here and there as far as the the east coast and do not seem to be in any way restric-

ted geographically.

9. J. stygius L. var. americanus Buch. -- Generally quite similar to J. Drummondii, but the stem bearing 1 leaf and the flowers sessile. Usually around 2 dm high. Flowers greenish with strong red lines, in 1-(2) glomerules of 1-3 flowers each, their perianth 4.5-5.5 mm high. Capsule (5.0)-6.0-(7.5) mm long, at first green, turning ± purple or brownish, especially on the angles. Mid summer. Bogs, rare. --(Mack)-Y-Aka, L-NF-(SPM), NS, NB-O, nS-nBC, (US, Eur).

The eurasian var. stygius has a smaller perianth, 3.4-4.5 mm high, and an often shorter fruit, 5-6 mm long.

10. J. triglumis L. var. albescens Lange -- (J. albescens (Lange) Fern.) -- The single glomerule terminal and bicolour or whitish, the tepals being almost entirely membranous but the bracts mostly reddish brown. Stem leafless, mostly 1-2 dm high. Glomerule becoming darker and often ± brown at maturity. Involucral bract small and inconspicuous, often no longer than the glomerule, more commonly overtopping it briefly. Often resembling the last, but the capsule smaller, only 3-4 mm long, turning brown to purple black. Perianth 3-4 mm high, the tepals broadly lanceolate, acute or acutish. Stamens included, usually about 3/4 as long as the tepals. Early summer. Shores and calcareous bogs in mountains and arctic or subarctic regions, often pioneering. -- G-Aka, L-NF, Q-nMan-nS-BC, US, (Eur).

A circumpolar species readily divisible into three geographical varieties. There is a fair amount of variation in any area and a certain degree of intergradation in criteria, yet nearly all specimens examined were readily referable to the expected local variation. Thus we would refer all neogean specimens to var. albescens as described above. The european material is referable to the typical var. triglumis with bracts usually of a deeper brown, becoming dark brown, and the exserted capsule becoming deep purple brown, hence the fruiting head much darker; lowest bract nearly always shorter than the glomerule; tepals 3-4 mm long, acute to rounded (especially the petals) at summit, usually turning rusty brown; stamens about as long as the perianth or more often slightly exserted; capsule usually exserted by 1-2 mm.

Asiatic material is referable partly to var. triglumis, partly to var. fuscatus Regel (=J. Schischkinii Krylov & Sumn.). At flowering time the latter resembles var. albicans by its paler and strongly bicolour inflorescence. Also var. fuscatus has a slightly larger perianth, 4-5 mm high, its tepals narrowly triangular lan-

ceolate and narrowly acute, its stamens and mature capsule about reaching the top of the perianth; the lowest bract shorter than the inflorescence.

There has been much confusion about the proper taxonomic disposal of the North American plants; some authors have called them J. triglumis, others J. albescens, others still (e.g. Hultén 1962) have detected both entities on our continent. But, using the criteria above, we would place all neogean specimens examined into var. albescens.

11. J. biglumis L. -- Pretty much as above, but the glomerule only 2-flowered and deep red-purple. Capsule purple black throughout or more commonly pale green with the sutures outlined heavily in dark purple. Mid summer. Rare on wet cliffs and wet alpine slopes. -- G-Aka, L, Q, nMan, swAlta-BC, US, Eur.

12. J. castaneus Sm. -- Similar to the last three, but stoloniferous, the stolons ending in a small bulb. Mostly 2-4 dm high. Glomerules red-brown, the lowest subtended by a bract overtopping the inflorescence. Capsule largest, 7-9 mm long. First half of summer. Wet peaty soils; subalpine or subarctic to arctic. -- G- Aka, L, Q--nMan-(nS)-swAlta-BC, US, Eur -- F. pallidus (Hooker) Boivin -- Glomerules of a lighter colour, yellowish to pale green: Churchill. --nMan, (Eur).

13. J. longistylis Torrey -- Tepals largely membranous and somewhat longer than the capsule. About twice taller than the preceeding, which it resembles. Stoloniferous. Stem leaves 2-3. Capsule 4-5 mm long. Mid summer. Wet meadows. --NF, Q-BC, US.

14. J. nodosus L. -- Typically the flowers are in a few, reddish-brown, globular glomerules. Stoloniferous and forming dense colonies, the stem and leaves thin and wiry. Tepals 3-4 mm long, overtopped by the bright, brown, acuminate capsule. First half of summer. Wet meadows, especially along shores, common. --Mack, (Aka), NF, NS-BC, US.

15. J. Torreyi Coville -- Resembling the preceeding but coarser, the heads nearly twice bigger and the leaves stiffly arching. Stoloniferous and forming numerous bulbs. Mid summer. Infrequent at the edge of sloughs and along slightly alkaline watercourses. --swQ--BC, US.

Two Manitoba collections were reported as J. canadensis J. Gay by Scoggan 1957. The first, Macoun, Manitoba 1872, (MTMG) is too immature for positive identification. Tentatively we have refered it to J. brachy-

cephalus. It may result from a label mixture since Macoun makes no mention of it in his Catalogue, and we have not noticed a corresponding collection at CAN.

The second collection, Denike, Birds Hill, 1942 (DAO), has been revised tentatively to J. Torreyi, being also too immature for positive identification.

16. J. ensifolius Wilkstr. var. ensifolius -- Leaves flat, largest, 3-5 mm wide, and equitant, that is conduplicate and the two halves fused face to face, like an Iris leaf. Mostly 3-5 dm high. Sheaths not auriculate, or rarely subauriculate. Heads (2)-3-5-(8), subglobular, dark brown to purple black. Tepals subequal. Stamens 3, opposite the sepals, the anthers shorter than the filaments. Early summer. Wet spots in the mountains. --Aka, Q-O, swS-BC, US, (Eur) -- Var. montanus (Eng.) Hitchc. (var. major AA.; J. saximontanus Nelson; J. Tracyi Rydb.) -- Stamens 6, the anthers about as long as the filaments. Sheaths more or less auriculate. Heads often more numerous, up to 10-12. Petals usually somewhat shorter than the sepals. Boisé Coteau, and westward. Often at lower altitudes. --swS-BC, wUS.

Var. montanus has often been called var. major Hooker 1838 (see Boivin 1967, etc.), but there is an earlier var. major Meyer 1828 which is probably nomenclaturally identical to var. major Hooker and in any case precludes the use of a later homonym. Since the type of Meyer's name came from Unalaska, well outside the range of var. montanus, the two cannot be taxonomically identical. The latter name appears to be the correct one for our geographical variation.

The distinction between J. ensifolius (=broad-leaved, 3 stamens), J. saximontanus (=broad-leaved, 6 stamens), J. mertensianus (=narrow-leaved, monocephalous), and J. nevadensis (=narrow-leaved, many heads) is not as sharp as might be desirable, although nearly all specimens examined could be readily assigned to one or the other species. Reducing them to a set of varieties was considered, but it did not seem that the resultant classification would be clearly more satisfactory. The separation is weakest between J. ensifolius and J. saximontanus and we have finally rallied with some diffidence to the solution recently proposed by Hitchcock 1969 of reducing J. saximontanus to varietal rank while retaining the other taxa as species.

17. J. nevadensis Watson var. nevadensis -- Heads small and many, as the last, but the leaves narrow and roundish like the next. Mostly (3)-4-(5) dm high. Leaves weakly septate, roundish to somewhat flattened, (0.5)-

1.0-(2.0)mm wide, one of them (as in J. ensifolius and J. Mertensianus) borne near the middle of the stem. Auricles 1-4 mm long, 0.5-1.5 mm wide, rounded at tip. Mostly with 5-12 heads, these mostly less than hemispheric. Sepals short caudate, longer than the petals by 0.5-1.0 mm. Stamens 6, the anthers ± 1.0 mm long and slightly longer than the filaments. Early summer. Springy meadows; local: Hoosier and Cypress Hills. -- swS-Alta, US.

Often transitional to J. ensifolius var. montanus. A number of more southern varieties are reported of which var. badius (Suksd.) Hitchc. has somewhat smaller flowers in fewer heads.

18. J. Mertensianus Bong. -- Resembles J. ensifolius, but the leaves narrower and rather terete. Smaller and commonly only 1-3 dm high. Heads 1-(2), mostly broadly hemispherical. Perianth purple black. Stamens 6. Mid summer. Springy places, alpine or subalpine, often near glaciers: Rockies. --Y-Aka, swAlta-BC, US, (Eur).

Larger plants may have wider leaves, thus grading into J. ensifolius, or more numerous heads and grading into J. nevadensis.

19. J. brachycephalus (Eng.) Buch. (J. brevicaudatus (Eng.) Fern.) -- Inflorescence lax, with numerous small glomerules; leaves strongly cross-septate. Tufted. Sepals 2.5-3.0 mm long, the petals similar and slightly longer. Capsule 3.0-4.0 mm long, acute. Seeds ± 1 mm long. Mid summer. Occasional pioneer on wet ground. -- seK, L-SPM, NS-Alta, US.

Usually treated as two species, the name J. brachycephalus being restricted to plants with more open inflorescences and nearly ecaudate seeds, while in J. brevicaudatus the branches of the inflorescence are nearly erect and the seeds end in whitish appendages half as long as the body. True, there is a tendency for more northern plants to have a narrower panicle, but the tendency is hardly strong enough to justify a taxonomic distinction. The length of the appendages of the seeds is an important taxonomic character with many a species of Juncus, but there is no reason to suppose that it should be regarded as important in every case, and in the present case it seems to be a random variation of no obvious import.

20. J. alpinoarticulatus Chaix (J. alpinus Vill., var. fuscescens Fern., var. rariflorus Hartman; J. Richardsonianus Schultes) -- Similar, the flowers smaller and on less divergent branches. Stems closely lined up along the rhizome. Sepals 1.5-2.5 mm long, the

petals shorter and rounder. Capsule 2.0-3.0 mm long, obtuse at tip. Seeds ± 0.5 mm long. Just before mid summer. Shores. --G, (K)-Mack-Aka, L-NF, (NS)-PEI-BC, US, Eur.

Many segregates have been proposed, based mainly on the colour of the perianth, or on the florets being all sessile or partly pedicellate. The latter type has been variously called var. rariflorus, J. nodulosus Wahl., or J. Marshallii Pugsley. Such taxonomic refinements are of no obvious significance within our area.

J. alpinoarticulatus forms an obvious pair with the generally more southern J. articulatus L.; the morphological basis of their distinction is minimal. Of the many reported differences, the most reliable proved to be anthers length: (0.3)-0.4-(0.5) mm in our J. alpinoarticulatus, but (0.5)-0.6-0.7-(0.9) in J. articulatus. When specimens are sorted out on anther length, it turns out to be reasonably well correlated with the shape of the inflorescence; at least twice longer than wide in J. alpinoarticulatus, the main branches usually diverging at an angle of 15-30°, but ovoid to ellipsoid in J. articulatus and the main branches diverging at 30-60°. Others differences are usually mentioned, but their value is at best no more than statistical. Which means that the area of morphological overlap is so broad, these other characters are usually not discriminant; their significance cannot be assessed until the identity of a specimen has been ascertained from some other angle.

The use of J. alpinoarticulatus Chaix 1786 versus J. alpinus Villars 1787 was discussed in Journ. Bot. 66: 210. 1928 and Rhodora 35: 234-5. 1933. Both names were obviously intended by Villars for the same species and the protologue of the second name repeats the prelinnean synonym and place of collection given in the protologue of the first; hence it seems difficult to treat the two names as anything but synonymous, in which case the earliest name has precedence. One may speculate from prima facie evidence that Villars intended J. alpinus to be merely a shortened form of the more than sequipedalian J. alpinoarticulatus, but this is only a speculation and has no bearing on the typification of either name.

Juncus effusus L. was mentioned for Saskatchewan by Groh 1950, but we failed to locate any justifying collection. Manitoba reports, repeated by Hitchcock 1969, were discounted by Scoggan 1957.

2. LUZULA WOODRUSH

Ovary 1-celled and only 3-seeded. Otherwise as in Juncus, but the herbage commonly pilose or ciliate.

a. Flowers all or mostly single at the end of obvious pedicels.
  b. Inflorescence simple or nearly so....1. L. pilosa
  bb. Inflorescence compound.
    c. Anthers 0.7-1.4 mm long; tepals about 3 mm long..... 4. L. glabrata
    cc. Anthers 0.3-0.5 mm long, tepals about 2 mm long.
      d. Leaves 5-12 mm wide..... 2. L. parviflora
      dd. Smaller, the leaves about 3 mm wide..... 3. L. Wahlenbergii
aa. Flowers in glomerules.
  e. Leaves thickened and rounded at tip.
    f. Glomerules many and mostly shorter than their peduncle..... 8. L. campestris
    ff. Glomerules mostly 3 and subsessile in a capitate inflorescence.... 9. L. hyperborea
  ee. Leaves acute at tip.
    g. Inflorescence compact and conspicuously nodding..... 5. L. spicata
    gg. Inflorescence open or erect.
      h. Glomerules (1)-3..... 6. L. confusa
      hh. More numerous and on recurved pedicels..... 7. L. arcuata

1. L. pilosa (L.) W. var. americana R. & S. -- (L. acuminata AA.; L. saltuensis Fern.) -- Leaves very long-ciliate up to the callous tip. Leaves strongly dimegueth, the basal ones 3-10 mm wide. Inflorescence a subglobose umbel of long-pedicelled flowers. Flowers solitary or a few of them 2 to a pedicel. Late spring. Rare or overlooked herb of light woods. --NF-SPM, NS-cAlta, US.

The more western var. macrocarpa (Buch.) stat. n. L. rufescens Meyer var. macrocarpa Buch., Pflanzenreich 4, 36 (25): 47. 1906, has smaller leaves, the basal ones 1 dm long or less, 2-4 mm wide, the caulinary one smaller still by half.

The more southern var. carolinae (Watson) stat. n., L. carolinae Watson, Proc. Am. Ac. 14: 302. 1879, has partly compound umbels and its leaves are often larger, up to 15 mm wide.

L. acuminata Raf., a name often used for our plant, is now considered to be a nomen dubium.

2. L. parviflora (Ehrh.) Desv. -- Very open inflorescence, a compound (or twice compound) raceme. Glabrous or nearly so; 4-10 dm high. Typically with 5 stem leaves, the latter usually very long ciliate at the junction of the limb and sheath. Racemes somewhat congested. All pedicels subtended by a bract reduced to its sheath. Early summer. Infrequent native, mostly of disturbed places in woods. --G, (K)-Mack-Aka, L-SPM, NS, NB-BC, US, Eur.

The darker and more compact plants from more open habitats are often named var. melanocarpa (Mx.) Buch. Some B.C. and Alaska specimens with a more open panicle and paler perianth have been differenciated as var. divaricata (Watson) Boivin (=L. divaricata Watson), but such specimens occur throughout the range and further they are a misidentification since true L. divaricata does not extend that far north, being primarily a California species with eciliate leaves, more stiffly divergent pedicels and acuminate (but not noticeably paler) tepals.

3. L. Wahlenbergii Rupr. -- As above, but the leaves narrower and the whole plant generally smaller. All or most leaves less than 1 dm long and 5 mm wide or less. Stem 1-4 dm high and bearing only 1-3 leaves. Bracteoles strongly fimbriate. Tepals often somewhat fimbriate. Early summer. Wet places and shores in subarctic to arctic or subalpine to alpine situations. -- (G)-F-Aka, L, Q, nMan-(S)-Alta-BC, (US), Eur.

Some specimens, especially from the western part of the range, may be somewhat more glaucous and somewhat more sturdier plants, and on that basis are sometimes identified as L. Piperi. However the latter name properly belongs to the synonymy of L. parviflora.

4. L. glabrata (Hoppe) Desv. -- Resembles the previous two, but the flowers larger and purple black. Capsule also purple black. Mostly 3-4 dm high. Inflorescence often somewhat nodding. Early summer. Disturbed or rocky places, alpine to subalpine. Rockies. -- swAlta-BC, US.

5. L. spicata (L.) DC. -- The whole inflorescence conspicuously nodding. Densely tufted. Inflorescence congested, of a single glomerule or of a few closely set glomerules. Lowest bract usually equalling the inflorescence. The main bract under each flower as long as, or longer than, its flower. Early summer. Alpine slopes and mountain tops; also dry tundra at Lake Nueltin. -- G-(F)-K-Aka, L-SPM, (NS), Q, nMan, swAlta-BC, US, Eur.

6. L. confusa Lindeberg -- Densely tufted like the preceeding, but the inflorescence stiffly erect. Glomerules smaller, 1-(3), the lower one, when present, on an elongate and stiffly erect peduncle. Lowest bract short, merely reaching the base of the glomerule, or even shorter. Late spring. Forming large tussocks on the tundra. --G-Aka, L, Q, nMan-neS, BC, (US), Eur.

A Drummond collection (GH) originally identified as L. hyperborea and later filed under L. confusa may have been the basis for extending the range of the latter to Alberta by Fernald 1950, repeated by Moss 1959, querried by Boivin 1967. This same collection may also be the source of an isolated Alberta dot on distribution maps by Raup 1947, Porsild 1957 and 1964, and Hultén 1962. Also an earlier report by Buchenau in the Pflanzenreich 4, 36(25): 71. 1906 for the "Felsengebirge". Still earlier, this same Drummond Rocky Mountains collection was reported by Hooker 1838 and Macoun 1888 as L. hyperborea var. minor. The latter varietal name is a synonym of L. confusa. But Drummond's specimen belongs with L. campestris, hence we are discounting all Alberta reports.

7. L. arcuata Wahl. (var. unalaschkensis Buch.) -- Branches of the inflorescence, and also, usually, the stems, arching. Only 1-3 dm high and growing in dense tufts. Inflorescence often branching in the manner of L. parviflora, the flowers in small glomerules. Early summer. Alpine slopes. -- Mack-Aka, swAlta-BC, (US, Eur).. Our plants are not consistently different from those of the Old World.

8. L. campestris (L.) DC. var. campestris (L. groenlandica Böcher; L. multiflora (Retz.) Lej., var. contracta Sam., var. frigida (Buch.) Sam., ssp. comosa (E. Meyer) Hultén; L. sudetica (W.) DC., var. frigida (Buch.) Fern.) -- Blackcaps, Chimney-Sweeps -- Leaf gradually attenuate into a callous tip. Very variable. Leaves very long-ciliate, the cilia usually sparse, exceptionally deciduous. Stem leaves many and somewhat larger than the basal ones. Inflorescence subtended and overtopped by a leafy bract. Glomerules dark brown to purple black, small and tending to be spiciform. Tepals and capsule 2-3 mm long. Late spring. River shores and bogs. --G-K-(Mack-Y)-Aka, L-SPM, NS-BC, US, Eur -- Var. pallescens Wahl. (L. pallescens (L.) Besser) -- Inflorescence lighter in colour, pale brown to yellowish green. Plants often taller. Of more southerly distribution. --(NF), NB-S, US, (Eur).

9. L. hyperborea Br. var. hyperborea (L. arctica Blytt; L. nivalis (Laest.) Berl.) -- Leaves eciliate

or essentially so, not quite so clearly callous at tip as the last. Foliage mainly basal, the stem leaf slightly smaller and usually only one. Bract shorter than the inflorescence, the latter pyramidal and mostly ± 1 cm long. Flowers smaller, the tepals and capsule ± 1.5 mm long. (Summer?). Wettish toundra: Churchill, Lake Paterson. --G-Aka, L, nQ, nMan-(nS), neBC, Eur.

L. hyperborea has been applied now to L. confusa, now to L. nivalis. We contend that such conflicting usage is not ground enough to discard a name, otherwise many, if not most, of the older names would have to be replaced. Conflicting usage normally calls only for restriction through typification. In his original description Robert Brown described clearly L. hyperborea as a plant with flat leaves and foliaceous bracts: within the general area of the type collection only L. nivalis fits this description, hence we hold L. hyperborea and L. nivalis to be synonymous.

Grades to the northwest into var. latifolia (Kjellm.) Boivin, with somewhat larger leaves, the main ones up to 3-4 mm wide, the younger ones irregularly ciliolate. Also the inflorescence is laxer, the longest peduncle 1-5 cm long.

FLORA

OF THE PRAIRIE PROVINCES

Bernard Boivin

Part IV

(continued)

CYPERACEAE

Order 71. CYPERALES

A single family of Grass-like herbs with solid stems which are nearly always triangular.

125. CYPERACEAE (SEDGE FAMILY)

Flower typically reduced to a bract, some stamens and a single ovary which matures into an achene. Perianth usually lacking, or sometimes reduced to bristles, more rarely to small bracts.

a. Pistillate flower subtended by two bracts, the inner one bottle-shaped and completely enclosing the flower except for the protruding style.
  b. Spikelet reduced to 1-2 flowers ..... 8. Kobresia
  bb. Flowers more numerous ..... 9. Carex
aa. All floral bracts open.
  c. Spikelet reduced to 1-2 flowers and a number of empty scales.
    d. Achene crowned by a tubercule (as in Eleocharis) ..... 7. Rhynchospora
    dd. No tubercule ..... 6. Cladium
  cc. Flowers more numerous.
    e. Scales distichous, that is alternating on opposite sides of the rachis to form only 2 longitudinal rows.
      f. Inflorescence terminal ..... 2. Cyperus
      ff. Axillary ..... 1. Dulichium
    ee. Scales spirally imbricated, that is borne on all sides of the rachis.
      g. Achene surrounded by numerous bristles which soon elongate into a conspicuous tuft of "cotton" ..... 3. Eriophorum

gg. Spikelets not maturing into heads of "cotton".
h. Stem leafless, the basal leaves reduced to bladeless sheaths ..... 5. Eleocharis
hh. Stem leafy, or at least with basal leaves or large inflorescence bracts ..... 4. Scirpus

1. DULICHIUM Pers.

Stem round and the inflorescences axillary, the latter resembling Cyperus. Perianth of 6-9 bristles.

1. D. arundinaceum (L.) Britton var. arundinaceum -- Galingale, Three-Way-Sedge -- Stem terete and hollow as if a Grass, but the flowers as in Cyperus. Stiffly erect, leafy herb with a simple and soft stem mostly 4-8 dm high. Leaves in three vertical rows. Sheath green all around, margined in red brown. Inflorescence an axillary raceme of ± 5 spikelets. Anthers (3.0) -3.5-(5.0) mm long. Mid summer. Shores of boggy lakes. -- NF-SPM, NS-seMan, BC, US.

Known in our area by only two collections: M.G. Dudley, Whitemouth River, Oct. 1, 1938 (DAO); Boivin & Champagne 14190, Réserve Forestière Whiteshell, Lily Pond, rivage, 25 sept. 1960 (DAO). It has also been collected at Ingolf just across the border in Ontario. The B.C. collections (CAN, DAO) are apparently recent introductions related to Cranberry cultivation.

From James Bay eastward, one will also find var. boreale, a generally smaller plant, 4 dm high or less, with shorter stamens, (1.5)-2.5-(2.8) mm long, growing on river shores rather than in boggy places.

2. CYPERUS L. GALINGALE

A basic type with the perfect flowers in distichous spikelets. Inflorescence terminal. Perianth (or bristles) lacking.

a. Annual, 3-15 cm high ..... 1. C. aristatus
aa. Taller perennials.
b. Spikelets in pectinate racemes ..... 2. C. strigosus
bb. In dense terminal glomerules.
c. Stem very scabrous ..... 3. C. Schweinitzii
cc. Smooth or nearly so ..... 4. C. Houghtonii

1. C. squarrosus L. (C. aristatus Rottb.; C. inflexus Muhl.) -- Scales acuminate into a strongly recurved tip. Tufted. Bracts large, about half the height of the plant. Inflorescence congested, sessile. Late summer. Inconspicuous herb of exundated shores. -- NB-BC, US, (CA), SA.

For the correct name of this species, see Blumea 10: 642, 1960.

2. C. strigosus L. -- Nut-Grass -- Scales lanceolate. Stem somewhat bulbous at base. Leaves up to 5-10 mm wide. Inflorescence often gold-tinged. Summer. Rare shore plant: Wawanesa, Watrous. -- swQ-S, US.

A fairly variable species, more so further south, and especially so on the Costal Plain. Many varieties have been described with longer spikelets, or longer scales, etc., but the material at hand is inadequate and we cannot tell if these are mere extremes of variation or possibly geographical varieties.

The limited number of collections (DAO) from our area, both in 1932, would seem to indicate a non-persistent adventive.

3. C. Schweinitzii Torrey -- Tufted with a bulbous base and numerous bulbous offshoots that are easily broken off. Stem scabrous on the angles. Scales broadly ovate, over 2.5 mm long, gold-tinged on the sides, acuminate, the acumen about 0.5 mm long. Late spring. Active sand dunes. -- O-S, US.

The source for an Alberta report by Moss 1959, repeated by Boivin 1967, remains obscure as no corresponding specimen could be located at ALTA in 1971.

4. C. Houghtonii Torrey -- Rather easily confused with the preceeding, but the stem smooth to slightly scabrous near the top. Scales smaller, the middle ones 2.0-2.5 mm long, purplish on the sides, merely mucronate at tip, the mucro about 0.1 mm long. Early summer. Sandy Pine woods. -- swQ-seMan, US, Eur (Breslau).

3. ERIOPHORUM L. COTTON-GRASS

As in Scirpus but the perianth-bristles very numerous and elongating into a conspicuous "cotton" tuft. As in most other Grass and Grass-like plants, the anthers are usually trapped in the inflorescence and are often still available for measuring at the maturity of the fruit.

Well collected specimens, not as easily done as said, will show conspicuous differences in the mode of growth. Species 1-5 are stoloniferous and the stems will arise singly or sometimes (especially E. viridicarinatum) in small clusters of 2 or 3 stems. Species 6-8 produce no stolons but grow in small to very large tufts.

a. Inflorescence of 2 or more spikelets; stem leaves with a blade.
   b. Upper leaf with a reduced limb, shorter than its sheath ..... 3. E. gracile

bb. Limb at least as long as its sheath.
c. Scales with the midnerve dilated above the middle ..... 2. E. viridicarinatum
cc. Midnerve gradually more tenuous upwards ..... 1. E. angustifolium
aa. Inflorescence reduced to a single terminal spikelet; stem leaves mostly reduced to bladeless sheaths.
d. Stoloniferous.
e. Anthers 0.5-1.0 mm long; scales blackish, barely hyaline-margined ..... 4. E. Scheuchzeri
ee. Anthers bigger, 1.5-3.0 mm long; scales with a broad hyaline margin, the blackish center covering only about half the width ..... 5. E. Chamissonis
dd. Tufted.
f. Scales with a broad hyaline margin, the outer ones becoming squarrose or reflexed ..... 8. E. vaginatum
ff. Scales blackish throughout.
g. Stem 1.0-2.5 dm high, with 1-(2) sheaths located below the middle ..... 7. E. callitrix
gg. Taller stem, 3-7 dm high, with 2-(3) sheaths of which the upper is borne above the middle ..... 6. E. brachyantherum

1. E. polystachion L. (E. angustifolium Honckeney, var. majus Schultz) -- Cotton-Grass (Herbe à coton) -- Inflorescence lateral, subtended by 2-(3) leafy bracts, these blackish in the lower 1-2 cm. Leaves 2-5 mm wide. Scales blackish, or brownish, the margin hyaline, the midnerve gradually evanescent above the middle. Anthers 2.5-5.0 mm long. Early summer. Boggy places. -- G-Aka, L-SPM, NS-BC, US, Eur.

Plants from the higher latitudes and altitudes tend to be smaller and usually more intensely coloured. Such specimens are often distinguished as var. triste Th. Fries, especially if they are less than 2.5 dm high. We have been unable to establish var. triste on anything other than a few arbitrary size distinctions and we suspect that size could be mostly ecologically conditioned. It may be significant that specimens from any area where both forms occur are likely in flower if they have been named var. triste, but much more likely to be filed as typical polystachion if they are full grown and fruiting with full heads of cotton.

2. E. viridicarinatum (Eng.) Fern. -- Resembles the above, but the base of the inflorescence green or brownish and the anthers only 1.0-1.5 mm long. Scales rather greenish, the midnerve gradually thickened upwards, becoming 2-3 times thicker

and wider tipwards than basewards. Early summer. Sphagnum bogs and marshy places. -- K-Mack, sAka, L-SPM, NS-BC, US.

Reports of E. tenellum Nutt. from our area may be mostly referable to E. gracile, but the two collections from lake Athabaska (CAN; DAO) listed by Raup 1936 have been revised to E. viridicarinatum.

3. E. gracile W.D.J. Koch var. gracile (E. tenellum AA.) -- Frog-Hair -- Inflorescence subtended by only one leafy bract, which is shorter than the inflorescence. Scales rounded at tip. Anthers 1-2 mm long. Early summer. Very wet and floating bogs, marshy flats and around boggy pools. -- Mack, Aka, L-NF-(SPM), NS-BC, US, Eur.

4. E. Scheuchzeri Hoppe -- Anthers very short. A smallish, 1-2-(3) dm high, stoloniferous species with a single terminal spikelet. Spikelets 1.0-1.5 cm long at anthesis, elongating to 2-3 cm in fruit. Scales narrowly hyaline along the margin, the lowest scale less than 1 cm long. Bristles white. Late spring and early summer. Edge of boggy pools and late snow patches. -- G-Aka, L-NF, Q-nO-nMan, swAlta-BC, wUS, Eur.

5. E. Chamissonis C.A. Meyer var. Chamissonis (var. aquatile AA.; E. medium AA.; E. russeolum Fries) -- Taller than the preceding and with longer anthers. Stem 2-6 dm high, 1-4 mm thick. Lowest scale mostly 1-2 cm long. Spikelet 1.5-2.0 cm high in flower, elongating to 3-5-(6) cm in fruit, the bristles cinnamon-coloured. Early summer. Around boggy pools. -- K, (Y)-Aka, L-SPM, NS-seMan, (Alta)-BC, (US), Eur -- Var. albidum (Nyl.) Fern. (f. subalbidum (Lindb. f.) Blomgr., f. Turneri Raymond; E. medium AA.; E. russeolum Fries var. albidum Nyl.) -- Bristles white. -- (F)-K-Aka, (NF), NS, NB-BC, (US, Eur).

Specimens reported as Chamissonis by Breitung 1947 for east-central Saskatchewan (DAO, MT) have since been revised to var. albidum. One of these was probably at the origin of a dot on a map in Svensk Bot. Tid. 48: 75, 1954. Alberta reports by Moss 1959 and in Svensk Bot. Tid. 48: 79, 1954 for var. Chamissonis also seem questionable, especially since all collections at DAO and CAN have been revised to var. albidum, but some important collections have yet to be checked on this point.

Throughout much of its range var. albidum gives the impression of being nothing more than a casual colour form, but nearly all the specimens examined from our area proved to belong to the white-headed phase, except for a few sheets in the southeastern corner. At least as far as our experience is concerned in our area, var. albidum presents itself as a geographical variation.

The scales have a similarly broad hyaline margin in E. Chamissonis and E. vaginatum and fragmentary specimens of either are best distinguished by the colour and nervation of the

scales. In E. Chamissonis the scales are more or less tinted or punctate in chestnut, especially the lowermost scale (=spathe), and more so towards the base or the margin. The lower scale is conspicuously marked by ± 5 raised longitudinal nerves; the second scale has only 2 such nerves; all other scales are uninerve. In E. vaginatum all scales are similarly uninerve and tinted only in grayish black.

Smaller plants are at times segregated as E. russeolum.

E. medium was used by Löve 1953 in reference to specimens (WIN) of both of our varieties. E. medium has been much misapplied, but we have accepted Raymond's opinion, Svensk Bot. Tidsk. 48: 74, 1954, that it properly belongs to the hybrid E. russeolum (=E. Chamissonis) x E. Scheuchzeri, a putative hybrid not yet known from our area.

6. E. brachyantherum Trautv. (E. opacum (Bjornstr.) Fern.) -- Hare's Tail -- Coarse and densely tufted. Scales blackish, erect-appressed. Anthers up to 1.2 mm long. Bristles lightly tinted above. Early summer. Very wet bogs or gravels. -- F-Aka, L-NF, wcQ-BC, (US), Eur.

7. E. callitrix Cham. -- Like a diminutive phase of the previous, the stem typically with only one sheath located well below the middle. Scales blackish. Bristles quite white. Anthers 0.7-1.0 mm long. Early summer. Muskegs: Churchill, Rockies -- G-Aka, L-NF, Q-nO-nMan, swAlta-nBC, (wUS), Eur -- F. moravium (Raymond) Boivin -- Scales straw-coloured. Churchill. -- (Mack, Aka, L), nMan.

8. E. vaginatum L. var. vaginatum -- Cotton-Grass, Catlocks -- Scales strongly squarrose-reflexed. In very large tufts, the sheaths of the basal leaves often very long, up to 1 dm or more. Spikelet usually oblong or cylindric at flowering, its rachis usually elongating to 1-2 cm at maturity. Anthers 2-3 mm long. Early summer. Very wet muskegs. -- wF-Aka, swMan (Riding Mt.)-nwS-BC, Eur -- Var. spissum (Fern.) Boivin (E. spissum Fern.) -- Cotton-Plant, Hares's Tail -- Anthers shorter, 1-2 mm long. Spikelet obovoid at flowering. Rachis 1 cm long or less. -- eF-Mack, Aka, L-SPM, NS-Alta, US.

4. SCIRPUS L. BULRUSH

Basic type of the family, with perfect flowers. Spikelet with only 0-2 empty scales at the base. Perianth lacking or reduced to 8 bristles or less.

a. Inflorescence terminal, subtended by leaf-like bracts ..... Group A
aa. Inflorescence various, but not subtended by leaf-like bracts ..... Group B

Group A

Inflorescence subtended by 2 or more leaf-like bracts.

a. Bristles much longer than the scales, crinky and rather obvious ..... 5. S. cyperinus
aa. Bristles shorter than the scales and hidden behind them.
b. Spikelets 1.0-2.5 cm long.
c. Larger leaves 10-17 mm wide ..... 1. S. fluviatilis
cc. Only 5-8 mm wide ..... 2. S. maritimus
bb. Much shorter.
d. Sheaths pale green ..... 3. S. atrovirens
dd. Light to deep red ..... 4. S. microcarpus

Group B

Bracts lacking or at least not leaf-like, often resembling the stem and continuing it.

a. Inflorescence secund and seemingly lateral.
b. Stem 1-4 dm high, weakly trigonous .... 6. S. nevadensis
bb. Much taller.
c. Stem sharply trigonous ..... 7. S. americanus
cc. Quite round ..... 8. S. lacustris
aa. Inflorescence clearly terminal, not overtopped by any bract.
d. Inflorescence a spike of small spikelets .. 13. S. rufus
dd. Spikelet terminal and solitary.
e. Bristles very long exserted ..... 12. S. hudsonianus
ee. Bristles included, being shorter than the scales.
f. Stem sharply trigonous and scabrous ..... 9. S. Clintonii
ff. Terete and smooth.
g. Densely tufted; outer scales short aristate ..... 10. S. caespitosus
gg. Stoloniferous; scales rounded at tip ..... 11. S. pumilus

1. S. fluviatilis (Torrey) Gray -- Very coarse herb 1-2 m high. Stem sharply triangular. Inflorescence subtended by ± 5 leafy bracts. Some spikelets on long pedicels. Stigmas 3. Achene sharply trigonous. Early summer. Lake shores in shallow water: Edmonton eastward. -- (NB)-Q-cAlta, US, Eur.

2. S. maritimus L. var. paludosus (Nelson) Kük. -- (S. paludosus Nelson) -- Bayonet-Grass (Trianglé) -- Like the above, but smaller, less than 1 m high. Inflorescence subtended by 2-(3) leafy bracts, nearly always compact. Stigmas 2. Achene lenticular. Early to mid summer. Alkaline shores and shallow

waters. -- seK-swMack, Aka, NS-BC, US, (CA).

As defined above, var. paludosus includes the costal S. pacificus since reputed criteria of the latter (e.g. colour of scales, laxness of inflorescence, etc.) occur sporadically in our area.

In var. maritimus of the east coast there are 3 stigmas and the achene is triangular, while the anthers tend to be shorter.

3. S. atrovirens W. (var. pallidus Britton; S. Hattorianus Mak.; S. pallidus (Britton) Fern.) -- Inflorescence a compound umbel of globose glomerules of small sessile spikelets. A coarse herb with the habit of the last two. Stem 2-3 mm thick toward the middle. Inflorescence with 1-2-(3) rays much longer than the others. Bristles retrorse-barbed above the middle only. Scales mucronate from the excurrent midrib. Achene triangular-compressed. Stigmas 3. First half of summer, often becoming proliferous in late season. Very wet places in freshwater areas. -- NF-SPM, NS-cAlta, US, (Eur).

The scales vary from acuminate to mucronate and from 1.3 to 2.5 mm in length. Plants from our area and west of the Mississipi tend to bear longer scales, i.e. ± 2.0 mm long, and may be recognized on that basis as var. pallidus. Those to the east have predominantly shorter scales, i.e. ± 1.5 mm long, and constitute var. atrovirens. But there is a wide range of variation in any area, and even within a single inflorescence. It seems doubtful that the distinction, if coldly implemented and without regard to the place of collecting, would result in a meaningful sorting of specimens.

4. S. microcarpus Presl var. confertus (Fern.) House (var. rubrotinctus (Fern.) M.E. Jones; S. rubrotinctus Fern.) -- (Rouche) -- The sheaths light to deep red and the stem thicker, 3-5 mm thick in the middle internode. Sheaths somewhat inflated, mostly 7-10 mm thick in the herbarium. The 5-8 longer rays of the inflorescence of about the same length; the glomerules more numerous. Scales broadly rounded and not mucronate. Bristles retrorse-barbed almost to the base. Stigmas 2 and the achene lenticular. Late spring and early summer. Marshy places. -- sMack, L-SPM, NS-BC, US.

Ours has seeds 0.6-1.0 mm long. The more western var. microcarpus has slightly larger seeds, 1 mm long or more, and its sheaths are usually green. Also, it tends to be a generally larger plant, its leaves closer to 1.5 cm wide (than to 1.0 cm in var. confertus), and its spikelets tend to be somewhat longer and quite sharply acute at summit. To the extent that we have investigated them, all reports from our area, or even all reports east of the Rockies, proved to be based on specimens of var. confertus. The range extension of microcarpus northward

into the Mackenzie District was based on a Kakisa River collection (DAO) similarly revised to var. confertus by Koyama in 1962. Another variant, var. Bissellii (Fern.) House (=S. expansus Fern.), has been reported for east of us, but we have not been able to substantiate its occurrence in Canada.

5. S. cyperinus (L.) Kunth var. cyperinus -- (Wool-Grass) -- Perianth bristles ± crinky and exserted, about 2-3 times the length of the scales and giving the inflorescence a brown-woolly appearance. Habit of the last few, the stem not quite round and the leaves narrowly elongate, mostly ± 5 mm wide. Involucral bracts much longer than the inflorescence and light to dark brown at base, forming an obvious colour patch at the base of the inflorescence, the latter becoming ± one-sided, its branches arching to drooping. Spikelets mostly 2-5 mm long, numerous, dark brown to blackish, some of them pedicellate, but mostly in glomerules of (2)-3-5. Mid summer. Marshes and shores at Lake of the Woods and Caddy and Shoal Lakes -- NF, NS-seMan, US -- Var. brachypodus (Fern.) Gilly (S. atrocinctus Fern.) -- The inflorescence bracts with darker and more conspicuous sheaths, blackish to black. More common and widespread. -- L-SPM, NS-BC, (US).

Reports of S. cyperinus (including S. Eriophorum Mx., etc.) from our area are apparently all referable to var. brachypodus, with the exception of a few collections from the extreme southeast corner of Manitoba. A collection from Lac-du-Bonnet (WIS) reported in Proc. Ac. Nat. Sc. Phil. 115: 306. 1964 proved to be somewhat intermediate in colouring.

6. S. nevadensis Watson -- Resembles the next, but much smaller. Stem somewhat triangular above, roundish below. Spikelets mostly over 1 cm long. Scales entire and usually not aristate, merely rounded at tip. Early summer. Shores of marshes: Delta and westward. -- scMan-BC, US, (SA).

7. S. pungens Vahl (S. americanus AA.) -- Three-Square, Sword-Grass -- A virgate, triangular herb, the stem leafless, the inflorescence secund and borne near the top. Stem sharply triangular, up to 1 m tall. Inflorescence bract stiffly erect, similar to the stem and seemingly continuing it. Spikelets usually not over 1 cm long. Scales short aristate and emarginate at summit, the sinus about 1 mm deep. Mid summer. Shores and marshes. -- (Aka), NF-SPM, NS-BC, US, (CA, SA, wEur, Oc).

The correct name of this species was worked out by A.E. Schuyler in Rhodora 76: 51-52. 1974.

8. S. lacustris L. (var. tenuiculmis Sheldon; S. acutus Muhl.; S. heterochaetus Chase; S. validus Vahl, var. creber Fern.) -- Bullrush, Toolies (Grand Jonc, Jonc des chaisiers) -- Very tall, leafless, cylindric stems, somewhat reminiscent of

a tall Onion leaf, 1-2 m high. Inflorescence lateral and seemingly near the top, the stem-like and erect bract rather short, often shorter than the inflorescence. Early summer. Common in less than 1 m of water. -- Mack-Y-(Aka), NF-SPM, NS-BC, US, (CA, SA), Eur.

Usually subdivided into a number of microspecies of which three are commonly recognized in U.S. and Canadian floras. The distinguishing criteria vary from flora to flora to monograph. In any of the classifications the criteria are neither strongly marked nor very constant, and the rank of species seems hardly warranted here. At the varietal rank they may be briefly noted as follows.

Var. tenuiculmis Sheldon; S. heterochaetus Chase -- Spikelets light brown. Stigmas 3. Achene unequally trigonous, one angle being much lower than the other two. Pedicels and spikelets more elongated than in the next two.

Var. condensatus Peck; S. validus Vahl -- Spikelets dull brown. Scales not strongly spotted. Stigmas 2. Achene biconvex.

Var. glaucus (Sm.) Böck., var. occidentalis Watson; S. acutus Muhl. -- Spikelet darker, red brown, the scales being abundantly maculate in deep red. Stigmas 2. Achene biconvex. Glaucus is probably not the earliest available epithet.

All three segregates have been recognized from our area; they are largely, if not wholly, sympatric; their taxonomic interest, if any, is not yet obvious to us.

9. S. Clintonii Gray -- Resembles an Eleocharis, but the filiform stem is triangular and scabrous above the middle. Mostly 1-2 dm high and tufted. Spikelet less than 1 cm long, subtended by a small bract shorter than the spikelet and often scale-like. Early summer. Rare in dry coniferous forests: Meadow Lake, Buck Lake. -- NB-O, S-Alta, US.

10. S. caespitosus L. var. caespitosus (var. callosus Big., ssp. austriacus AA.) -- Deer-Grass, Deer's Hair -- Also resembling an Eleocharis; in large tufts of filiform and leafless but round stems. Leaves all basal and reduced to a sheath and sometimes a vestigial blade. Mostly 2-3 dm high. Achene about 2 mm long. Early summer. Infrequent in boggy places. -- G-Aka, L-SPM, NS-BC, US, Eur.

Usually subdivided in two varieties or subspecies by most European authors, the primary basis being the slant of the summit of the sheath of the uppermost leaf. In var. caespitosus (or var. callosus), widespread around the northern hemisphere, the opening is slanted at about 45° and measures about 1.0-1.5 mm along the longer axis. In var. austriacus (Palla) stat. n., Trichophorum austriacum

Palla, Ber. Deutsch. Bot. Ges. 15: 468. 1897, of European distribution, the angle is much steeper and the opening is commonly 2-3 mm long. Other reported criteria did not measure up to expectations.

In accordance with the Code of Botanical Nomenclature the correct varietal name for our plants is var. caespitosus since it is the typical variety.

11. S. pumilus Vahl var. Rollandii (Fern.) Beetle -- Resembles the previous, but stoloniferous and forming very small tufts. Less than 2 dm high. Achene small and black. Early summer. Rare or inconspicuous in alkaline bogs and limestone river flats. -- swMack-sY, (cL), seQ, cS-BC, (US).

Seen only from Sutherland (DAO) and Jasper (DAO).

Ours is technically separable from the paleogean phase on minutiae of size and shape of the achene. In var. pumilus the achene is narrowly ellipsoid-trigonous, mostly 1.6-1.7 mm long by 0.7 mm broad, at least twice as long as broad or a little longer, the angles nearly equally sharp and the sides flattish. In var. Rollandii the achene is lenticular-obovate, (1.3)-1.4-1.6-(1.7) mm long by (0.7)-0.8-0.9-(1.0) mm wide and usually less than twice as long as broad, convex on one face, the other with a low and obtuse ridge. Other reported criteria did not stand up under close checking.

12. S. hudsonianus (Mx.) Fern. (Eriophorum alpinum L.; Leucocoma alpina (L.) Rydb.) -- Bristles elongating to 2 cm or more as in Eriophorum, but not forming a dense tuft, there being only 6 bristles per flower. Late spring and early summer. Muskegs. -- seK-Aka, L-SPM, NS, NB-BC, US, Eur.

An intermediate type, it is often placed in Eriophorum, or erected into a monotypic genus.

13. S. rufus (Hudson) Schrader -- Inflorescence a deep brown distichous spike of spikelets. Stem 2-4 dm high with the habit of the last 4 species. Bract of the inflorescence varying from small and inconspicuous, to overtopping the spike. Early summer. Alkaline bogs, rare: Sutherland and eastward. -- seK-Mack, Aka, NF, NS-cS.

Known or reported from Delta, the Red Deer River, Churchill (QFA) and Sutherland (DAO).

American plants are reputed to have smaller and more tapered achenes, hence they have been segregated as var. neogaeus Fern. But the distinction is not borne out by the specimens at hand.

Despite Manitoba reports of S. Torreyi Olney by Fernald 1950 and Scoggan 1957, we have found no corresponding sheet at

CAN or GH. But there is a collection labelled V.W. Jackson, Delta, July 25, 1921 (WIN) which is a mixture on the one hand of two plants of S. americanus linked by a rhizome, and on the other hand a dissected fragment of S. Torreyi. Obviously this fragment does not come from the colony represented by the rest of the sheet, and further the fragment is in a more advanced stage of maturity and corresponds to a collection that might have been made in late summer. We see no reason to accept the label data as applicable to the dissected fragment. To our knowledge, Manitoba reports of S. Torreyi are still to be substantiated.

5. ELEOCHARIS Br. SPIKE-RUSH

Achene crowned by the persistent and much enlarged base of the style. Otherwise as in Scirpus and especially like the last few species. Stem leafless, the basal leaves reduced to sheaths with or without a vestigial blade. Spike small, solitary, terminal, its bract small and similar to the scales.

a. Annual in large tufts of divergent stems ..... 3. E. ovata
aa. Perennial and stoloniferous, the erect stems solitary or in small tufts.
b. Style not constricted at base ..... 1. E. quinqueflora
bb. Base of the style set off by a constriction from the top of the achene.
c. Achenes white, with longitudinal ribs ..... 2. E. acicularis
cc. Coarser plants with coloured and ribless achenes.
d. Stigmas 2; achene lenticular... 4. E. palustris
dd. Stigmas 3; achene trigonous ..... 5. E. tenuis

1. E. quinqueflora (Hartmann) Schwarz (E. pauciflora (Lightf.) Link, var. Fernaldii Svenson, var. Suksdorfiana (Beauv.) Svenson) -- Somewhat intermediate to Scirpus, the bract slightly longer than the scales and the elongate style only slightly enlarged at base, not set off by a constriction. Lowest bract or scale at least half as long as the spikelet, otherwise quite similar in texture and colour to the other scales and sharply differenciated from the tissue of the stem. First half of summer. Water's edge. -- G, (seK)-Mack-Y-(Aka), NF-SPM, NS-PEI-(NB)-Q-BC, US, Eur.

Most american floras call this plant E. pauciflora, but it was pointed out by Schwarz 1949 that the epithet quinqueflora has priority by 10 years.

Plants from eastern North American are often distinguished as var. Fernaldii and those from our area have been called either var. Fernaldii or more rarely var. Suksdorfiana. Repu-

ted varietal differences are not borne out clearly by the specimens at hand.

The basis for the Alberta report of E. rostellata Torrey by Moss 1959 and Boivin 1967 was a pair of specimens, Brinkman 814, Craigmyle, 1923 (ALTA) and Breitung 16623, Chief Mtn., 1953 (ALTA), both revised since to E. quinqueflora. The Waterton collection was not listed by Breitung 1957.

2. E. acicularis (L.) R. & S. (var. occidentalis Svenson, var. submersa (Nilss.) Svenson) -- Forming dense carpets of filiform stems, usually 0.1-0.2 m thick and less than 1 dm high. Sheath dilated-ventricose and membranous in the upper part. Spikelet small, often lacking. Scales up to 2.5 mm long. Achene small, pearly-white. Summer. Exundated places. -- G-Aka, L-SPM, NS-BC, US, (CA), Eur, (Oc).

Re E. Wolfii Gray reported for Alberta by Gleason 1952, see comment under Buchloë dactyloides. A report for Saskatchewan by Fernald 1950, repeated by Svenson 1957, was similarly discounted by Breitung 1957. Despite the many reports, only one Canadian sheet could be located under that name: J. Macoun 7548, Crane Lake, June 9, 1894 (NY). It is a small plant with a polygonal stem 0.2 mm thick, etc., and we can't see why it should not belong with E. acicularis.

3. E. OVATA (Roth) R. & S. (E. Engelmannii Steudel, var. monticola (Fern.) Svenson; E. obtusa (W.) Schultes) -- Dense tufts of stems of widely varying lengths, the longest often 10 times the shortest. Spikelet becoming truncate at base at maturity. Achene mostly 1 mm long or slightly less, whitish turning brown, strongly biconvex with a pair of raised marginal nerves. Summer. Places submerged earlier. -- (NF), NS-BC, US, Eur, (Oc).

Present evidence would seem to indicate an introduced species in our area. The first collection, and the only one known to Scoggan 1957 or to Svenson, the monographer of the genus, was by Macoun at Killarney along a railroad in 1896. All other collections seen are of the last twenty years and are rather few in number. For Manitoba we have seen it from Otterburne, 1954 (MSM) and Hecla Island, 1961 (DAO). Breitung 1957 does not list it for Saskatchewan and we have seen only the following more recent collections: Regina, 1958 (DAO); Saskatoon, 1965 (DAO); Sutherland, 1965 (DAO), and Govan, 1967 (DAO). For Alberta we know of only a collection by Moss in 1952 at Granum (DAO). The habitat of the oldest collection, the general lack of old collections across our area and the high sporadism of the few known collections, all point to an adventive in process of entrenchment around sloughs and other wet places.

4. E. palustris (L.) R. & S. (E. calva Torrey; E. mamillata Lindb. f.; E. uniglumis (Link) Schultes) -- Clubrush (Jonquine) -- Highly variable species from blackish rhizomes. Stem 1-6 dm high, (0.5)-1.0-3.0-(5.0) mm thick. Tissue of the stem grading into the tissue of the lowermost scale to form a broad green zone in the lower half. Spikelet usually lanceolate, commonly 1 cm long or more. Lowest scales less than ½ as long as the spikelet. Stigmas 2. Achene obovoid, mostly ± 1.5 mm long, yellowish turning brown, obscurely lenticular, both faces being strongly convex. Tubercule higher than broad. First half of summer. Wet places. -- G, seK-Aka, L-SPM, NS-BC, US, (CA), Eur, (Afr, Oc).

The american representatives of E. palustris are often subdivided into 2 to 6 species. The primary basis of the classification is the ± clasping base of the lowermost scale of the spikelet. In E. uniglumis the base of the scale encircles the stem completely or nearly so. Such plants always have a thin stem. But E. palustris proper is usually a coarser plant with a fatter and longer spikelet and the lowermost scale encircles the stem only halfway or two thirds of the way around. The variation on that score appears to be continuous and gradual throughout the range; the distinction seems arbitrary.

In the more elaborate classification adopted by Fernald 1950 and accepted in the North American Flora 1957, three names refer to costal plants, the three other names refer to inland plants and are relevant to our area. In this latter scheme the plant described above as E. uniglumis becomes E. calva (or E. erythropoda Steudel) while E. palustris is restricted to the Old World, its american counterparts being an eastern E. Smallii Britton from Manitoba eastward and a western E. mamillata (or E. macrostachya Britton). The geographical segregation of E. palustris (Old World), E. Smallii and E. macrostachya is plain enough, but the morphological basis of the distinction is more elusive.

5. E. tenuis (W.) Schultes var. tenuis (E. nitida Fern.) -- Kill-cow, Poverty-Grass -- As the preceding but the tubercule depressed, much wider than high. Stems filiform, mostly 0.2-0.3 mm thick, with 4-(5) rather sharp angles. Spikelet tending to ovoid and commonly ± 0.5 cm long. Stigmas 3. Achene ± 1.0 mm long, usually golden yellow, ± trigonous, the faces slightly convex. First half of summer. Wet places; rare: Stony Rapids -- (Aka), NF-SPM, NS-O, nS, US -- Var. borealis (Svenson) Gleason (E. elliptica Kunth) -- Stem thicker and not flattened, angular-cylindric, mostly 0.3-0.5 mm wide, the angles mostly 6-8. -- NF-(SPM), NS, NB-BC, US -- Var. atrata (Svenson) Boivin (E. acuminata AA.; E. compressa Sullivant) -- Stem flattened, 0.5-1.5 mm wide, about 2-3 times wider than thick, the 6-8 angles being very unequal. -- NS, Q-Man-(S)-

Alta-BC, US.

Var. tenuis with filiform stems is primarily eastern and var. atrata with flattened stems is primarily western, while var. borealis is more or less transcontinental. Old records are not very reliable. Macoun 1888 at first reported E. tenuis as far west as the Rockies, but in 1890 the Manitoba and Saskatchewan records were transfered to E. acuminata. More recently Scoggan 1957 has placed the Porcupine Mountain specimen under E. pauciflora, Breitung 1957 has refered the Moose Jaw report to E. compressa and we have revised the Kananaskis collection (DAO, MTMG) to E. quinqueflora. However a more recent report of Argus 1968 from the eastern end of lake Athabaska proved to be based on a specimen (SASK) quite characteristic of var. tenuis, which leads us to speculate that the typical phase may still prove to extend westward across the northern reaches of our area, even if all earlier and more southern reports proved to be questionable.

6. CLADIUM Browne

As in Scirpus, but each spikelet subtended by more than one sterile scales and holding only 1-(2) fertile flowers. Bristles lacking.

1. C. mariscoides (Muhl.) Torrey (Mariscus mariscoides (Muhl.) Kuntze) -- Twig-Rush -- General habit of S. atrovirens, etc., but with 1-2 additional inflorescences on long peduncles from the axils of the upper leaves. Stem cylindric, becoming deeply channeled above on one side. Spikelets warm brown. Mid summer. Bogs; very rare: Wallwort. -- swNF, NS, NB-O, ecS, US.

Collected once at Wallwort near Dahlton in 1936 (DAO, SASK). The McKague report by Breitung 1947 is apparently a lapsus calami.

7. RHYNCHOSPORA Vahl BEAK-RUSH

The flower borne amid a ring of bristles. Achene crowned by a tubercule as in Eleocharis. Otherwise similar to Cladium, the spikelet similarly much reduced and subtended by many empty scales.

This genus has been rarely collected in our area and comes from rather scattered localities. The first species is known from Dahlton (SASK), Wallwort (DAO), McKague (DAO), Little Gull Lake (SASK), Hudson Bay Junction (DAO), Prince Albert (SASK) and Nipawin (DAO). The discontinuity across Manitoba and Alberta is rather unexpected. The second species has been collected at Bird's Hill (DAO), Nipawin (DAO, MT), Wallwort (DAO), Prince Albert, and Heather Down (DAO). It is

not clear at this stage if this reflects the true occurrence of these species on merely the inadequacy of field work.

a. Spikelets whitish to pale coloured ..... 1. R. alba
aa. Darker and brown ..... 2. R. capillacea

1. R. alba (L.) Vahl -- Spikelets whitish at first, maturing pale pinkish-brown. Bristles about 10. Spikelets in 1-2-(3) glomerules. Achene broadly obovate, abruptly contracted into the tubercule. First half of summer. Bogs, rare. -- Aka, L-SPM, NS-O, S(c,n), BC, Eur.

2. R. capillacea Torrey -- Generally larger, the spikelets brown. Bristles about 6. Achene oblong, gradually tapering into the tubercule. First half of summer. Bogs, uncommon. -- NF, NS, NB-Alta, US.

On a distribution map of R. fusca (L.) Aiton f. by Hultén 1958 there is a dot in east-central Saskatchewan. The source of the report has not been investigated.

8. KOBRESIA W.

Generally resembling Carex. Spikelet reduced to 1-(2) fertile flowers. Each achene subtended by 3 bracts, the outer being the bract of the spikelet and the inner, partly enclosing the achene, is the equivalent of the perigynium. Spikelets numerous in a condensed spike or panicle of spikelets.

a. Panicle of spikelets, the lowermost branch bearing 2-8 one-flowered spikelets ... 1. K. simpliciuscula
aa. Inflorescence simple, a spike of spikelets ..... 2. K. myosuroides

1. K. simpliciuscula (Wahl.) Mack. var. americana Duman -- As the following but taller, mostly 2-3 times taller than the leaves, and the inflorescence more complex. Early summer. Arctic tundra and subalpine bogs. -- G-Aka, NF, Q-nMan, swAlta-BC, US.

The eurasian var. simpliciuscula has a slightly larger achene, its body ± 2.5 mm long.

2. K. myosuroides (Vill.) F. & P. (K. Bellardii (All.) Degland) -- Resembles a densely tufted Carex, but the scape leafless and the inflorescence devoid of leafy bracts. Basal leaves tending to be as tall as the scape. Mid summer. Alpine slopes. -- G-Aka, L, nQ, swAlta-eBC, US, Eur.

The epithet myosuroides is usually supposed to start with Villars, Hist. Pl. Dauph. 2: 194. 1787, two years later than Bellardii Allioni, Fl. Ped. 2: 264. 1785. But it was pointed out by Mansfeld 1938 and Hylander 1945 that myosuroides

actually came out much earlier in Villars, Prosp. Hist. Pl. Dauph. 17. 1779 and has priority. The latter could not be checked as it is a very rare book and we are aware only of the one copy in existence, in the library of De Candolle.

9. CAREX L. SEDGE

Achene enclosed in a bottle-shaped bract termed "perigynium", with only the style and stigmas exserted. Flower unisexual, subtended by a scale, borne in spikes that are often unisexual. The spike is termed "androgynous" if the male flowers are at the top and the female ones at the base, or "gynandrous" if the pistillate ones are at the top. In the text that follows the unspecified description of scales always refers to pistillate scales.

We are indebted to J.H. Hudson, of Saskatoon for much documentation and many invaluable comments and suggestions with regard to our treatment of Carex.

By far our largest genus and a rather important one. Most of our species belong to a few sections that may be readily recognized as follows. The two subgenera are also useful concepts.

Subgenus Vignea. Species 1-52. Stigmas 2 and the achene lenticular. Perigynium tending to reflect the shape of the achene and to be similarly flattened into a biconvex or plano-convex structure. Spikelets typically all similar, and mostly carrying both staminate and pistillate flowers. At maturity the staminate flowers are often reduced to a group of empty scales at the top or base of each spikelet. Spikelets nearly always sessile. The perigynium shows a dorsal suture.

Sections 1. Nardinae to 3 Callistachys, species 1 to 4, are unispicate.

Sections 4. Foetidae to 11. Vulpinae, species 5 to 20. Terminal spike androgynous. Further, the species of the first four sections are long stoloniferous, but loosely to densely tufted in the last four.

Sections 12. Heleonastes to 16. Ovales, species 21 to 52. Terminal spikelet gynandrous, the others spikelets either gynandrous or pistillate.

Section 12. Heleonastes, species 21-30. Resembles the Ovales, but the perigynium not winged. This and section Ovales comprise nearly all the species with gynandrous spikelets.

Sections 16. Ovales, species 35-52. Perigynium strongly flattened and produced at the sides into longitudinal wings. The 6. Arenariae, species 9-10, also have winged perigynia, but their spikelets are androgynous.

Subgenus Carex, species 54-128. Stigmas typically 3 and the achene triangular. Perigynium tending to be round, often inflated. Spikelets typically dimorphic with the terminal one entirely staminate and the lower ones entirely pistillate. Often the lower spikelets are borne on long pedicels and drooping. Perigynium without obvious dorsal suture.

Sections 17. Polytrichoideae to 42. Cryptocarpae, species 53 to 113. Style of a different texture from the achene and withering in age, usually falling off at the junction point. This large group does not lend itself to convenient subdivisions, but some more readily recognizable types can be singled out.

In subgenus Carex the style divides into three stigmas, but there are three exceptional sections as follows. Section 41. Acutae, species 103-110. Stigmas 2 and the achene lenticular, the perigynium rather flattened, otherwise typical of the subgenus. Scales obtuse to acute. The 42. Cryptocarpae, species 111-113, differ from the Acutae by their aristate scales and the achene is marked by a deep groove on one angle or face. The 27. Bicolores, species 71-73, also have 2 stigmas. And 122. C. saxatilis in the Vesicariae has only 2 stigmas.

Section 40. Atratae, species 96-102. Resembles the Acutae by its small beakless and strongly compressed perigynia, but the stigmas are 3 and the achene is trigonous. The terminal spike is mostly gynandrous. The 39. Limosae, species 93-95, are also similar but the roots are felty-pubescent and the terminal spike is staminate.

The stem may bear many spikelets, but 6 species belonging to as many small sections have only one spikelet. These are: 17. Polytrichoideae, 19. Filifoliae, 20. Obtusatae, 22. Scirpinae, 24. Rupestres, and 25. Firmiculmes.

The perigynia are densely puberulent and ± obovoid, being somewhat tapered at base, in section 21. Montanae, species 58-61. Some spikelets may be ± hidden among the basal leaves. Another 10 species with pubescent perigynia are found in sections 23. Digitatae, 32. Sylvaticae, 36. Ferrugineae, 38. Hirtae. Further, there are two species with glabrous perigynia but pubescent foliage in sections 32. Sylvaticae, and 37. Virescentes.

Some 8 or 10 species with a gynandrous terminal spikelet are found in sections 31. Gracillimae, 33. Capillares, 36. Ferrugineae and 40. Atratae.

Mostly the spikelets are borne together near the top of the stem, or at least in the upper half of the stem. But in some 8 species the inflorescence is more scattered and

at least one spikelet is borne below the middle of the stem. These are in sections 21. Montanae, 23. Digitatae, 28. Paniceae, 29. Laxiflorae, 30. Granulares and 33. Capillares.

Finally there are some 12 species with their style sharply defined as described above, but either they cannot be regarded as members of any broadly defined group, or else they fit only in part in any of the above groupings. These comprise sections 18. Phyllostachyae, 26. Albae, 28. Paniceae, 29. Laxiflorae, 33. Capillares, 34. Longirostres and 35. Extensae, along with part of sections 20. Obtusatae and 24. Rupestres.

Lastly, in sections 43. Orthocerates to 48. Lupulinae, species 114 to 128, the achene and the style are of the same colour and texture, and the style is persistent. The perigynium is strongly inflated in such a way that the achene occupies only half of the cavity of the perigynium.

Briefly these last 6 sections may be characterized as follows: 43. Orthocerates is unispicate; in 44. Folliculatae and 48. Lupulinae, the perigynium is longest, at least 1 cm long; in 45. Pseudo-Cyperae there is only one staminate spikelet; in 46. Paludosae and 47. Vesicariae there is usually 2 or 3 staminate spikelets. The inflorescence may also bear more than one staminate spikelet in the following sections: 38. Hirtae, 41. Acutae and 42. Cryptocarpae.

The reader interested in this genus should consult Hudson 1978 for more detailed descriptions and pertinent comments as to ecology, distributions, and distinctiveness of the more troublesome taxa.

KEYS TO CAREX

a. Inflorescence simple, a single terminal spike ..... Group A
aa. Inflorescence compound: a spike of spikelets or a raceme of spikelets; sometimes a panicle of spikelets.
b. Inflorescence entirely staminate. Divisae.
c. Spikelets subcylindric, 3-4 times longer than wide ..... 6. C. Douglasii
cc. Much shorter and rather ovoid to oblong ..... 8. C. praegracilis
bb. Perigynia present.
d. Stigmas 3; achene trigonous or round ..... Group G
dd. Stigmas 2; achene lenticular; perigynia glabrous.
e. Lower spikelets clearly pedicellate ... Group B
ee. All spikelets sessile except usually the upper one.
f. Spikelets dimorphic, the terminal much narrower and staminate ..... Group B
ff. Spikelets rather similar, at least in their general appearance, the terminal one entirely or partly pistillate. Subgenus Vignea.
g. Spikelets gynandrous.
h. Perigynia flattened, the edges grading into a marginal wing. Ovales ..... Group C
hh. No marginal wing ..... Group D
gg. Spikelets androgynous, exceptionnaly dioecious.
i. Long stoloniferous ..... Group E
ii. Densely to loosely tufted ..... Group F

UNISPICATE SPECIES

Group A

Inflorescence a single terminal spike. See also Group E for some species simulating group A, their many spikelets reduced and crowded into a spike-like but really compound inflorescence.

a. Spike staminate only.
b. Leaves less than 1 mm wide. Dioicae ..... 31. C. gynocrates
bb. 2-3 mm wide. Scirpinae ..... 62. C. scirpoidea
aa. At least partly pistillate.

c. Perigynia pubescent.
d. Spikes hidden among the leaf bases ..... 61. C. umbellata
dd. Spikes borne on scapes at least as long as the leaves.
e. Spike entirely pistillate ... 62. C. scirpoidea
ee. Spike androgynous. Filifoliae ..... 55. C. filifolia
cc. Perigynia glabrous.
f. Spike with a single (rarely 2) perigynium at the base. Firmiculmes ..... 69. C. Geyeri
ff. With more than one pistillate flower.
g. Perigynia 2.0-3.5 mm long ..... Group A-1
gg. Longer, 4-8 mm long.
h. Scales leaf-like and many times longer than the erect perigynia. Phyllostachyae .. 54. C. Backii
hh. Scales much shorter than the perigynia, the latter reflexed at maturity. Orthocerates.
i. Perigynia 3-4 mm long ..... 114. C. microglochin
ii. Perigynia fewer and bigger, 5-8 mm long ..... 115. C. pauciflora

Group A-1

The single spike bearing more than 2 perigynia, these glabrous, rather small, and erect to spreading.

a. Perigynia green, beakless and rounded at tip. Polytrichoideae..... 53. C. leptalea
aa. Perigynia acute to beaked.
b. Styles 2; leaves less than 1 mm wide.
c. Mature perigynia strongly falcate and mostly spreading. Dioicae ..... 31. C. gynocrates
cc. Perigynia straight.
d. Perigynia narrowly obovate and stipitate. Nardinae ..... 1. C. nardina
dd. Perigynia broadly ovate and sessile.
e. Spike androgynous; plant 1 dm high or more. Capitatae ... 2. C. capitata
ee. Spike gynandrous; stem less than half as high ..... 25. C. ursina
bb. Styles 3; leaves mostly wider.
f. Scales lightly tinged in brown and much lighter in colour than the dark red-brown perigynia. Obtusatae ..... 56. C. obtusata
ff. Scales dark brown, about as deeply coloured or more deeply coloured than the

perigynia.
g. Scales about as long as the sessile perigynia, the latter with a short and abruptly defined beak. Rupestres ..... 67. C. rupestris
gg. Perigynia stipitate, protruding beyond the scale by about 1 mm, or about the length of the poorly or weakly defined beak. Callistachys.
h. Loosely stoloniferous; leaves mostly 2-3 mm wide ..... 4. C. nigricans
hh. Densely tufted; leaves around 1 mm wide ..... 3. C. pyrenaïca

DIGYNOUS SPECIES

Group B

Stigmas 2 and the achene lenticular. Perigynia compressed to inflated. Otherwise typical in habit of the subgenus Carex. Cryptocarpae, Bicolores and Acutae.

a. Scale abruptly contracted into a long scabrous awn. Cryptocarpae.
b. Tufted; stem scabrous at least above and in the inflorescence ..... 111. C. crinita
bb. Stoloniferous; stem smooth ..... 112. C. paleacea
aa. Scale awnless or sometimes with a short and smooth awn.
c. Stem short, usually under 5 cm; terminal spike gynandrous ..... 71. C. rufina
cc. Stems taller; terminal spike usually staminate.
d. Perigynia inflated to somewhat compressed, becoming broadly rounded along the edges.
e. Beak ± 0.5 mm long; perigynium usually dark purple. Vesicariae .... 122. C. saxatilis
ee. Perigynium beakless, pale coloured. Bicolores.
f. Pistillate scales broadly rounded, deep brown with a green midnerve ..... 72. C. bicolor
ff. Scales of a lighter colour and obtusish to short cuspidate; peduncles longer ..... 73. C. aurea
dd. Perigynia strongly flattened, sharply acute at the edges.
g. Achene with a deep groove on one side near the middle; scales acutish to short aristate; maritime plants. Cryptocarpae ..... 113. C. salina

gg. Achene plump. Acutae ..... Group B-1

Group B-1

Acutae. Perigynia strongly flattened and the scales not aristate. Stigmas 2, as above. Often with 2 or 3 staminate spikes.

a. Terminal spike less than 2 cm long, mostly around 1 cm.
  b. Terminal spike staminate; stem and leaf margins scabrous throughout ..... 103. C. Bigelowii
  bb. Terminal spike usually gynandrous; leaves and stems smooth or scabrous only towards the tip ..... 106. C. eleusinoides
aa. Longer, 2-6 cm long, only exceptionally shorter.
  c. Scales exserted, being longer than the perigynia.
    d. Perigynia with 5 longitudinal nerves on each face; leaves 3-7 mm wide ..... 107. C. nebraskensis
    dd. Either the perigynia nerveless or the leaves narrower.
      e. Aphyllopodic; stem scabrous and sharply triangular; spikelets mostly 3-4 mm wide ..... 110. C. stricta
      ee. Phyllopodic.
        f. Lowest bract overtopped by the inflorescence; spikelets 5-7 mm wide ..... 108. C. aperta
        ff. Lower 2 or 3 bracts equalling or overtopping the inflorescence; stem smooth or nearly so ..... 109. C. aquatilis
  cc. Scales shorter than, to nearly as long as the perigynia.
    g. Stem very scabrous on the angles, deeply concave on the faces; densely tufted ..... 110. C. stricta
    gg. Stem smooth or nearly so, flattish on the sides.
      h. Leaves 2-8 mm wide, at least some of them over 3 mm; long stoloniferous, the stems in small tufts.
        i. Perigynia with ± 12 prominent nerves, one on each side and ± 5 on each face ..... 107. C. nebraskensis
        ii. No nerves on either face, only the 2 marginal ones present; perigynia sessile or nearly so..109. C. aquatilis

hh. Leaves narrower, 1.0-2.5 mm wide; tufted plants; perigynia stipitate.
j. Inflorescence primarily green in colour and gradually more lightly coloured below, the lower scales with a median green band at least as wide as the lateral red brown zones ..... 104. C. lenticularis
jj. Inflorescence darker, the scales with a much narrower green band ..... 105. C. Kelloggii

Group C

Perigynia strongly flattened and the edges produced into a narrow to wide peripheral wing. Tufted and the spikelets gynandrous. Ovales.

The key to Group C is quite homogeneous, comprising all species of the section Ovales and none other. For the convenience of the user this key has therefore been placed at the beginning of the section Ovales.

Group D

Spikelets gynandrous and generally resembling the Ovales, but the perigynia not quite so flat and the edges wingless, merely bordered by a raised nerve on each side. In this group the lateral spikelets are quite sessile. Some specimens of section Bicolores may tend to key out here, but they will stand out by their dark brown scales and, upon close examination, the lower spikelet will proved to be pedunculate by at least 1-3 mm and the perigynium is devoid of spongy tissue.

a. Perigynium without spongy tissue at base; inflorescence deep brown, small, crowded, and pyramidal, about 1 cm long ..... 38. C. illota
aa. Spongy tissue present; inflorescence green to lightly brown-tinged, varying from crowded to moniliform.
b. Lower 1/3 or 1/2 of the perigynium cavity filled with soft, spongy tissue; achene stipitate and occupying only the upper part of the cavity.
c. Scales and beaks at least lightly brown-tinged; perigynia shorter. Stellulatae.
d. Perigynium ± 2.5 mm long ..... 32. C. interior
dd. Larger, (3.0)-3.5-(4.0) mm long ..... 33. C. phyllomanica
cc. Inflorescence pale green; perigynia usually 4-5 mm long. Deweyanae ... 34. C. Deweyana

bb. Only a thin layer of spongy tissue; achene occupying nearly the whole of the cavity. Heleonastes ..... Group D-1

Group D-1

Plants tufted. Spikelets sessile and gynandrous. Perigynia with a thin layer of spongy tissue in the lower part, yet the achene still occupying most of the cavity. Heleonastes.

a. Spikelets ± overlapping.
b. Scales membranous and quite colourless except for the green midnerve.
c. Spikelets 2-(3) ..... 23. C. tenuiflora
cc. Much more numerous ..... 30. C. arcta
bb. Scales light to dark brown ..... 26. C. Heleonastes
aa. At least the lowermost spikelet distant.
d. Lowest spikelet very remote and subtended by a bract as long as the inflorescence ..... 22. C. trisperma
dd. Bracts much shorter, usually shorter than the spikelets.
e. Perigynia obtusish and quite beakless at tip ..... 24. C. loliacea
ee. Contracted into an acute but short beak.
f. Spikelets subglobose and spreading ..... 28. C. brunnescens
ff. Spikelets oblong and nearly erect.
g. Perigynia sessile ..... 29. C. curta
gg. Stipitate, the stipe 0.3-0.5 mm long ..... 27. C. Mackenziei

Group E

Long stoloniferous species with at least the terminal spikelet androgynous. Or sometimes dioecious. Stigmas 2 and the achene lenticular. Spikelets sessile or essentially so, often small and crowded into a small inflorescence which may simulate a single spike.

a. Perigynia narrowly wing-margined above as in the Ovales. Arenariae.
b. Perigynia 4.5-6.0 mm long ..... 10. C. siccata
bb. Perigynia shorter; spikelets more numerous ..... 9. C. Sartwellii
aa. Not wing-margined, merely with proeminent lateral nerves.
c. Scale broadly acute to obtuse, shorter than the perigynium.
d. Perigynia rounded on the sides, almost globular. Heleonastes ..... 21. C. disperma

dd. Perigynia acute along the sides, more so towards the summit. Foetidae ... 5. C. maritima
cc. Scale acute to cuspidate, longer than the perigynium.
e. Perigynia at first strongly flattened, becoming nearly globular; stem arising from a superficial stolon. Chordorrhizae ..... 11. C. chordorrhiza
ee. Perigynia plano-convex. Stem borne on an underground rhizome. Divisae.
f. Usually (3)-4-(5) dm high; leaves mostly 2 mm wide ..... 8. C. praegracilis
ff. Shorter plants, the leaves all or mostly narrower, often filiform.
g. Heads dioecious or nearly so and usually pale green .... 6. C. Douglasii
gg. Spikelets deep brown and androgynous ..... 7. C. stenophylla

Group F

Spikelets androgynous and generally similar to group E, but growing in loose to dense tufts, not spreading by long stolons, nor forming a carpet.

a. Inflorescence a spike of spikelets ..... Group F-1
aa. Inflorescence more or less obviously branched into a narrow panicle ..... Group F-2

Group F-1

Spikelets borne one at a time, forming a spike.

a. Spikelets quite remote.
b. Perigynia mostly in 2's and equally convex on both faces. Heleonastes ..... 21. C. disperma
bb. Perigynia 3-5 to a spikelet, flat ventrally, convex dorsally. Bracteosae ..... 12. C. rosea
aa. Spikelets conspicuously overlapping.
c. Leaves 3.5-5.0 mm wide.
d. Stem winged, the wing about 0.5 mm wide. Vulpinae ..... 20. C. alopecoidea
dd. Stem triangular and wingless, although the corner nerve is often strongly raised on the edge. Bracteosae .....15. C. gravida
cc. Narrower, 1.5-3.5 mm wide. Bracteosae.
e. Scales ± acute, as long as to shorter than the perigynia ..... 13. C. Hoodii
ee. Scales cuspidate to short aristate, longer than the perigynia ..... 14. C. Hookerana

Group F-2

Inflorescence more complex, more or less paniculate, at least a lower branch present and bearing 2 or more spikelets. All of our species with a branched inflorescence belong in this group.

a. Bracts quite conspicuous, the lowest usually overtopping the inflorescence. Multiflorae ..... 16. C. vulpinoidea
aa. Bracts very short or the lower sometimes longer than its spikelet.
b. Leaves 1-3 mm wide. Paniculatae.
c. Upper part of sheath copper-brown .. 18. C. prairea
cc. Sheath merely brown-dotted ventrally ..... 17. C. diandra
bb. Leaves larger, the largest 4-8 mm wide. Vulpinae.
d. Beak of perigynium longer than the body ..... 19. C. stipata
dd. Beak obviously shorter than the body ..... 20. C. alopecoidea

TRIGYNOUS SPECIES

Group G

Stigmas 3 and the achene consequently trigonous, but sometimes obscurely so when the achene is so plump as to appear round.

a. Perigynia pubescent ..... Group H-1
aa. Perigynia glabrous, or at most scabrous-puberulent along the margins.
b. Herbage variously pubescent ..... Group H-2
bb. Herbage glabrous or, at the most, scabrous.
c. Terminal spike gynandrous ..... Group I
cc. Terminal spike staminate or sometimes androgynous.
d. Spikelets scattered; some borne below the middle or at the base of the stem ..... Group K
dd. Spikelets all borne well above the middle of the stem, forming a terminal raceme or spike of spikelets.
e. Pistillate spikelets all sessile, or sometimes the lowest on a short peduncle less than 5 mm long ..... Group L
ee. Pistillate spikelets pedunculate, the lowest peduncle over 5 mm long, but sometimes somewhat included in the sheath of the bract.

f. Staminate spikes 2-4 ..... Group M
ff. Only 1.
g. Spikelets 1.0-2.5 cm wide ..... Group N
gg. Narrower.
h. Spikelets pale coloured, the scales hyaline to straw-coloured ..... Group O
hh. Darker, the scales at least with 2 broad brown bands.
i. Lowest bract with a sheath at least 5 mm long ..... Group P
ii. Sheaths shorter, mostly 1-2 mm long ..... Group Q

PUBESCENT SPECIES

Group H-1

An artificial group comprising all the species of the subgenus Carex with pubescent perigynia.

a. Terminal spike androgynous, the lateral ones drooping on long peduncles.
b. Inflorescence terminal. Ferrugineae ..... Group J
bb. Spikelets borne from base to top of the stem ..... 63. C. pedunculata
aa. Terminal spike staminate.
c. Beak emarginate or obliquely cut and asymmetrical at tip, obtusish, or more rarely prolonged into a single sharp point; not bifid.
d. Bracts leaf-like and overtopping the spikelets. Sylvaticae ..... 82. C. assiniboinensis
dd. Bracts bladeless, reduced to a coloured scale or sheath. Digitatae.
e. Pistillate scales finely ciliate ..... 64. C. concinna
ee. Not ciliate.
f. Spikelets widely scattered from base to top of the stem ..... 63. C. pedunculata
ff. Spikelets all borne near the top.
g. Bracts reduced to coloured sheaths about 1 cm long ..... 66. C. Richardsonii

gg. Bracts smaller, scale-like and only short sheathing ..... 65. C. concinnoides

cc. Beak shallowly to deeply bifid into a pair of sharp and subequal teeth.

h. Terminal staminate spike 2 cm long or more. Hirtae.

i. Perigynia densely tomentose, the pubescence obscuring the nerves ..... 92. C. lasiocarpa

ii. Pubescence more sparse, the nerves obvious ..... 91. C. Houghtoniana

hh. Staminate spike shorter, less than 2 cm. Montanae.

j. Stems all elongate and somewhat longer than the leaves.

k. Scale shorter than the perigynium, not reaching the base of the beak ..... 58. C. nigromarginata

kk. Scale about as long as the perigynium ..... 59. C. pensylvanica

jj. All stems, or some of them, much shorter than the leaves.

l. Elongated stems present; lowest bract leaf-like and usually equalling or overtopping the inflorescence .. 60. C. deflexa

ll. Elongated stems absent or, if present, with the lowest bract very short and ± scale-like ..... 61. C. umbellata

Group H-2

Miscellaneous species with pilose herbage, but glabrous perigynia.

a. Leaves pilose on both faces. Virescentes .. 90. C. Torreyi

aa. Leaves glabrous above.

b. Leaves pilose below and ciliate to the tip. Sylvaticae ..... 81. C. castanea

bb. Leaves pilose on the sheaths and blades mainly near the throat. Paludosae .. 121. C. atherodes

TRIGYNOUS AND GLABROUS

Group I

Terminal spike gynandrous.

a. Inflorescence pale, the scales membranous.

b. Perigynia rounded at tip and beakless. Gracillimae ..... 80. C. gracillima
bb. Perigynia acute at tip and obviously beaked. Capillares ..... 83. C. capillaris
aa. Inflorescence dark-coloured, the scales brown to blackish.
c. Lowest bract with sheath 5-20 mm long. Ferrugineae ..... Group J
cc. Bracts sheathless or nearly so. Atratae.
d. Lowest bract leaf-like, 3-5 mm wide ..... 101. C. Mertensii
dd. Bracts much smaller, less than 2 mm wide.
e. Small plants, less than 1 dm high, the stems overtopped by the foliage ..... 71. C. rufina
ee. Much taller, the stems taller than the foliage, commonly twice taller.
f. Spikelets narrow, less than 4 mm and mostly 2-3 mm wide ..... 96. C. Parryana
ff. At least 4 mm wide.
g. Scales narrowly lanceolate and cuspidate, usually longer than the perigynia ..... 102. C. Buxbaumii
gg. Scales shorter and broader, broadly ovate to narrowly elliptic.
h. Scales and perigynia less than 2.5 mm long; the inflorescence small and compact ..... 97. C. norvegica
hh. Scales, perigynia and inflorescence longer ..... 100. C. atrata

Group J

Spikelets rather dark-coloured and generally resembling the Atratae, but the lower bract long-sheathing, its blade most often reduced or vestigial. Perigynia very flat and much larger than the small trigonous achene. Ferrugineae.

a. Terminal spike(s) androgynous ..... 87. C. petricosa
aa. Terminal spike staminate or gynandrous.
b. Perigynia ± 1 mm wide, lanceolate ..... 88. C. misandra
bb. Broader, narrowly ovate ..... 89. C. atrofusca

Group K

Spikelets widely scattered along the stem, some borne below the middle or even arising among the basal leaves.

a. All bracts leaf-like and overtopping their spikelets.
  b. Both the staminate and the lower pistillate spikelet much shorter than their peduncles ..... 75. C. tetanica
  bb. Either the staminate or the pistillate spikelets much longer than their peduncles.
    c. Peduncle of the staminate spikelet longest ..... 79. C. Crawei
    cc. Peduncle of the staminate spikelet lacking or many times shorter than most.
      d. Stem wingless and merely acute on the angles, flattish on the sides; perigynia mostly 20-30 per spikelet ..... 78. C. granularis
      dd. Stem produced on the angles into a wing about as wide as the central core; perigynia mostly 5-10 to a spikelet ..... 77. C. laxiflora
aa. At least the upper bracts reduced and much shorter than the spikelets.
  e. Spikelets stiffly erect or ascending.
    f. Inflorescence blackish, usually overtopping the foliage ..... 103. C. Bigelowii
    ff. Greenish and overtopped by the foliage ..... 61. C. umbellata
  ee. Spikelets drooping on very long peduncles.
    g. Bracts reduced mainly to an elongate sheath, the blade many times shorter or vestigial. Digitatae ..... 63. C. pedunculata
    gg. At least the middle and lower bracts with a blade longer than the sheath.
      h. Perigynia obovoid and almost beakless. Paniceae ..... 75. C. tetanica
      hh. Perigynia ovoid and tapering to a fairly well defined beak.
        i. Leaves 0.5-4.0 mm wide. Capillares ..... 83. C. capillaris
        ii. Basal leaves broader, 4-8 mm wide. Laxiflorae ..... 77. C. laxiflora

Group L

Pistillate spikelets sessile or nearly so. Terminal spikelet staminate.

a. Pistillate spikelets 2-5 mm wide ..... Group L-1
aa. Over 5 mm thick ..... Group L-2

Group L-1

Spikelets narrow, 5 mm wide or less.

a. Pistillate spikelets light green. Extensae ..... 85. C. viridula
aa. Darker, brown to purple black.
b. Stem smooth and roundish. Rupestres.. 68. C. glacialis
bb. Stem sharply triangular and often scabrous on the angles.
c. Pistillate spikelets ovoid; leaves less than 1.5 mm wide. Obtusatae ..... 57. C. supina
cc. Spikelets cylindric; leaves wider.
d. Stigmas 3; stem 2-3 times taller than the foliage; perigynium 2.0-2.5 mm long, completely filled by the achene. Atratae ..... 96. C. Parryana
dd. Stigmas normally 2, exceptionally 3; stem usually about as tall as the foliage; perigynium 2.5-3.5 mm long and empty in the upper third, being ± 1 mm longer than its achene. Acutae ..... 103. C. Bigelowii

Group L-2

Pistillate spikelets fatter, over 5 mm wide.

a. Staminate spikelet on an elongate peduncle which is well over 5 mm long and usually overtops the upper pistillate spikelet.
b. Perigynia at least 1 cm long. Lupulinae ..... 128. C. intumescens
bb. Much smaller. Vesicariae.
c. Perigynia very numerous ..... 124. C. rotundata
cc. Fewer, only 3-10-(15) to a spikelet ..... 127. C. oligosperma
aa. All spikelets sessile or nearly so. Extensae.
d. Beak less than half as long as the body ..... 85. C. viridula
dd. Perigynia longer, the beak more than half as long as the body ..... 86. C. flava

Group M

Staminate spikes 2-4. Plants rather large with usually large and open inflorescence of many coarse spikelets. N.B.: the Cryptocarpae also usually have two staminate spikelets, but only two stigmas (group B).

a. Perigynia with only 2 nerves, i.e. only the two lateral ones. Longirostres ..... 84. C. Sprengelii
aa. Also with nerves on both faces.
b. With 15-20 nerves, i.e. 7-12 nerves simultaneously visible on a face. Paludosae.
c. Teeth of the perigynia about 0.5 mm long ..... 119. C. lacustris
cc. Longer, mostly around 1 mm .... 120. C. laeviconica
bb. With 8-10-(12) nerves, i.e. with 3-5-(7) nerves visible at a time. Vesicariae.
d. Beak less than 1 mm long ..... 124. C. rotundata
dd. Beak longer.
e. Perigynia mostly reflexed; bracts many times longer than the inflorescence ..... 126. C. retrorsa
ee. Perigynia more or less ascending; bracts up to twice as long as the inflorescence.
f. Stem very sharp and scabrous on the angles, thinly clothed (± 3 mm thick) at base with red sheaths, these mostly short and bladeless ..... 123. C. vesicaria
ff. Stem obtusish and smooth or nearly so on the angles, thickly clothed (5-15 mm thick) below with old leaf bases which are mostly brownish to straw-coloured ..... 125. C. rostrata

Group N

Coarse plants with coarse spikelets over 1 cm wide, the lower pedunculate, but only one staminate spikelet.

a. Perigynia at least 1 cm long, in subglobose heads.
b. Perigynia narrowly lanceolate, ± 2 mm wide. Folliculatae ..... 116. C. Michauxiana
bb. Perigynia ovoid, ± 5 mm wide. Lupulinae ..... 128. C. intumescens
aa. Perigynia shorter and in elongate spikelets.
c. Perigynia with only 2-(4) nerves. Longirostres ..... 84. C. Sprengelii
cc. With 8-20 nerves.
d. Bracts many times longer than the inflorescence. Vesicariae ..... 126. C. retrorsa
dd. Bracts less than twice as long as the inflorescence. Pseudo-Cyperae.
e. Perigynia straight, mostly widely spreading ..... 117. C. hystricina

ee. Falcate and somewhat reflexed
..... 118. C. Pseudo-Cyperus

Group O

Miscellaneous group, the spikelets narrow, pale-coloured, pedunculate, the terminal one staminate.

a. Perigynia somewhat less than 2 mm long.
Albae ..... 70. C. eburnea
aa. At least 2.5 mm long.
b. Perigynia all or mostly 5-7 mm long.
Vesicariae..... 127. C. oligosperma
bb. Only 2.5-4.0 mm long.
c. Perigynia with 2 obvious lateral nerves, otherwise nerveless. Capillares..83. C. capillaris
cc. With more numerous longitudinal ribs or nerves.
d. Leaves 1-3-(4) mm broad. Paniceae
..... 75. C. tetanica
dd. Foliage much coarser and longer, the basal leaves 4-10 mm wide.
e. Beak of perigynium truncate rather than bifid at tip.
Laxiflorae ..... 77. C. laxiflora
ee. Beak ending in a pair of sharp teeth (0.4)-0.6-1.0 mm long.
Pseudo-Cyperae ..... 118. C. Pseudo-Cyperus

Group P

Much as above, but the scales darker, brown or more often purplish brown to blackish. Lowest bract with a well developed sheath.

a. Perigynia as black as the blackish or purple-black scales. Ferrugineae ..... 89. C. atrofusca
aa. Perigynia green to purple brown, paler than the scales.
b. Perigynia spreading or usually reflexed.
Vesicariae ..... 124. C. rotundata
bb. Perigynia divergent to nearly erect.
Paniceae.
c. Beak nearly straight and 0.5-1.0 mm long ..... 76. C. vaginata
cc. Beakless or with a shorter and strongly bent beak.
d. Foliage glaucous, some or all the leaves less than 2 mm wide ..... 74. C. livida
dd. Foliage green, the leaves at least 2 mm wide ..... 75. C. tetanica

Group Q

As in group P, but the bracts not sheathing or only short-sheathing.

a. All pistillate spikes drooping on filiform peduncles. Limosae.
  b. Scales lanceolate, about half as wide and nearly twice as long as the perigynia ..... 95. C. magellanica
  bb. Scales ovate, about as wide and nearly as long as the perigynia.
    c. Stem smooth throughout; scales dark purple ..... 93. C. rariflora
    cc. Scabrous in the upper 1/3; scales golden brown ..... 94. C. limosa
aa. At least the upper pistillate spikes erect or strongly ascending on shorter and stiff peduncles.
  d. Pistillate spikes 2-3 times thicker than the staminate spike.
    e. Terminal spike long-pedunculate, the peduncle often longer than the spike. Vesicariae ..... 124. C. rotundata
    ee. Terminal spike sessile or nearly so. Atratae ..... 99. C. Raynoldsii
  dd. Pistillate spikes not much thicker than the staminate one.
    f. Perigynia 2.0-2.5 mm long; leaves long attenuate into filiform and ± curly tips. Atratae ..... 96. C. Parryana
    ff. Perigynia 2.5-4.5 mm long; leaves gradually tapered to straight tips.
      g. All spikes erect or nearly so; staminate spike (2)-3-(4) mm thick. Acutae ..... 103. C. Bigelowii
      gg. Lowermost spike usually drooping; staminate spike rather fat, ± 5 mm thick. Atratae ..... 98. C. podocarpa

SHORT INDEX TO CAREX

This listing is to facilitate the concurrent use of the key and the descriptions since many important characters once given in the key are not usually repeated in the description. Mainly the recognized species are listed, discounted species and most synonyms are omitted. The page references are first to the key, then to the corresponding description.

1. NARDINAE

A vestigial structure termed rachilla is present inside the perigynium; it is a vestigial structure, a seta-like axis, somewhat shorter than the achene. A rachilla is also present in the Capitatae and Filifoliae, and becomes conspicuous in one species of Orthocerates. A rachilla is normally lacking or sometimes minute in all other sections. Tufted, unispicate, androgynous, distigmatic and the perigynia flattened, longitudially nerved, tapering to a substipitate base.

1. C. nardina Fries (var. Hepburnii (Boott) Kük.) -- Small and densely tufted species with filiform leaves and a single spike. Leaf-bases marcescent, becoming chestnut-brown. Perigynia finely puberulent-scabrous above along the edges. Early summer. Dry alpine outcrops, especially on ridges and mountain tops. -- G-Aka, nL, Q, swAlta-BC, wUS, Eur.

Larger plants are often segregated as var. Hepburnii, an extreme of variation found throughout the range.

A collection from Waterton (CAN) was identified as C. elynoides Holm and so reported in Can. Field-Nat. 56: 112. 1942. But its perigynia are glabrous, the beak scabrous-ciliate, very short and brown, the scales elliptic and the achene lenticular; it has been revised to C. nardina.

2. CAPITATAE

Much as in the first, but the perigynia nerveless and rounded to a sessile base.

2. C. capitata L. (f. arctogena (H.Sm.) Raymond) -- Same habit as the above. Spike short and compact, typically ovoid. Scale shorter than the body of the perigynium. Perigynia pale green, with a nearly orbicular body abruptly contracted into the beak. Early summer. Alpine slopes and peaty places in the arctic and subarctic regions. -- G-Aka, L-NF, Q-nMan-BC, US, (CA, SA), Eur.

Smaller plants with a darker head may be distinguished as f. arctogena, apparently an ecological form of drier habitats, widely sporadic in the range of the typical phase.

3. CALLISTACHYS

As the first two, but tristigmatic. Perigynia stipitate, the beak obliquely cut into a single, dorsal, and obtusish point.

3. C. pyrenaica Wahl. var. pyrenaica -- Densely tufted species with very narrow to filiform leaves and a single spike. Spike dark brown. Perigynia broadly lanceolate, acute at tip, abruptly contracted into a stipe ± 0.5 mm long. Early summer. Alpine prairies.-- wMack-Y, swAlta-BC, wUS, Eur.

A fairly variable species. In our typical phase the leaves are 0.3-1.2 mm wide and the stigmas 3, while the beringian var. micropoda (C.A. Meyer) Boivin has a smaller perigynium, 2.4-3.0 mm long, the leaves 1-2 mm wide and the stigmas mostly 2. Further variations are found in Japan where the perigynia are longer, in the Kuriles where the perigynia are reflexed, etc.

4. C. nigricans C.A. Meyer -- Closely resembles the preceeding. Leaves larger, 1-3 mm wide. Stoloniferous. Scales soon deciduous. Perigynia contracted into the beak, becoming reflexed at maturity. Stipe rather thin and sharply defined, 0.3-1.2 mm long. Early summer. Wetter alpine prairies. -- sAka, swAlta-BC, wUS, (eEur).

4. FOETIDAE

Like the next, but the beak not bidentate at tip, merely cut obliquely into a single rounded or truncate tip. This and the next few sections, up to the Vulpinae included, with the terminal spike (or often all spikes) androgynous, that is with staminate flowers at top, the pistillate ones at base, hence the spikelets tend to be rounded at base.

5. C. maritima Gunner var. maritima (C. Dutillyi O'Neill & Duman; C. incurva Lightf.) -- Stem usually arching like the leaves. Less than 2 dm high and very stoloniferous, the stolons deeply buried. Nearly smooth except the leaf tips. Inflorescence small, compact, ovoid and brown. Perigynia ovate to broadly ovate, usually quite nerveless. Early summer. Gravelly soils along the coast. --G-Mack-(Y)-Aka, L -NF, Q-nO-nMan, (Eur) -- Var. incurviformis (Mack.) Boivin (C. incurviformis Mack.) -- Generally somewhat smaller, less than 1 dm high, and the perigynia narrowly ovate and faintly nerved on both faces. Late-snow patches in the mountains (Banff), dunes of lake Athabaska and, more rarely, on gravelly shores of glacier draining rivers: York Factory, Edmonton -- (swY), Man-nS-Alta-eBC, nwUS.

Previous reports of C. maritima for York Factory (ALTA) by Scoggan 1957, William River (DAO) by Argus 1968, and Edmonton (ALTA) by Moss 1959 were based on specimens since revised to var. incurviformis. Also adventive on railway gravel at The Pas (DAO), and the specimen has been checked to var. incurviformis. Cf. Blue Jay 32: 25-26. 1974.

In the more southern material the perigynium, including the beak, is commonly 3.0-3.5 mm by 1.2-1.6 mm while in the coastal and more northern specimens it is usually 3.5-4.0 by 1.7-2.0 mm. The collections from York Factory (ALTA, CAN, GH) exhibit the full range of variation of both taxa.

5. DIVISAE

As the next section, but the perigynia not wing-margined. Or similar to the Bracteosae, but stoloniferous. Beak usually bidentate.

6. C. Douglasii Boott -- Dioecious or near so, the anthers rather large and the perigynia completely hidden behind the much larger scales, but the styles conspicuous, rather long exserted, usually by 4-8 mm, marcescent and tending to form tangled masses. Smallish species with a rather fat and crowded inflorescence. Dioecious or nearly so. Leaves ± filiform, about as long as the stem. Inflorescence of numerous spikelets, green to lightly brown-tinged. Perigynium body suborbicular and the beak about as long as the body. Early summer. Wet saline meadows or sandy shores. -- soMan-BC, US.

7. C. stenophylla Wahl. var. Eleocharis (Bailey) Breitung (var. enervis AA.; C. Eleocharis Bailey) -- A small and common prairie species with a small dark brown inflorescence. About 1 dm high, singly or in small tufts from deeply buried blackish rhizomes. Leaves filiform, marcescent. Spikelets many and very small, crowded into a spike-like head, the latter commonly ± 1 cm long, compact, cylindric. Perigynia 2.5-3.0 mm long, stipitate, brown, but the beak hyaline and obliquely cut into a single point. Late spring and early summer. Steppes and prairies, common. -- (sMack)-Y-sAka, sMan-BC, US, (eEur).

The typical phase is Eurasian and is supposed to differ from our plants mainly on the basis of the slightly larger periginia, 3.0-3.5 mm long. The paucity of eurasian sheets at hand does not allow for a close scrutiny of this distinction. We are maintaining it for the time being but we note that Cronquist 1969 was dissatisfied with it, possibly with good cause.

On var. enervis we have adopted the solution proposed by M. Raymond ex C. Rech. f., Symb. Afg. 6: 32. 1965. According to Raymond C. enervis C.A. Meyer rests on a chinese plant related to C. maritima and is not applicable to our taxon.

8. C. praegracilis W. Boott var. praegracilis -- A middle size species with rather coarse and brown to blackish rhizome. Stem about twice taller than the foliage and leafy near the base only. Leaves 1-2-(3) mm wide. Inflorescence subdioecious, mostly 2-3 cm long, deep brown, crowded. Scales minutely sca-

brous-ciliate dorsally along the midnerve, about as large as the perigynia, the latter 2.5-3.5 mm long, rather small, deep brown and shiny, the beak at least 0.5 mm long. First half of summer. Marshy places, even if alkaline. -- swY, wO-sMan-BC, US, (CA, SA) -- Var. simulata (Mack.) Boivin (C. simulata Mack.) -- Plant bases and rhizomes brown rather than blackish. Perigynia smaller, (1.7)-2.0-(2.5) mm long, broadly ovoid, truncate to subcordate at base, abruptly contracted into a smaller beak about 0.3-0.5 mm long. Wet meadows (not saline) in forested areas: Shand, Wood Mountain to Cypress Hills, Central Saskatchewan westward, and southwestern Alberta, also at Harris Pike Lake and Burke Lake. -- S-Alta, (US).

Collections of var. praegracilis from east of us (DAO, TRT) seem to represent a recent highway and railway introduction.

Var. simulata (Mack.) stat.n., C. simulata Mack., Bull. Torrey Bot. Club 34: 604. 1908. Within its range var. simulata seems to be only an extreme of variation with smaller fruits, but since this phenotype is restricted to much less than half of the range of the species it seems desirable to accord it recognition as a geographical variety.

6. ARENARIAE

Stoloniferous and the spikelets androgynous. Otherwise pretty much as in the Ovales, the perigynia similarly flattened and wing-margined.

9. C. Sartwellii Dewey (C. disticha AA.) -- Often with most of the upper spikelets entirely staminate. Rhizome and lower part of plant black. Resembles the preceeding, but the stem more leafy, clothed with leaf sheaths up to about the middle, with somewhat larger leaves, and the inflorescence paler with more numerous spikelets. Foliage about as tall as the stem and the main leaves (2)-3-(4) mm wide. Sheath of stem leaves green ventrally, except the upper few millimeters where it becomes membranous and hyaline or brownish. Scales 3 mm long or less, usually slightly smaller than the perigynia. The latter small, 2.5-3.5 mm long, narrowly wing-margined above the middle, its beak ± 0.5 mm, in numerous small pale brown spikelets. Early summer. Swamps and sloughs, often a pioneer on bare clay shores. -- seK-sMack, swQ-BC, US.

10. C. siccata Dewey (C. foenea AA.) -- Spikelets few and all androgynous, or more commonly rather numerous and the middle ones entirely staminate. Long stoloniferous sand-binder, blackish below. About 3-4 dm high, its leaves near basal and 1-2 mm wide. Sheaths hyaline ventrally. Inflorescence light brown. Resembles the last two but the scales are larger, (3.5)-5.0-(6.0) mm long, the perigynia also larger, 4-6 mm long, with a

conspicuously winged margin. Beak commonly ± 2 mm long. Late spring to early summer. Sandy soils, wet or dry. -- (sMack)-sY, swQ-Alta-(BC), US.

The interpretation of the type of C. foenea has produced a wide variety of opinions. In 1836 Schlechtendal identified it to C. albolutescens Schwein., but to Kunth in 1837 it was a mere form of C. scoparia. Nearer to our times, Bailey in 1889 has identified it to C. argyrantha while in 1938 Svenson places it with C. siccata. All these tergiversations are a source of confusion and we have chosen not to use C. foenea until a better type photograph becomes available, in the hope that we may then be able to make a convincing choice among so many authoritative opinions. A tracing of the type (W 17,167) made by J.M. Greenman in 1900 and 2 photos at GH show a plant 5-6 dm high, with leaves 2.0-2.5 mm wide. On size alone, it seems not too likely that the type of C. foenea could belong with C. siccata.

At GH there is a second tracing made in Berlin by H.K. Svenson with a sketch of a single perigynium. This second tracing would easily fit into Carex siccata, but unfortunately it does not match the earlier tracing, nor does it jibe with the two photographs of the type specimen or the microfiche at DAO. One wonders what specimen Svenson was studying; certainly it was not Willdenow's number 17,167, even though his drawing is inscribed with that number. Fernald's discussion in Rhodora 40: 325-9. 1938 is apparently based on the specimen illustrated by Svenson rather than the plants shown in the photographs; hence his conclusion is not accepted as clearly relevant.

7. CHORDORRHIZAE

New shoots at first erect, elongate, leafy and sterile, becoming prostrate the second year and producing fertile culms at the tip and from the leaf axils; eventually overgrown by Sphagnum and becoming a buried rhizome. Otherwise much as in the last two, especially the Divisae, but the perigynia at first slightly flattened, becoming inflated and strongly rounded on the sides.

11. C. chordorrhiza L. f. -- The very long rhizomes at first running on the surface of the bog, eventually buried by the fast growing Sphagnum. Stem 1-3 dm high. Leaves marcescent and strongly dimegueth, those of the sterile shoots more than twice as long as the new leaves at the base of the flowering stems. Inflorescence small and compact, simulating a single spike, the spikelets being few-flowered, with only 1-3 perigynia each. Perigynia brown, conspicuously lined with darker nerves. Early summer. Sphagnum bogs. -- sF-Mack, Aka, (L)-NF-SPM, PEI-BC, US, Eur.

8. BRACTEOSAE

A generalized type of the subgenus Vignea, not specialized in any particular direction: tufted, inflorescence a spike of spikelets, distigmatic, perigynia flattened and bidentate. At least the terminal spikelet with a few staminate flowers at tip, i.e. androgynous, hence the spikelets generally rounded at base.

12. C. rosea Schkuhr (C. convoluta Mack.) -- Spikelets small and remote, mostly of 3-8-(15) perigynia spreading horizontally. A fine species, densely tufted. Resembles C. interior, but in the latter the terminal spikelet is conspicuously gynandrous. Second spikelet from the top often with only 1-2 perigynia. Perigynia pale green, the lower half filled with spongy tissue. Stigmas at first straight or flexuous, becoming strongly recurved, eventually breaking off. Scales small, barely tinted. Mid spring. Wet spots in mixed woods, from The Pas eastward. -- NS, NB-Man, US.

13. C. Hoodii Boott -- Perigynia brown, deep green along the margin. Inflorescence short and crowded and the whole plant resembling C. macloviana, but the spikelets androgynous and the body of the perigynia not winged, while the beak is scabrous-serrulate to the tip and the base is spongy like the last. Scales ± brownish with a green midnerve. Late spring and early summer. Wetter montane prairies. -- swS-swAlta-BC, US.

14. C. Hookerana Dewey (C. Hookeriana sphalm.) -- Perigynia membranous, except for the green margin, the brown achene visible through the wall. Very scabrous and densely tufted from a blackish base, with a brown inflorescence, the bracts long aristate, the scales short aristate. Early summer. Infrequent on dryer prairies or hillsides. -- wO-Alta, ncUS.

Native in our area and barely spreading beyond our borders. The single Ontario collection is from Schreiber (GH) and is apparently an introduction. An early report from B.C. by Henry 1915, querried by Boivin 1967, could not be substantiated in any of the herbaria inventoried.

15. C. gravida Bailey var. gravida -- Sheaths much paler than the blades, membranous ventrally, ± membranous dorsally. A rather tall and coarse tufted species, the divergent stems commonly 1 m tall. Perigynia triangular-ovate, 4 mm long or a little longer, 2.5 mm wide, 3-5 times wider than thick, commonly brown ventrally and straw-coloured dorsally, with thin green margins. Early summer. Galerie-forests, rare or overlooked: Oxbow, Roche-Percée, Shand, Willowbunch. -- swO, sS, US.

Grades southeastward into var. Lunelliana (Mack.) Hermann with a broader and stubbier perigynium, the body orbicular and

about 3 mm wide, more abruptly contracted into the beak.

Manitoba reports by Löve 1959 and Scoggan 1978 were based on J.-P. Bernard 54/289, Saint-Pierre Jolys, en bordure du bois, 24 juillet 1954 (DAO, QFA), since revised to C. alopecoidea.

9. MULTIFLORAE

Like the last, but the inflorescence is a panicle in this and the next two sections, the spikelets being crowded on the lower branches. But this paniculate condition not always very obvious because of the crowding of the spikelets, or because the actual branching may be reduced to the two lowermost spikelets being borne on a very short branch, the panicle then becoming essentially spiciform. In all our other sections the inflorescence is a single spike or a spike of spikelets, or a raceme of spikelets. Perigynia plano-convex, winged along the margin above the middle, not spongy at base. Upper dm or so of the sheath becoming transversely corrugated on the hyaline side.

16. C. vulpinoidea Mx. var. vulpinoidea -- With many conspicuous and setaceous bracts. Tufted stems 1-6 dm high, from half as long as to nearly as tall as the foliage. Inflorescence green, crowded, much branched. Scales small, the brownish body about 1 mm long, produced into an awn mostly at least as long. Perigynia quite small, only 2-3 mm long, the body 1.0-1.5 mm wide, broadly ovate and membranous, but the beak pale green along the edges. Early summer. Sandy shores. -- NF-SPM, NS-BC, US, Eur(nat.).

In late summer the stem may elongate to overtop the leaves, the perigynium turns brownish and, being distended by the maturing achene, its body becomes nearly orbicular and the beak appears to be relatively shorter. Such late season specimens have been at times named C. annectens Bickn.

Southward there is a var. xanthocarpa (Bickn.) Kük. with slightly larger fruits, 1.6-1.8 mm wide, often yellowish tinged at maturity.

10. PANICULATAE

Inflorescence branched as in the last and the next, but the perigynia strongly convex on both sides and devoid of spongious tissue. Sheaths variously tinged in brown.

17. C. diandra Schrank -- Sheaths brown-dotted ventrally and the perigynia very small, 2.0-2.5 mm long, brownish, turning deep brown to purple black and falling off readily at maturity. In small tufts 4-6 dm high. Spikelets small, numerous, mostly 3 to 8 on each branch, the latter appressed into a

cylindric inflorescence. Perigynium shiny, convex on both faces, more so dorsally, nerveless except the two marginal nerves. Beak triangular, strongly flattened, slightly concave ventrally, broadly wing-margined, minutely ciliate. Early summer. Common in bogs. -- (K)-Mack-Aka, sL-SPM, NS-BC, US, Eur, (Afr), Oc.

18. C. prairea Dewey -- Sheaths conspicuously copper-brown in the upper few millimeters. 3-6 dm high in flower, elongating to 6-8-(10) dm in fruit. Similar to the preceeding, the inflorescence light brown to chestnut brown, and not so crowded, the lower branch often somewhat remote, the perigynia slightly longer. Spikelets so crowded, so small and so few-flowered that often the branching is none too obvious. Perigynium chestnut brown, flattish on the ventral side. Late spring to mid summer. Calcareous bogs. -- (NS), nwNB-BC, US.

11. VULPINAE

In this and the two previous sections the inflorescence is clearly to obscurely branched into a narrow or spiciform panicle. Scales awnless. Perigynia plano-convex, not winged, filled with spongy tissue in the lower half. The part which is filled with spongy tissue tends to shrink slightly in drying. Hence the lower half of the perigynium tends to become slightly wrinkled while the upper half remains clearly distended over the firm achene. The presence of spongy tissue is associated with a stipitate achene. In this and the previous sections the terminal spikelet is androgynous, the lateral ones are androgynous or pistillate.

19. C. stipata Muhl. var. stipata -- With the most obviously paniculate inflorescence. A coarse species with broad leaves 4-8 mm wide and thick and spongious stems, especially so below. Perigynia (3.5)-4.0-5.0 mm long, narrowly conical-lanceolate, broadest at the somewhat bulbous and spongious base, the beak somewhat longer than the body. Late spring. Marshy places. -- sAka, L-SPM, NS-BC, US, eEur.

In our typical variety the sheath is convex ventrally at the margin, thin and very fragile. In the more eastern var. laevivaginata Kük. the sheath margin is concave ventrally and reinforced by an opaque marginal cartilaginous thickening, while the perigynia are usually 5-6 mm long. Recombinations of these characters are occasional.

C. conjuncta Boott was reported for Manitoba by Löve 1959, querried by Scoggan 1978, based on J.-P. Bernard, St.-Pierre-Jolys, 16 juin 1958 (MT, MTJB, QFA). The sheet at QFA is now filed a C. vulpinoidea and the two duplicates have also been revised, perhaps to C. alopecoidea.

20. C. alopecoidea Tuck. -- Similar to the previous, generally smaller, the perigynia rather much flattened and the

beak obviously shorter than the body. Stem not soft, but flattened into 3 thin wings. Inflorescence not obviously branched. Perigynia broadly ovate, 3-4 mm long, about 1.5 mm wide, less than twice as wide as thick. Early summer. Moist deciduous woods. -- sQ-ecS, neUS.

If the branching of the lower part of the inflorescence is not detected, a specimen is likely to end up at C. gravida in the key. Allowance for this difficulty has been made in the key. Also, in C. gravida the perigynium is much more flattened.

12. HELEONASTES

In this and the remaining sections of Vignea the spikelets are gynandrous, hence the spikelets will often affect a ± clavate shape because the staminate part of the spikelet is much narrower. The gynandrous condition is fairly obvious at flowering time. Later on the staminate part of the spikelet is reduced to a series of empty scales at the base of the spikelet. In this section the plants are tufted, the perigynia are wingless and the layer of spongy tissue at the base is thin, the cavity being almost wholly filled by the achene, while in the next three section the spongy tissue occupies the lower ½ of the cavity. No spongy tissue in the Ovales.

21. C. disperma Dewey -- The remote spikelets mostly with only 2 perigynia each. In very loose tufts and somewhat stoloniferous. Inflorescence rather pale green. Perigynia plump, the beak very short. Early summer. Shaded and mossy ground. -- (swG, swK)-Mack-Aka, L-NF-(SPM), NS-BC, US, Eur.

22. C. trisperma Dewey -- Inflorescence rather characteristic, being made typically of 3 very small and few-flowered spikelets of which the upper 2 are quite close together while the other is very remote and subtended by a bract about as long as the inflorescence. Stoloniferous and forming a lax carpet of weak stems. Spikelets pale green with very few and inconspicuous staminate flowers. Scale membranous with a green midnerve. Early summer. Bogs and Black Spruce forests. -- (G), L-SPM, NS-BC, US.

Known in Saskatchewan only from the south shore of Lake Athabaska (DAO, SASK). The Candle Lake region (SASKP) sheet listed by Breitung 1957 was revised to C. brunnescens by J.H. Hudson in 1967.

The range was extended northward to Chippewyan (QFA) and Fort-Norman (QFA) by Louis-Marie 1961. Upon examination, both specimens cited proved to belong to C. disperma.

A Mackenzie report by Porsild 1968, repeated by Cody & Pors., Can. Field-Nat. 82: 266. 1969 and Scoggan 1968, was based on a depauperate collection of C. brunnescens: Cody 15476, Mantic Lake, July 26, 1966 (DAO).

C. trisperma is stoloniferous, has a pale green inflorescence; few staminate flowers, only 1-2 to a spikelet; scales hyaline but for the green midnerve; perigynia 3.0-3.5 mm long. By contrast C. brunnescens is tufted, has usually more than 3 spikelets, these ± brownish in age; terminal spikelet clavate because of the more numerous staminate flowers; scales with a green midnerve flanked by castaneous strips and a wide hyaline border; perigynia smaller, ± 2 mm long.

23. C. tenuiflora Wahl. -- Resembles C. trisperma minus the lower spikelet and the long bract. Not quite so stoloniferous, forming a denser carpet. Spikelets usually 2, sometimes 3, always congested in a pale green head. Perigynia ellipsoid, beakless. Early summer. Muskegs. -- K-Aka, L-NF, NB-BC, US, Eur.

24. C. loliacea L. -- Inflorescence pale green and the perigynia beakless as in the last 3 species, but spreading horizontally at maturity. Especially similar to C. disperma, but the perigynia more numerous, (3)-5-8-(10) per spikelet. Spikelets 3-4, gradually more remote below. Bracts small, or the lowest sometimes half as long as the inflorescence. Late spring and early summer. Wet coniferous woods northward. -- Mack-Aka, O-BC, Eur.

On the basis of its general distribution it should be widely distributed across northern Manitoba, yet Scoggan 1957 mentioned only a Lake Nueltin (CAN, TRT, WIN) collection and we know of no other.

25. C. ursina Dewey -- Smallest, less than 5 cm high, and usually unispicate, or bearing a second much reduced spikelet just below the main one. Forming small tufts or large cushions. Leaves equalling or somewhat overtopping the inflorescence. Spike ovoid, ± 5 mm long, with deep brown scales, dull green perigynia and a few staminate flowers at base. Perigynia ovate, ± 2 mm long, nearly beakless. Early summer. Sandy or muddy flats at high tide: Churchill. -- G-Aka, L, (nQ), nMan, Eur.

26. C. Heleonastes L. f. var. Heleonastes (C. amblyorhyncha Krecz.; C. bipartita All., var. amphigena (Fern.) Pol.; C. glareosa Wahl.; C. Lachenalii Schkuhr; C. marina Dewey; C. neurochlaena Holm) -- The dorsal suture, a common feature of species in subgenus Vignea, particularly obvious in this species; it presents itself as a sulcate line commonly 0.5-1.0 mm long, running down the center on the dorsal side of the perigynium from the tip downwards; actually it is a deep sinus the sides of which touch each other or overlap slightly; there is no corresponding sinus on the ventral side. About 4 gynandrous spikelets of wingless perigynia which become about as dark brown as the brown scales. Loosely tufted and 1-4 dm high, the stems overtopping the foliage. Inflorescence brown, 1-2 cm

long, the terminal spikelet obviously clavate, the lower spikelet(s) sometimes entirely pistillate. Scales brown with paler center and a broad membranous margin, just about covering the whole of the perigynium, the latter mostly 2-3 mm long and green at first. Beak short to nil, darker brown. First half of summer. Bogs, wet rocky ledges and alpines prairies, mostly on late-snow patches. -- G-Aka, L-SPM, (nNB)-Q-BC, (nUS), Eur, (Oc).

On the other side of the Rockies one may find a variant with shorter scales (1.2)-1.5-(2.0) mm long, covering only about two thirds of the perigynium, the latter averaging smaller, (1.5)-2.0-(2.2) mm long: var. dubia (Bailey) Boivin (stat. n., C. canescens L. var. dubia Bailey, Bot. Gaz. 9: 119. 1884; C. praeceptorum Mack.). One may also add that in var. Heleonastes there are commonly 4 spikelets, occasionaly only 2-3, while in var. dubia there are usually 4 spikelets, occasionally as many as 5-6.

Sometimes subdivided into two (Boivin 1967), or more commonly three, taxa (Mack. 1931, Pors. 1957, Hultén 1962). The last two authors have provided us with comparable distribution maps. More rarely up to 6 segragates have been proposed.

C. bipartita (= C. Lachenalii) is the smaller plant with a smooth stem and a perigynium commonly 2.0-2.5 mm long. Plants with narrower perigynia have been distinguished as C. glareosa. Seashore plants may be identified as var. amphigena (= C. glareosa in Hultén = C. marina in Mack.), but we have not been able to detect here any difference other than the habitat. Taller plants with scabrous stems and perigynia ± 3 mm long are usually tagged C. Heleonastes (= C. amblyorhyncha). The latter may be subdivided further into C. neurochlaena if the beak is indistinct, C. amblyorhyncha if the beak is poorly defined, and C. Heleonastes if the beak is well defined.

The specimens examined do not conform readily with the criteria given above; the morphological variation seems continuous and random between C. bipartita and C. Heleonastes. Their distributions as per published maps are roughly similar, except that the more common phenotype has a fuller, more rounded out distribution. We are not convinced that these two names represent either significant or workable distinctions. The other segregates appear to be uncommon extremes of variation and of no obvious import.

27. C. Mackenziei Krecz. (C. norvegica W.) -- Maritime counterpart of C. curta, the terminal spikelet very conspicuously gynandrous, the staminate part usually longer than the pistillate. Spikelets mostly 3. Scales brownish. Perigynia stipitate. Early summer. Tidal marshes: Churchill. -- swG, (K-Mack), Aka, (L)-NF, NS-nMan, (neUS, Eur).

28. C. brunnescens (Pers.) Poiret (var. sphaerostachya (Tuck.) Kük.) -- Similar to the next and the last, but the spikelets smaller, shorter and all but the top one spreading. Inflorescence at first pale green, often turning brown at maturity. Terminal spikelet narrowed at base into a short staminate portion comprising only a few staminate flowers. Common in cool forests, becoming more abundant after a fire or lumbering. -- G, sK-sAka, L-SPM, NS-BC, US, Eur.

Plants from shaded habitats tend to be more luxuriant and have been distinguished as var. sphaerostachya, an ecological form more frequent southward.

29. C. curta Good. var. curta (C. canescens AA., var. subloliacea Laest.) -- Spikelets conspicuously gynandrous, especially the terminal and basal ones. Densely tufted. Somewhat glaucous and the inflorescence of 5-6 stiffly erect spikelets. Inflorescence pale green to lightly brownish. Beak less than 0.3 mm. Early summer. Muskegs, common northward. -- G, (F-K)-Mack-Aka, L-SPM, NS-BC, US, SA, Eur, (Oc).

Apparently, the type specimen of C. canescens belongs with C. Buxbaumii, hence the name change. See below under the latter name. See also D.M. Moore & O.A. Chater in Bot. Not. 124: 324. 1971.

In the more western var. robustior (Kük.) Boivin (= C. arctiformis Mack.) the spikelets are more crowded, as crowded as in C. arcta, and the lower spikelets are strongly overlapping.

30. C. arcta Boott var. arcta -- Inflorescence pale green and of overlapping spikelets, each with very few staminate flowers at base. Densely tufted and resembling C. curta, except for the much more crowded inflorescence. Foliage usually overtopping the stems. Spikelets 6-9. Scales sometimes becoming brown-tinged at maturity. Perigynia much compressed and pale green, mostly around 2.5 mm long or slightly shorter, the body bordered by thickened nerves, the beak 0.5 mm long or less, scabrous-ciliate in the manner of most Ovales. Early summer. Marshy or peaty shores northward. -- sY-Aka, L, NB-BC, US.

Seemingly transcontinental, but rarely collected in our area and possibly discontinuous between Pinkney L. (DAO) in central Saskatchewan and Fort Saskatchewan (CAN) in central Alberta.

In the more western var. oregana (Bailey) stat.n. (C. canescens var. oregana Bailey, Mem. Torrey Bot. Club 1: 75. 1889) the inflorescence is usually more deeply coloured because of the brown tinged scales and the perigynia are bigger, 2.6-3.2 mm long, the beak 0.6-1.2 mm.

13. DIOICAE

Long stoloniferous. Perigynia wingless and filled with spongy tissue in the lower 1/3. The inflorescence is reduced to a single spike. A polygamous plant, the spike being typically gynandrous, but varying to entirely pistillate or entirely staminate.

31. C. gynocrates Wormsk. (C. dioica L. var. gynocrates (Wormsk.) Ost.) -- Small stoloniferous species half buried in Sphagnum. Spike solitary, usually androgynous, but variable. Perigynia becoming brown, spreading and curved, the beak deflexed. Early summer. Shaded Sphagnum bogs. -- G-Aka, L-SPM, eNS, nNB-BC, US, Eur.

Quite closely related to the eurasian C. dioica. The morphological discontinuity is minimal here and the one taxon could quite reasonably be treated as a variety of the other as was done by Breitung 1957.

14. STELLULATAE

The lower part of the perigynium is filled with spongious tissue, as in the Vulpinae, but the inflorescence is a simple spike of spikelets. Tufted. Perigynia small and divergent to spreading, wingless, yet very thin at the margin, becoming almost wing-margined in the beak.

C. muricata L. has been used in Europe and in America as a collective name for a group of species that comprises most of the Stellulatae. Similarly C. sterilis W. has been used as a collective name for a group of North American taxa centering about C. angustior and C. atlantica. We are not ready at this stage to propose a coherent classification of the Stellulatae, but it seems that tentatively the two following taxa may be recognized at the specific level.

32. C. interior Bailey (C. muricata AA., var. sterilis AA.) -- Usually 3 small spikelets of which the terminal one is conspicuously clavate, the pistillate portion being usually shorter than the much narrower staminate base. Grows in tufts of fine stems and leaves, the latter (0.5)-1.0-2.0-(2.5) mm wide. Inflorescence small on a long and thin stem. Scales shorter than the body of the perigynium, the latter squarrose from the base and becoming spreading to reflexed. Perigynium ± 2.5 mm long and 1.5-1.7 mm wide, less than twice as long as wide, the body elliptic-ovate, contracted into a beak 0.6-0.7 mm long, its summit barely notched, the teeth obtusish and hardly 0.1 mm long. Early summer. Common in wettish places. -- (Y-Aka), NS-(PEI-NB)-Q-Alta-(BC), US.

33. C. phyllomanica W. Boott var. angustata (Carey) Boivin -- (C. angustior Mack.; C. muricata AA., var. angustata

(Carey) Bailey; C. sterilis AA.) -- A fine herb with the inflorescences readily tangling because the perigynia are squarrose from the base and spreading to somewhat reflexed. Similar to the last, but the tufts tending to be larger and lower. Inflorescence usually of 4 spikelets of which the terminal is less conspicuously clavate, the staminate portion being a bit shorter than the pistillate. Perigynia finely nerved, at least dorsally, flat ventrally, the lateral nerves conspicuously thickened below, becoming scabrous-serrulate and often nearly wing-margined above, (3.0)-3.5-(4.0) long, (1.0)-1.2-(1.5) mm wide, nearly 3 times longer than wide, triangular-lanceolate and the beak indistinct or the body slightly narrowed into a beak 1.0-1.5 mm long, ending into very sharp teeth ± 0.3 mm long. Early summer. In bogs northward. -- L-(NF, NS-PEI)-NB-O-(Man)-S-(Alta-BC, US).

Many Saskatchewan collections are unusual in having the terminal spikelet entirely staminate.

The typical phase occurs west of us on the coast and in the Cascades; it differs essentially by its slightly longer perigynia, (3.5)-4.0-(4.5) mm long, its beak 1.5-2.0 mm; its leaves often a bit larger, up to 3.0 mm wide at the end of the summer. Spikelets overlapping.

C. phyllomanica var. angustata (Carey) stat. n., C. stellulata var. angustata Carey in A. Gray, Man., ed. 1: 544. 1848.

Another variant occurs further south, in the Sierra Nevada, in which the inflorescence is laxer and longer, the lower spikelet distant, otherwise the perigynia longer as in var. phyllomanica, namely: C. phyllomanica var. ormantha (Fern.) stat. n., C. echinata Murray var. ormantha Fern., Proc. Am. Ac. 37: 483. 1902.

The taxonomy of this interior-angustior group is much debated at present. K.K. Mackenzie, the last monographer of the genus, recognized 10 species in 1930, Fernald went further and recognized 13 species for the east in 1950. But in 1952 Gleason accepted only 10 species and 4 varieties. In 1969 Cronquist recognized only two species in the west. We have been unable to make up our mind fully on this problem, however we would recognize at least 5 species and one variety in Canada, of which only the above two occur in our area. Authors who would greatly reduce the number of species in this group are liable to use any one of the following as a collective name: C. echinata Murray, C. muricata L., C. stellulata Good., or C. sterilis W.

15. DEWEYANAE

A rather weak segregate of the last section. Perigynia appressed and somewhat bigger, 3.5-5.5 mm long.

34. C. Deweyana Schwein. var. Deweyana -- Mature achene brown, visible through the membranous and nearly hyaline perigynium. Tufted, the tall stems much longer than the foliage, rising at an angle, weak and eventually touching the ground at tip under the weight of the ripe inflorescence. The latter pale green, of 3-4 spikelets, of which the lowest is much remote and subtended by a fine and long bract. Scales membranous with a green midnerve, the latter scabrous from the middle upward. Early summer. Common in woods, especially in wetter situations. -- Mack-Aka, NF, NS-BC, US.

A Keewatin report by Mackenzie 1931 has never been confirmed; it may have been based on a Northern Ontario collection, but no justifying sheet could be located at NY in 1972.

Grades into the following western variants: var. leptopoda (Mack.) Boivin, spikelets commonly 5 and less distant, the lowest almost overlapping the base of the next; bracts shorter, the lower one often shorter than its spikelet; scale and beak of the perigynium mostly brown tinged. Occurs from the interior plateau of B.C. southward. Var. Bolanderi (Olney) W. Boott, spikelets commonly longer and ± cylindric, all overlapping or the lower slightly distant; inflorescence brownish, the scales being brown-tinged and the beak of the perigynium with a brown line on the back or on both faces; bracts short. Ranges from southwestern B.C. to California.

Var. collecteana Fern. was based on specimens typical of the species except for the shorter inflorescence, the lower spikelet being barely remote; it is an uncommon phenotype of sporadic occurrence in the range of the typical phase and is not considered to be significant.

Quebec reports of var. Bolanderi and of C. leptopoda Mack. were apparently based on specimens (GH, MT, NY) of var. collecteana.

16. OVALES

Marginal nerves expanded into a thin peripheral wing, as in 6. Arenariae, but the plants tufted.

This section has given us endless trouble. It seems that we are dealing here with two groups of polythetic taxa. We have tried lumping, even drastic lumping, and found it even more unsatisfactory than the fine splitting offered by Mackenzie in 1931 (74 species), Fernald 1950 (33 species), or Gleason 1952 (27 species). The present treatment is a halfway house arrived at after much correspondence with J.H. Hudson. The intermediates between certain species are frequent and especially noted by Hudson 1978. We have regarded such specimens as casual intermediated between imperfectly isolated species rather than interspecific hybrids.

a. Bracts foliaceous, at least the lowest many times longer than the spike of spikelets.
  b. With 3 or 4 foliaceous bracts of nearly equal length ..... 35. C. sychnocephala
  bb. Longest bract 2-4 times longer than the next longest ..... 36. C. athrostachya
aa. Bracts very narrow, setaceous and usually very small, rarely overtopping the inflorescence.
  c. Inflorescence short, ovoid to pyramidal, usually under 2 cm long ..... Group A
  cc. Inflorescence more elongated.
    d. Scales nearly as long and as wide as the perigynia ..... Group B
    dd. Scales narrower and shorter by about 1 mm.
      e. Perigynium 6-9 mm long ..... 41. C. petasata
      ee. Shorter.
        f. Perigynium body nearly orbicular (2.0)-2.5-3.0-(4.0) mm wide..52. C. brevior
        ff. Perigynium body ovate or obovate or elliptical, (1.0)-1.5-2.0-(2.5) mm wide ..... Group C

Group A

Inflorescence short and compact, deltoid to ovoid. Wings of the perigynium tapering out before reaching the tip of the beak, the latter therefore wingless and ± cylindric in the last 0.3-0.5 mm. Stem usually about twice taller than the foliage.

a. Perigynia only 2.5-3.0 mm long ..... 38. C. illota
aa. Bigger, 3.5-5.5 mm long.
  b. Spikelets 5-10, crowded into a short inflorescence.
    c. Spikelets rounded at base ..... 37. C. macloviana
    cc. Staminate flowers more numerous, hence the spikelets cuneate at base.. 39. C. pachystachya
  bb. Inflorescence short by virtue of their being only 3-4 overlapping spikelets.
    d. Perigynium broadest well below the middle, the body ovate and clearly contracted near the upper third ..... 39. C. pachystachya
    dd. Perigynium broadest about the middle, rhomboid-lanceolate, gradually tapered above the middle ..... 40. C. phaeocephala

Group B

Scale about the same size as its perigynium, and more or less covering it. Hence when the spikelet is viewed sideways the visible surface is taken up mainly or almost entirely by

the tips of the scales, the latter hyaline to brown.

a. Inflorescence dark brown, the scales being dark brown with narrow hyaline margins and tip; perigynia similarly coloured at least along the edges and at the tip.
b. 1-3 dm high, leaves 0.5-2.0 mm wide.40. C. phaeocephala
bb. Taller, main leaves 2-4 mm wide ... 39. C. pachystachya
aa. Inflorescence greenish to light brown or golden bronze, the scales with very broad hyaline zones.
c. Staminate flowers more numerous at the base of the uppermost spikelets; only 1-3 staminate flowers at the base of the lower spikelets; hence at maturity the lowermost spikelet will be ± rounded at base ..... 44. C. adusta
cc. Staminate flowers most numerous at the base of the lowermost spikelet, hence the latter is cuneate to long attenuate at base.
d. Inflorescence stiffly erect; leaves 1-2 mm wide ..... 43. C. xerantica
dd. Inflorescence arching and nodding; larger leaves 2-3 mm wide.
e. Perigynia about 3 times longer than wide ..... 42. C. argyrantha
ee. Mostly 2-2½ times longer; staminate portion of lower spikelet shorter ..... 41. C. petasata

Group C

Scales shorter and narrower than the perigynia by about 1.0-1.5 mm. Hence when viewed sideways the surface of the spikelet is largely taken up by the tips of the greenish perigynia. Marginal wings usually tapered to the tip of the beak, the latter plano-convex to the tip.

a. Perigynia narrow, 1 mm wide or slightly less, and 4-6 times longer than wide ..... 45. C. Crawfordii
aa. Perigynia more stubby, about 1½-3 times longer than wide, and almost always over 1 mm wide.
b. Main leaves 4-6 mm wide.
c. Beaks of some of the mature perigynia incurved, but most of them straight to slightly curved outward or even squarrose at tip ..... 47. C. cristatella
cc. Beaks straight or mostly incurved, none squarrose.
d. Perigynia 2-2½ times longer than wide ..... 48. C. normalis
dd. 3-4 times longer than wide...49. C. tribuloides
bb. Not over 4 mm, mostly 1-3 mm wide.

e. Inflorescence deep brown ..... 39. C. pachystachya
ee. Lighter in colour, green to light brown.
f. Perigynia 4.0-6.5 mm long, 3-4 times longer than wide ..... 46. C. scoparia
ff. Smaller and about twice longer than wide.
g. Perigynia (1.5)-1.7-(2.0) mm wide, commonly ± 15 to a spikelet.. 50. C. tenera
gg. Narrower and commonly 2-4 times more numerous ..... 51. C. Bebbii

35. C. sychnocephala Carey -- Inflorescence bracts unusually long and leafy, representing ¼ to ½ the height of the plants; 3 or 4 of the bracts being many times the length of the inflorescence. Perigynia narrowly lanceolate, 4.5-6.5 mm long, mostly twice as long as the scales. Summer. Shores and lately exundated places. -- sMack-Y, swQ-BC, nUS.

36. C. athrostachya Olney var. athrostachya -- With the lowest bract leafy and many times longer than the inflorescence, but the second bract much narrower and only half as long, yet usually also longer than the inflorescence. Inflorescence compact, more or less rhomboid. Perigynia broadly lanceolate, 3.0-4.5 mm long, the beak terete and wingless in the last 0.3-0.5 mm. Early summer. Low meadows and sloughs. -- seAka, sS-BC, US.

In the more western var. unilateralis (Mack.) stat. n. C. unilateralis Mack., Erythraea 8: 43. 1922, the lowest bract tends to be vertical or nearly so, the inflorescence is usually deflected from the vertical by 45° or more, and the beak of the perigynium tends to be winged to the tip. Some transitional material occurs in Saskatchewan and was noted by Cronquist 1969 and Hudson 1978, but the only characteristic Canadian specimens seen were from B.C.

37. C. macloviana D'Urv. var. Haydeniana (W. Boott) Holm (C. Haydeniana Olney; C. incondita F.J. Hermann; C. nubicola Mack.) -- Inflorescence dark brown, compact and pyramidal. Tufted, the stems thickish and usually about twice as high as the foliage. Leaves around 1 dm long, sometimes much shorter. Perigynia (3.5)-4.0-(5.0) mm long and 2 mm wide or a little less, dark brown to red brown along the edge and at the center, the intervening zones green. Beak hyaline in the last 0.2 mm or so and along the edge of the dorsal cut. Scales usually dark brown or red brown, sometimes with a very narrow hyaline border. Early summer. Montane and alpine prairies, sporadic eastward: Riding Mtn., mouth of Qu'Appelle, Cypress Hills and Rockies. -- Mack-Aka, swMan-swS-BC, US -- Var. microptera (Mack.) Boivin (C. festivella Mack.; C. microptera Mack.) -- Perigynia narrower and ± lanceolate, 1.0-1.5 mm wide, coloured

as above, or more commonly entirely light green except for the brown beak. Scales brown. Tends to be a taller plant, commonly 5-8 dm high. -- Cypress Hills and from the Edmonton area westward. -- swS-BC, (wUS).

Barely distinct from the eastern representatives of the species. The latter is referred to var. macloviana in which the perigynia are dull brown, with paler submarginal stripes, which sometimes become green in the beak; the scales display a broad to narrow hyaline margin. In our western phase the perigynia are deep brown with submarginal zones in bright green; the scales are entirely of the same deep brown as the perigynia or they may exhibit a narrow hyaline margin. There is some variation from plant to plant and the perigynia darken as they mature. Yet this admittedly thin difference in colour appears to be adequate to separate our western material from the eastern phase; something we failed to do in our Enumeration of 1966-67.

In part of the range plants are frequently found with taller stems, narrower and paler perigynia. These are arbitrarily separable as var. microptera.

In C. macloviana, its segregates, and relatives, the beak of the perigynium tends to be thinner than in other species of the section. In most floras and monographs this characteristic is overstressed and is commonly used as a major division in keys. But we find this character to be rather tenous and often elusive. It would probably be more realistic to state merely that in this group of species the perigynium is usually attenuated into a somewhat longer and thinner beak.

Eastward, C. macloviana is a reasonably discrete and not too variable entity. But in our area and westward it dissolves itself into an endless and confusing series of named variants that have provided us over the years with much frustration, wasted herbarium time, and little intellectual satisfaction.

38. C. illota Bailey (C. limnophila F.J. Hermann) -- Perigynium smaller, its wings narrow to obsolete. Inflorescence somewhat smaller, narrowly deltoid, about 1 cm long and slightly narrower. Perigynia broadly lanceolate, 2.5-3.0 mm long, (0.9)-1.2-(1.4) mm wide. Otherwise quite similar to C. macloviana; except for being generally somewhat smaller, the tufts usually only ± 2 dm high and the leaves not over 2 mm wide. Just before mid summer. Wettish and subalpine to low alpine meadows, commoner about timberline. -- swAlta-sBC, wUS.

Because of the near lack of marginal wing this will sometimes key out to C. Heleonastes, but otherwise C. illota is obviously related to C. macloviana despite the inconspicuous wing.

39. C. pachystachya Cham. (C. macloviana D'Urv. ssp. pachystachya (Cham.) Hultén; C. platylepis Mack.; C. Preslii Steudel) -- Not always clearly separable from C. macloviana. Usually taller, 3-6 dm high, and the spikelets not so crowded as the last. Leaves longer, the main ones around 1 dm long and 2-4 mm wide. Inflorescence varying from ovoid to cylindric. Spikelets resembling C. petasata, but not so distant. Perigynium 3.5-4.5 mm long, the body with a brown center and a green wing, the beak brown to the tip or very narrowly hyaline along the dorsal sinus. First half of summer. Wet openings in montane forests. -- (Aka, swAlta)-BC, wUS.

40. C. phaeocephala Piper -- Not always clearly separable from the preceeding. The foliage all basal, 1-2 dm high, stiff, narrow and marcescent, the leaf tips becoming curved or curly. In dense tufts 1-3 dm high. Leaves 0.5-2.0 mm wide. Inflorescence dark brown, the spikelets only 3-5, strongly overlapping, short-clavate. Perigynium 3.0-4.5 mm long, 1.2-1.5 mm wide, rhomboid-lanceolate, broadest about the middle, gradually tapered above. Cylindrical part of the beak about 0.5 mm long. Mid summer. Alpine gravels and rocky slopes, usually above timberline. -- (seAka), swAlta-BC, wUS.

In this and other relatives of C. macloviana the marginal wings do not reach the top of the beak, thus the upper part of the beak is ± cylindric for about 0.5 mm long. In the next species this feature is also usually recognizable. In the remaining species of the section the wings will normally taper to the top of the beak and the latter will appear to be plano-convex rather than cylindrical in the upper part.

41. C. petasata Dewey var. petasata -- Perigynia longest. Resembles the taller variants of C. macloviana by its stiff stems about twice taller than the foliage, but the inflorescence more like that of C. argyrantha var. aenea. Leaves 1.5-2.5 mm wide. Inflorescence mostly 3-4 cm long, stiffly arching. Spikelets golden brown, narrowly ovate to broadly cylindric, conspicuously tapered at base. Scales 6 mm long or more. Perigynia (6)-7-(8) mm long, 2.5-3.0 mm wide, green with a brown center and a green wing ± 0.3 mm wide, pencil-margined in brown at maturity. Early summer. Festuca prairies in the Cypress Hills and the Rockies. -- (Y), swS-BC, (US) -- Var. minor (Boott) Boivin -- (C. praticola Rydb.; var. subcoriacea F.J. Hermann; C. Piperi Mack.) -- Perigynia smaller (4.5)-5.0-6.0 mm long, (1.8)-2.0-(2.2) mm wide, 2½-3 times longer than wide, broadly lanceolate. Scales just about covering the perigynia. General and frequent in moist prairies. -- (G), K-Aka, (L-NF, NE), Q-O-(Man)-S-Alta-(BC) US .

C. petasata Dewey var. minor (Boott) stat. n., C. adusta Boott var. minor Boott in W.J. Hooker, Fl. Bor.-Am. 2: 215. 1839.

Grades into C. aenea, but not in a frequent or troublesome manner. Nearly all specimens can be readily identified satisfactorily by checking on the longer perigynia for var. minor, the narrower shape, and the higher length-width ratio.

Readers who use more than one book in their identification work will no doubt notice certain discrepancies in measurements between our text and those of Cronquist 1969, Fernald 1950, Gleason 1952, Hudson 1978 and Mackenzie 1935, for this and other species.

The measurements by Cronquist, Hudson and ourselves were almost invariably made afresh on the material available to each worker. The figures in Gleason, Fernald and Mackenzie are either similarly made afresh or repeated from previous editions of their own work. In part, the discrepancies will arise because each writer is working from a different series of specimens, often specimens from a different area.

Sizes in Hudson tend to be on the short side of ours; this may arise from different techniques of measurement under magnification.

Numbers in Gleason and Mackenzie often seem surprisingly precise, more precise than one would expect in the measurement of variable biological objects. E.g. 1.75 mm, 4.1 mm. In the early part of this century the New York group was using the English foot for measurements with an inch divided in 12 lines. Each line was almost equal to 2 mm. Checking the current edition against a previous one, many current measurements seem derived from the use of a conversion table: $1\frac{1}{4}$"=2.4 mm, $1\frac{1}{2}$"=2.9 mm, 2"=3.9 mm, $2\frac{1}{2}$"=4.9 mm, etc.

Numbers in Fernald often include all the extreme and exceptional variants. Thus Rosa blanda is stated to be 0.07-2 m high, a statement which fails to carry the information that this shrub is commonly around 1 m high. Measurements of extreme variations are best denoted by the use of bracketed numbers, e.g. (2.5)-3.0-4.0-(5.0) mm, and very extreme individuals are best ignored if numbers are to remain meaningful and carry an image of what a particular plant looks like.

All this does not explain the basic discrepancy in perigynium measurements given by Fernald for var. minor (=C. praticola): 4.5-6.5 X 1.5-2, and C. aenea: 4-5 X 1.9-2.7, while ours read (4.5)-5.0-6.0 X (1.8)-2.0-(2.2) and 3.5-4.5 X 1.7-2.3 respectively. With Fernald the dimensions overlap in both directions with the difference being most marked in the width. With our figures the overlap in width is the same, while in length there is no overlap.

42. C. argyrantha Tuck. var. aenea (Fern.) Boivin (C. aenea Fern.; C. foenea AA.) -- Inflorescence arching, moniliform

in the lower half, the spikelets abruptly contracted at base into a stipe-like staminate portion, the lowermost spikelet with the staminate portion at least half as long as the pistillate portion, or more commonly of about equal length. In dense tufts of slightly divergent stems, (2)-4-6-(8) dm high and much overtopping the leaves, the latter (1)-2-(3) mm wide. Spikelets (4)-6-(8). Bracts small, narrower than the scales, not much different from them, usually awnless. Scales largely hyaline below to brownish above, giving their colour to the inflorescence. Perigynium 3.5-4.5 mm long, 1.7-2.3 mm wide, about twice as long as wide, the body ovate, becoming brown in the lower half at maturity, with 7 nerves on the dorsal side and 0-5 on the ventral side. Contracted to the narrowly triangular beak. Early summer. Wet sands or gravels in forested regions. -- seK-Aka, L-NF, NS-BC, nUS.

Not to be confused with the habitally similar C. petasata var. minor, also with an inflorescence frequently arching and partly moniliform. But in var. minor the lowermost bract is most often short aristate and reaches the summit of its spikelet; staminate flowers usually fewer, hence the spikelets commonly are merely cuneate or short-attenuate at base; but mainly the perigynia are broadly lanceolate and a bit longer in var. minor.

Occasional specimens will exhibit up to 5 nerves on the ventral side of the perigynium and such specimens have often been reported as C. argyrantha Tuck., but the latter is a more southern species that does not approach our borders. The following specimens of var. aenea from our area have been noted with 5 nerves on the ventral side: W. Krivda 211, Lynn Lake, 1958 (DAO, QFA); G. Gardner 90, Flin-Flon, 1930 (DAO, QFA); J.S. Maini, La Ronge, 1960 (QFA).

A Manitoba report of C. argyrantha by Scoggan 1957 and 1978 is herewith discounted. It was based on the C. aenea collection cited above for Flin-Flon.

Other western reports of C. argyrantha, including our own in 1968, were also based on specimens of C. aenea as pointed out by Scoggan 1978. In 1968 we had not yet seen any satisfactory material of var. argyrantha and we were placing into argyrantha such specimens of var. aenea that had five good nerves on the ventral side. This faulty interpretation led us eventually to consolidate aenea and argyrantha.

After repeated attempts to distinguish them, we have come to the conclusion that C. argyrantha and C. aenea are not morphologically discrete. We are here confronted with a cline in which a very large proportion of the material is intermediate. However it is quite true that many southern plants tend to be taller, have on the average a paler inflorescence, a perigynium

mostly half a millimeter shorter, with slightly broader wings, a better defined beak, and 5-(7) nerves on the ventral side. Most northern plants tend to be a shade or two darker brown in the inflorescence, the perigynium is often triangular ovate and nerveless on the ventral side. The most confusing intermediates are those with the general characters of aenea, but 5-(7) well marked nerves on the ventral side; such specimens have been the basis of many herewith discounted reports of C. argyrantha from Labrador to Manitoba.

In order to achieve a meaningful sorting we have found it necessary to define var. argyrantha rather restrictively and to verse all intermediates into var. aenea.

Var. argyrantha. The main criteria are based on the shape and nervation of the perigynia. The latter is 3-4 mm long, its body suborbicular to short elliptic, typically 2.7 mm by 2.0 mm, light green, not turning brown at maturity, although the dark achene is somewhat visible through the thin wall. The shape is well illustrated by Gleason 1952 with the body abruptly contracted into the beak, the latter (0.5)-0.7-1.0 mm long. The white nerves are strongly expressed and obvious on both faces, but a bit fewer and only 5-(7) on the ventral side. Other characters are less readily definable or are mere statistical averages. The range of the typical phase is quite restricted in Canada; we have seen specimens only from Oka (RIM), Pointe-au-Chêne (DAO), Pont-Rouge (DAO), Cape Blomidon (DAO), Camp One (DAO) and Kentville (DAO), out of nearly 1,000 sheets checked.

Var. aenea (Fern.) stat. n. (Carex aenea Fern., Proc. Am. Ac. 37: 480. 1902). Perigynia more variable, sometimes ovate and abruptly contracted into a beak 1 mm long or more, varying to triangular-ovate and gradually tapering into the beak, as illustrated by Gleason 1952; lower half of the body commonly turning brown. Nervation variable on the ventral side, commonly lacking or weak, sometimes approaching the condition in var. argyrantha. Common and widespread across Canada.

The range of var. aenea (as C. aenea) was extended to southeastern Keewatin by Louis-Marie 1961. A rather likely extension, but the justifying sheet, A. Dutilly 10,090, Strutton Island, baie James, 1942 (QFA, GH) is somewhat intermediate to C. petasata. Its perigynia are 4.4-4.5 X 1.7-1.8 mm and somewhat nerved ventrally; its scales are darker brown with a broad silvery-hyaline margin. Yet, after examination, it seemed a bit closer to var. aenea and has been retained as such.

Hudson 1978 has noted the existence of intermediates to C. adusta, C. brevior, C. praticola (=C. petasata var. minor), C. tenera and C. xeranthica.

43. C. xerantica Bailey -- Foliage rather narrow and short, not reaching much beyond 2 dm above ground level, and the blades only 1-2 mm wide. Stems (3)-4-(6) dm high, rather rigid and about twice taller than the foliage. Inflorescence straight, whitish to light-coloured, the rachis stiffly zigzag, the scales lightly tinted and partly hyaline. Spikelets 5 to 8 and not crowded, but somewhat overlapping, cuneate at base but not long attenuate, the staminate portion less than half as long as the pistillate. Perigynia 3.5-5.0 mm long, 1.6-2.0 mm wide, rhomboid-lanceolate, broadest about the middle, its beak ill-defined. (Early summer?). Prairies on sandy or gravelly soil -- swMan-sBC, (US).

44. C. adusta Boott -- Bracts rather broadly dilated towards the base, at least the lowest bract with a base obviously broader than the scales. Similar to C. tribuloides, but generally a larger and coarser plant with the scales longer, about as long as the perigynia, ± 5 mm long, usually with a wide membranous margin giving the inflorescence a pale silvery appearance, or sometimes darker and brownish. Fairly tall, the stem stiff and much overtopping the leaves, the latter mostly 3-4 mm wide. Inflorescence crowded, the (4)-5-(7) spikelets ovoid and ± rounded at base. Perigynia ± 5 mm long, thickened and strongly convex dorsally, ovate, with a peripheral wing, which is narrow and very finely ciliate above the middle, but tends to grade below the middle into a thickened, glabrous, shining, and strongly raised marginal nerve. Early summer. Wet sands. -- (Mack), NF, NS, NB-BC, (US).

Hudson 1978 reports the existence of transitional (or hybrid?) material to C. aenea (= C. argyrantha var. aenea).

44X. C. tincta Fern. -- Possibly a hybrid with C. Bebbii but perhaps only intermediate material. Similar to C. Bebbii with the scales covering most of the beak, but the perigynia longer than in C. Bebbii, yet not quite as long as in C. adusta. Early summer. Wet sands and shores. -- PEI-Q, S-Alta, (US).

Our usage of C. tincta is only tentative and we are not too sure that it is realistic to talk about hybrids in the Ovales. It might be better to call such specimens "intermediates" and let it go at that. A medley of such intermediates occur throughout the section, which prompted Hudson (in litt.) to comment "There must be something peculiar in the reproductive situation in Ovales for the appearance of a very large number of very slightly different species (or alternatively, a smaller number of variable species) with intermediates between the entities no matter how fine (or how coarsely) one divides up the material".

45. C. Crawfordii Fern. -- Perigynia lanceolate to narrowly lanceolate, 4-6 times as long as wide, only 1 mm wide or

slightly less. Densely tufted and 2-4 dm high. Otherwise similar to the following and generally smaller. Spikelets (6)-8-(15), strongly overlapping to crowded, and rather narrow, rhomboid or obrhomboid, and usually twice longer than broad, less than 5 mm wide. Perigynia 3-4 mm long, acute at base, almost gradually tapered to a fairly long beak. Early summer. Shores and wet places. -- Mack, Aka, L-SPM, NS-O-(Man)-S-BC, US, (Eur).

Hudson 1978 reports intergradation to C. Bebbii.

46. C. scoparia Schkuhr -- Perigynia 4.0-6.5 mm long, longer than in most of its relatives, lanceolate like the last, but somewhat larger, 1.5 mm wide or slightly broader, 3-4 times longer than wide, obtuse to rounded at base. Mostly 4-6 dm high, with many somewhat shorter sterile shoots. Leaves mostly 1-3 mm wide. Inflorescence at first crowded, becoming nearly moniliform and arching, of 5-6 relatively large spikelets, the latter mostly 10-12 mm long, oblong to rhomboid, about twice as long as wide. Late spring and early summer. Wet meadows and shores. -- NF-(SPM), NS-seMan, (Alta)-swBC, (US).

We have seen from our area only collections from Lac-du-Bonnet and Sasaginnigak Lake. Reports for Saskatchewan by Ledingham 1943, Fraser 1944, Russell 1954, Breitung 1957, Scoggan 1978, querried by Boivin 1967, were based on collections from Saskatoon and Carnduff, both at SASK. But Hudson (in litt.) could not find the Saskatoon collection, while he reports the Carnduff (SASK) one as probably mislabelled and likely originating from Olds, Alberta. Further the latter has been revised to C. Bebbii. Hence the corrected range.

The Alberta reports have not been checked yet but they now seem doubtful in view of the absence of the species from Saskatchewan. The B.C. reports appear based on introductions.

47. C. cristatella Britton -- Some of the perigynia with the beak curved outward at maturity or even squarrose at tip. Commonly 6-8 dm high and producing numerous sterile shoots about as high. Stem leafy and clothed with sheaths in the lower half. Leaves (4)-5-(6) mm wide. Inflorescence (2)-3-(4) cm long, of (6)-8-(12) crowded spikelets, the latter subglobular, (6)-7-(8) mm long, green with a light brown tinge. Scales broadly lanceolate. Perigynium 3-4 mm long by 1.5-2.0 mm wide, about twice longer than broad, the body ovate to short elliptic. Marginal wings tending to be undulated, often inflected inward about the middle. Beak of most perigynia straight to slightly curved outward, and almost invariably with a few of them squarrose at tip. (Early summer?). Occasional in open marshes, sometimes in marshy woods. -- sQ-sMan-(cS), US.

Previous Saskatchewan reports of C. cristatella 1954 were referred to C. Bebbii by Breitung 1957. The justifying sheets

(SASK) were revised to C. Bebbii by J.H. Hudson. However Hudson 1978 would retain a collection (not seen) from Anglin L. (SASKP) as C. cristatella. Alberta reports by Turner 1949, and Scoggan 1978 are based on Fort Saskatchewan sheets (SASK) of C. Bebbii. A related species was reported for Manitoba by Hooker 1839 and Macoun 1888 as C. arida Schwein. & Torr., by Fernald 1950, Gleason 1952 and Scoggan 1957 and 1978 as C. muskingumensis Schwein. In 1964 we leafed through the whole of the Ovales at CAN without finding any of the sheets cited. We expect those reports to be unsubstantiated or perhaps based on misidentifications.

48. C. normalis Mack. -- Habit and herbage like the last but the inflorescence often laxer, the scales triangular ovate, and the beaks straight or incurved. -- (NB-Man), US.

Judging from published descriptions and a few reliably identified U.S. sheets, C. normalis differs only by the two characters noted above, both of which seem to intergrade with C. cristatella. Furthermore, of the 50 or so Canadian sheets at hand from Quebec, Ontario and Manitoba, none is a good match for the U.S. sheets, most of them have either the narrow leaves of C. tenera, or the narrow perigynia of C. projecta. We are however refraining from passing judgement on this taxon at this juncture; we are only expressing our dissatisfaction.

49. C. tribuloides Wahl. var. reducta Bailey (C. projecta Mack.) -- Habit and herbage of C. cristatella, but the inflorescence laxer, the perigynia narrower, and the beaks straight or incurved. Inflorescence often very loose or moniliform in the lower half, of 5-10 smallish greenish spikelets, these ± 5 mm wide, often with less than 20 perigynia each. Scales broadly lanceolate. Perigynia (3.0)-3.5-(4.0) mm long, (0.8)-1.2-(1.4) mm wide, triangular-lanceolate, (2½)-3-(4) times longer than wide, the beak broadly winged, but the body with a very narrow to obsolete wing. Early summer. Swampy places. -- NS-PEI-(NB)-Q-seMan, US.

Typical C. tribuloides has more numerous perigynia (30-60) in longer spikelets and the scales are more deeply tinged in chestnut.

Manitoba and Alberta reports of C. tribuloides Wahl. by Boivin 1967 are to be discounted as they were based on earlier reports of C. cristatella. The report of C. tribuloides for B.C. querried by Boivin 1967, repeated by Taylor 1977, is in need of rechecking.

50. C. tenera Dewey -- Obviously resembling the last by its small and few-flowered spikelets in a lax inflorescence, but the foliage much finer and the perigynia a bit wider. Commonly 4-6 dm high, densely tufted and producing numerous tall sterile shoots in the manner of C. cristatella. Leaves (1)-2-

(3) mm wide. Inflorescence 2-4 cm long, usually moniliform and arching over, or the (4)-5-(8) spikelets ± overlapping, the latter (4)-5-(6) mm wide, short ovoid or short obovoid, relatively few-flowered, commonly of about 15 perigynia each. Scales broadly lanceolate. Perigynia triangular to triangular-ovate, 3-4 mm long, (1.5)-1.7-(2.0) mm wide, 2-(2½) times longer than wide. Early summer. Mainly in wettish spots under Aspen. -- (NS, NB)-Q-S-(Alta-BC), US.

51. C. Bebbii Olney -- Similar in habit to C. Crawfordii, but taller, a gracile species with small perigynia gathered into a short inflorescence. Stems (4)-6-(9) dm high and commonly equalling the leaves, these (1.0)-2.0-3.0-(3.5) mm wide. Inflorescence (1.5)-2.0-(2.5) mm long, of (4)-8-10 strongly overlapping spikelets. Spikelets broadly ovoid, 5-6-(7) mm long, narrower by about 1 mm, often similar to C. tenera, but the smaller perigynia more crowded and much more numerous, usually 30-60 to a spikelet. Perigynia ovate-lanceolate, (2.5)-3.0-(3.5) mm long, the body ovate to elliptic, (0.8)-1.2-(1.5) wide, weakly contracted into an ill defined beak. Achene surrounded by spongy tissue as in C. brevior, but the ring narrower and less obvious. Early summer. Very common in wet open places, especially if under fresh water in early spring. -- NF, NB-BC, US.

The range was extended northward into Mackenzie by Thieret 1963, repeated by Boivin, 1967, Porsild 1968, and Scoggan 1978, but the justifying sheet from the Kakisa River (DAO) has been revised to C. Crawfordii. The range of C. Bebbii was also extended into Alaska by Fernald 1950, and Scoggan 1978, querried by Boivin 1967; no justifying sheet could be located at GH in 1965.

The following intermediates may be met with as noted by Fernald 1950 and Hudson 1978.

C. Bebbii to C. Crawfordii

C. Bebbii to C. cristatella

C. Bebbii to C. scoparia

C. Bebbii to C. tenera

A report of C. festucacea Schkuhr for the west by Boivin 1967 was properly discounted by Scoggan 1978 as it was based on specimens of C. Bebbii.

52. C. brevior (Dewey) Mack. (C. Bicknellii Britton; C. cumulata (Bailey) Mack.; C. Merritt-Fernaldii Mack.; C. molesta Mack.) -- Perigynia broadest, the body orbicular or nearly so. Stems mostly 3-6 dm tall, overtopping the foliage by about 1/3. Leaves (1)-2-(3) mm wide, partly in sterile shoots, partly cauline, their sheaths clothing the lower third of the stem.

Inflorescence (1)-2-3-(4) cm long, mostly of (3)-5-(8) spikelets, tinged brown, with a yellowish cast. Spikelets 6-7 mm wide, very abruptly contracted into a short and narrow staminate base 1-3 mm long. Perigynia (3.5)-4.0-4.5-(5.5) mm long, (2.0)-2.5-3.5-(4.0) mm wide, the body suborbicular, its wings very broad, abruptly contracted into the beak. Achene not filling the whole of the perigynium, but centrally located and surrounded by a narrow ring of spongy tissue. Early summer. Sandy places and sand dunes, sometimes on dry rocks. -- swQ-Man-(S)-Alta-(BC), US.

Many more segregates have been proposed, but we are still unconvinced on their value. Hudson's experience (in litt.) is similar to ours. "In feeding material of our C. brevior into the keys of Mackenzie, Fernald, and Gleason ... one could wind up at any of half-a-dozen other names: Bicknellii, cumulata, molesta, Merritt-Fernaldii, etc., etc. The name arrived at on a coldly objective following of the key varied from specimen to specimen of what were plainly samples of the same population".

Commenting on the segregates of this and the previous species, Cronquist 1969 wrote "Monographic study might lead to a broader specific concept, with several varieties, but these varieties would be unusual in lacking ecogeographic differenciation inter se". The differenciation remains just as unsatisfactory when recognized as species.

Canadian reports of C. straminea W. by Boivin 1967 were largely based on the distribution of C. brevior.

17. POLYTRICHOIDEAE

Sections from here to the end belong to subgenus Carex as described above on pp. 71-72. Also, most of these sections, except the last four, have a style more or less deciduous and of a different texture than that of the achene. In this section there is only one spike, it is androgynous, and the scales of the staminate flowers form a tight sheath around the rachis, their edges being fused for at least half of their length.

53. C. leptalea Wahl. var. leptalea -- Small species with a single small spike of green perigynia. Forming dense carpets, 1-2 dm high, of fine and soft foliage. Spikelet green and usually 0.5-1.0 cm long. Pistillate scales hyaline except the green midnerve, or sometimes partly tinged in brown, especially towards the edge and the apex, usually falling off before the fruit matures. Perigynia few, beakless, 2.0-3.5 mm long, rounded at tip, conspicuously nerved. Late spring. Boggy woods. -- swK-sMack, L-SPM, NS-BC, US -- Var. Tayloris Boivin -- Spikelets bicolour: green and brown. Pistillate

scales brown but the midnerve green. Lower scales acuminate to cuspidate or sometimes more or less aristate. Jasper and westward. -- Aka-sY, coAlta-CB.

A rather distinct type and not to be confused with anything else. In our area, and throughout the continental part of its range, it is a rather uniform plant, but near the coasts a number of variations occur that are not matched by the inland material. The following three are recorded.

On the east coast, from Nova Scotia southward, plants with longer perigynia (i.e. 3.5-4.0-(5.0) mm) have been distinguished as var. Harperi (Fern.) Weath. & Grisc. Not otherwise similar to the west coast C. Jimcalderi which also tends to longer perigynia.

To the west and northwest of us a var. Talyloris with bicolour spikelets and lower scales with the midnerve excurrent into a short point or more rarely into an awn. To the north of us, from northern Manitoba to southern Mackenzie, intermediates leptalea-Tayloris are fairly frequent; mostly the scales approach those of var. Tayloris in colour, more rarely some intermediates have excurrent midnerves. However none of these intermediates exhibited both characters and they have therefore been referred to var. leptalea, the only variety known otherwise to occur in the area.

From Vancouver Island to southeastern Alaska there is a coarser plant which has been previously described as ssp. pacifica, but upon close study has proved to differ by quite a number of small characters. We are therefore recognizing as a species in its own right. Var. leptalea and the new species may be contrasted as follows.

Var. leptalea: stems (1)-2-(4) dm high, (0.3)-0.5-(0.7) mm thick near the base, including the sheaths. Lowermost leaf 0.6-1.0 mm wide, the others narrower still. Inflorescence mostly 0.5-1.0 cm long. Pistillate scales as described above. Perigynia ellipsoid to broadly lanceolate, (2.0)-2.5-3.0-(3.5) mm long. Achenes narrowly obovoid, at least 1½ times as long as wide, commonly 1.6 mm long by 0.7-1.0 mm wide, acute on the angles, the stipe 0.4-0.6 mm long. Anthers 0.4-0.5 mm long.

C. Jimcalderi: stems (2)-3-(4) dm high, coarser and more densely tufted, (0.8)-1.0-1.2-(1.5) cm thick near the base, including the sheaths. Lowermost leaf 1.0-1.2-(1.5) mm wide. Inflorescence mostly 1.0-1.5 cm long. Scales as in var. Tayloris. Perigynia (3.0)-3.5-4.0-(4.5) mm long, broadly to narrowly lanceolate. Achenes obovoid, 1.5 mm long by 0.8-1.2 mm wide, rounded on the angles, about 1½ times longer than wide, exclusive of the stipe 0.8-1.2 mm long. Anthers 0.8-1.0 mm long.

Carex leptalea var. Tayloris var. n. Inflorescentia bicolor, perigyniis viridulis, squammis brunneis. Squammae foemineae brunneae nisi nervo medio viride. Squammae inferiores nervo medio plus minusve excurrente, interdum etiam aristatae. Typus: T.M.C. Taylor & alii 1421, Haines Road, mile 46, wet peat bog, July 15, 1956 (DAO). Named after Dr. T.M.C. Taylor, formerly of Toronto, now of Victoria. He has made a major contribution to the knowledge of the flora of Canada, especially of British Columbia.

Carex Jimcalderi sp.n., C. leptalea ssp. pacifica Calder & Taylor, Can. J. Bot. 43: 1391-2. 1965, nec Carex pacifica Drejer, Flora excursoria hafniensis, p. 292. 1838; nec Carex pacifica Grisebach, Archiv für Naturgeschichte (Wiegemanni) 8: 292. 1852. Type: J.A. Calder & R.L. Taylor 35,217, Moresby Island, 1964 (DAO). Named after James A. Calder, Jim Calder to his friends, a keen student of the Cyperaceae, outstanding collector of Canadian plants, his contribution yet unmatched for quality and quantity; about 250,000 sheets over a 20 year period.

18. PHYLLOSTACHYAE

Lower pistillate scales much enlarged, green, foliaceous, resembling bracts. Staminate scales sheathing as in the last section, these being the only two sections with this feature. Beak of the perigynium empty, triangular-flattened.

54. C. Backii Boott var. Backii -- Inflorescence inconspicuous, being immersed in the foliage and overtopped by many unusually large, green, and leaf-like (or bract-like) scales. Perigynia 5-6 mm long, few, green, gradually tapered and compressed into a beak 2-3 mm long. Late spring. Rare in wooded hills in the south. -- NB-BC, US -- Var. saximontana (Mack.) Boivin (C. saximontana Mack.) -- Perigynia shorter, ± 4 mm, the beak being only ± 1 mm long. Hills, usually on sandy soil, more frequent northward. -- sMan-BC, US.

The presence of the related C. Willdenowii Schkuhr in our area is still doubtful at best. It is a highly localized species and we know of only 3 Canadian collections: Sorel (MT) in Quebec, Niagara (CAN) in Ontario, and a Macoun collection in 1872 (MTMG, QK) on the Lake of the Woods. The latter is debatable as to provincial appartenance, and is likely to remain so, until confirmed by a modern collection. Tentatively we have refered it to Ontario on grounds of probability. It was cited by Macoun 1888. A Manitoba report by Lowe 1943 was somewhat indefinite or tentative and was discounted by Scoggan 1957. We concur with his approach until better documented or more convincing evidence becomes available.

19. FILIFOLIAE

Resembles the Montanae, but the inflorescence is reduced to a single androgynous spike.

55. C. filifolia Nutt. -- Niggerwool -- Spike solitary and the perigynia finely puberulent towards the top. Densely tufted species with filiform leaves and brown, marcescent leaf bases. Stem nearly cylindric, with 6 low ridges. Scales large, broadly obovate to nearly orbicular, brown with a very wide membranous margin. Early spring. Rolling steppes and hillsides. -- swMack-sY, swMan-BC, US.

20. OBTUSATAE

Technically similar to the next because the weakly trigonous perigynium reflects the shape of the closely enclosed achene. Perigynium lustrous, glabrous, its nerves weak or obscure, its wall thickish, often ridged.

56. C. obtusata Lilj. -- Common prairie species and sand binder, stoloniferous and with a single spike. 2 dm high or less, with blackish rhizome and narrow leaves. Perigynia few, brown to blackish and very shiny. Beak margin very obliquely cut into a single and broadly membranous point. Late spring. Well drained prairies and steppes. -- wMack-Aka, sMan-BC.

57. C. supina Wahl. var. spaniocarpa (Steudel) Boivin -- Inflorescence small and compact, reduced to 2-(3) spikelets, of which the terminal is longer and staminate, while the lateral one(s) is usually reduced to 2-5 perigynia. Stoloniferous, 1-2 dm high, the leaves narrow. Perigynia red-brown and very glossy. Beak as in previous species. Mid spring (?). Northern prairies. -- G-K-(Mack-Aka), nQ, (Man)-nwS-nAlta-nBC, (ncUS), Eur.

According to Hultén 1942 the scales of the paleogean var. supina are shorter than the perigynia. In our var. spaniocarpa the scales are about as long as the perigynia and the latter have a more prolonged, more evenly tapered beak.

21. MONTANAE

In this and the last three sections the achene is only weakly trigonous, its walls being convex, and the perigynium, which envelops the achene closely, is also weakly trigonous to orbicular in cross-section. Spikes more than one. Perigynia more or less puberulent.

58. C. nigromarginata Schwein. var. elliptica (Boott) Gleason (C. Peckii Howe) -- A common forest species with puberulent perigynia, similar to the following, but the narrowly

obovoid perigynia gradually tapered at base. Forming a loose carpet with reddish bases and stems that overtop the leaves. Inflorescence short, green or brownish, the staminate spike light coloured and not very conspicuous, about 1 mm thick, usually under 1 cm long, and little overtopping of the inflorescence. Spikelets crowded or the lower sometimes distant. Perigynia 3-4 mm long, the beak up to 1 mm long, the ill-defined stipe about as long. Scale reaching to about the base of the beak. Early to mid spring. Common in mixed and deciduous woods. -- Y-(Aka), NB-BC, US.

The nomenclature and taxonomy of this group have known many avatars and are currently somewhat confused.

The specimens from eastern Canada are commonly identified C. Peckii if they have a crowded inflorescence, but C. varia Muhl. (or C. artitecta, sometimes C. Emmonsii) if the lowermost spikelet is more or less remote. These same variations occur throughout our area, but nobody seems to have attempted to subdivide our western material in the same manner. Further this usage of C. varia and C. artitecta is apparently incorrect as these two names actually refer to more a southern variant with smaller perigynia.

The more realistic taxonomy is that of Gleason 1952. His var. Muhlenbergii (Gray) Gleason (= C. artitecta Mack., C. Emmonsii Dewey and C. varia Muhl.), is mainly a planicostal and magnilacustrine type, with smaller perigynia, (2.0)-2.5-(3.0) mm long, 0.7-1.0 mm wide, about equalling their scales, the latter often hyaline, hence the inflorescence is usually pale green. Also the leaves tend to be relatively longer and the inflorescence is more often laxer.

According to Gleason, the stems in var. Muhlenbergii overtop the leaves, while they are shorter than the leaves in var. minor (Boott) Gleason. This distinction did not prove very convincing and we would refer the latter name to the synonymy of var. Muhlenbergii.

Four Manitoba collections named C. communis Bailey were examined, including the one listed for Otterburne (MT, QFA) by Löve 1959 and Scoggan 1978; all have been revised to C. nigromarginata var. elliptica.

59. C. pensylvanica Lam. var. pensylvanica -- Staminate spike rather conspicuous, being ± 3 mm thick, mostly around 1.5 cm long, and about as long as the rest of the inflorescence. General habit of the preceeding. Commonly 3-4 dm high, the foliage about 2 dm high. Perigynia 2-3 mm long, 1.0-1.5 mm wide, the subglobose body abruptly contracted above and below into a beak and a coarse stipe, both about the same length. Mid to late spring. Mixed or deciduous woods. -- (NS), NB-sMan, US -- Var. digyna Boeckl. (C. heliophila Mack.) --

A common prairie type with puberulent perigynia. Generally a smaller plant, but the perigynia larger. Stems usually 1-2 dm high, the foliage mostly around 1 dm high. Bracts not sheathing and the pistillate spikelets all sessile. Perigynia (2.5)-3.0-3.5-(4.0) mm long, 1.0-1.5 mm wide. Mesic or dryer prairies and sandy woods. -- O-neBC, US -- Var. vespertina Bailey (C. inops Bailey) -- Like var. digyna but the bracts usually longer and short sheathing, the sheath up to 4 mm. Lower spikelet on a short peduncle, up to 4 mm long, which is usually included in the sheath of its bract. Mountain prairies. -- swAlta-BC, wUS.

60. C. deflexa Horn. var. deflexa (C. brevipes W. Boott) -- Stems very uneven in length, some very short, others many times longer and nearly equalling to somewhat overtopping the foliage. Stoloniferous, yet forming small to large tufts. Bracts with purplish auricles. Scales shorter than the perigynia, the latter 2-3 mm long, the beak ± 0.5 mm long. Staminate spike small, 5 mm long or less, and often overtopped by the uppermost pistillate spike. Early summer. Coniferous woods on acid soils. -- G, seK-Aka, L-SPM, NS-BC, neUS -- Var. Rossii (Boott) Bailey (C. Rossii Boott) -- More scabrous with larger perigynia, 3.0-4.5 mm long, the beak (0.7)-1.0-1.5 mm long. Staminate spike up to 15 mm long. Bracts with membranous auricles. Banks and dry woods. -- sMack-sAka, wO-BC, US.

61. C. umbellata Schkuhr var. brevirostra Boott (C. abdita Bickn.; C. umbellata sensu Mack.) -- Most stems very short and hidden among the leaf bases: some stems longer and more obvious, yet shorter than the leaves. Very scabrous throughout. Leaves 1-3 mm wide, ± marcescent. Perigynia abundantly puberulent all over except towards the base, ± 3 mm long, abruptly contracted into a beak (0.5)-0.7-(1.0) mm long and less than half as long as the obovoid body, the latter ± 2 mm long. Scales as long or longer than the perigynia. Early summer. Dry sands, wooded or not, especially if disturbed. -- (L-SPM, NS, NB)-Q-Man-(S)-Alta-(BC, US) -- Var. tonsa Fern. (C. tonsa (Fern.) Bickn.) -- Perigynia bigger and glabrous or nearly so, except the lateral nerves being ciliate to puberulent. Growing in ± hemispherical tufts. Elongated stems few, often lacking. Leaves stiffer and often broader, up to 3-4-(5) mm wide. Perigynia mostly 3.5-4.5 mm long, the beak (1.0)-1.2-1.5-(1.8) mm long and more than half as long as the body. Dry sands and precambrian outcrops. -- (L), NS-PEI-[NB]-Q-nBC, US.

Löve 1959 extended the range of var. umbellata to Manitoba on the basis of Otterburne collections (QFA) since revised to var. brevirostra. Moss 1959 also reports C. umbellata from Alberta with an ambiguous description in which the perigynia

exhibit the unlikely combination of small overall size and quite long beaks. Alberta material examined belonged either to var. brevirostra or to var. tonsa.

The species was recently reported from Greenland as C. abdita (= var. brevirostra) but the report is varietally ambiguous as the perigynia are described as glabrous (= var. tonsa) by Böcher in his flora of 1968.

Mackenzie 1935 extended the range of var. brevirostra to Keewatin, but this cannot be accepted without more precise knowledge of the place or date of the justifying collection, as large tracts of Ontario and Manitoba were part of Keewatin until 1912.

Our two varieties are reasonably distinct in our area, but eastward the situation is quite different because of the additional presence of a typical variety which is intermediate between our taxa and intergrades with both. This has led some authors, including Gleason 1952 and Boivin 1967 to unite all three taxa. However, Hudson 1978 has rightly pointed out that in our area only two varieties occur and that there is here no problem of intergrades. Hence it seems justifiable to recognize these three varieties even if their distinctiveness is poor in parts of their overlapping ranges.

There has been some debate and conflicting usages as to which variety should be called var. umbellata. This point does not seem to have been settled clearly yet and we are therefore sticking to the traditional usage, which happens to coincide with that of Fernald 1950 and Breitung 1959. In 1915 Mackenzie claimed that C. umbellata had been misapplied and was really synonymous with var. brevirostra (or C. abdita). For the plant previously called C. umbellata (= var. umbellata of this text) he proposed the name C. rugosperma. Fernald retorted in 1942 in Rhodora 44: 288-290. 1942, in an article that we find overassertive, needlessly sarcastic and not fully convincing. The illustrations of Schkuhr reproduced by Fernald do not show clearly a longer beak for var. umbellata. As for the difference in the shape of the scales, it is far from being decisive and as sharp as Fernald makes it. In both taxa the scales are narrowly ovate to ovate-lanceolate with a tendancy to somewhat longer and relatively narrower scales in var. umbellata (= C. rugosperma). Fernald's descriptions in his 1950 Manual are an exageration of a weak statistical difference. The type of the species is in need of a careful check.

22. SCIRPINAE

In this and all the sections that follow, except those with two stigmas, the achene is strongly trigonous, its sides being either flattish or concave. In this and the next four

section the perigynium is not inflated and holds the achene so tightly that at maturity the perigynium reflects the strongly trigonous shape of the achene. In this and the next section the perigynia are more or less puberulent. In this section the spike is solitary and unisexual.

62. C. scirpoidea Mx. var. scirpoidea (C. stenochlaena (Holm) Mack.) -- Dioecious, with the hirsute perigynia in a single dark-coloured terminal spike. Stoloniferous, mostly 2-4 dm high. Leaves 2-3 mm wide. Sheaths abundantly and finely puberulent on the ventral side. Spike linear, dark coloured. Scales usually ciliate, deeply coloured to the margin except for the paler midnerve. First half of summer. Boggy meadows and wetter rocky places, mainly northward. -- G-Aka, L-SPM, eNS, Q-BC, US, Eur -- Var. scirpiformis (Mack.) O'Neill & Duman (C. athabascencis F.J. Hermann; C. scirpiformis Mack.) -- Spikes more lightly coloured because of the scales having a conspicuous hyaline border, the latter mostly 0.3 mm wide. Prairie meadows; somewhat alkali tolerant. -- wQ-BC, (US).

The shape of the perigynium varies from broadly ovate to ± lanceolate and its length varies accordingly. Plants with the longer perigynia (= var. stenochlaena Holm) are supposed to occur only from the Rockies westward, but this does not come out clearly in the material at hand.

23. DIGITATAE

Bracts purplish and bladeless, reduced to a tubular sheath. Perigynia more or less puberulent as in the last two sections.

63. C. pedunculata Muhl. -- Spikelet on very long peduncles and arising from all levels, at least one of them from the conspicuously reddish base. Perigynia conspicuously trigonous, conspicuously clavate-oblanceolate, pale green and ± puberulent above, abruptly tapering to a whitish base. Early spring. Dry open woods from Cumberland Lake and Hudson Bay Junction eastward. -- wNF-SPM, NS-ecS, US.

Largely distributed from southern Ontario eastward, but its Canadian distribution is more spotty in the west. It is found in the Thunder Bay area and occurs westward to Caribou (DAO) and Seven Sisters in southeastern Manitoba. It reappears on the Prairie Coteau at Riding Mt. (DAO) and Duck Mountain, northward to Cumberland House (GH, K) at 54° N. The latter represents the limit of the range as known to us. An Alberta report by A.E. Roland, Fl. Nov. Scot., Proc. N.S. Inst. Sc. 26: 167. 1966 is undetermined as to its source; it may have been a Jasper (CAN) sheet once filed as C. pedunculata, now revised to C. deflexa var. Rossii. We know of only one B.C. collection; Macoun, Revelstoke, 1890 (CAN). It was checked by

Mackenzie and is apparently the source of all subsequent B.C. reports. Considering that this is the only collection west of the Dakotas and of Cumberland House, considering the absence of any recent collection, we judge the stated B.C. locality to be probably in error.

It was also mentioned by Boott ex Hooker 1839 for Norway House and the Rockies. The Norway House report arises from difference in labelling of the Cumberland House collection, some specimens (GH) being labelled "Cumberland House" while others (K) obviously of the same collecting are inscribed "Norway & Cumberland House". The Rocky Mountains (K) collection is correctly identified, but likely erroneous as to locality, having never been confirmed.

64. C. concinna Br. -- Scales minutely ciliate above the middle. Small and tufted, the stems commonly 1 dm high and the foliage only half as tall. Not scabrous except the leaf tips. Inflorescence short, with pale green, puberulent perigynia, and shorter, dark brown scales, the latter with a green base and hyaline margins. Bracts reduced to sheaths 1-3 mm long, the blades lacking or sometimes a mere awn 1-3 mm long. Styles 2-3, about half as long as the perigynium. Mid spring. Wetter Spruce woods, etc. -- seK-Aka, L-NF, nNB-BC, US.

A report by Louis-Marie 1961 of a Dutilly collection from Resolution Island at the southeast tip of Baffin in Franklin district, querried by Boivin 1967, may have been only a lapsus calami for Fort Resolution in southern Mackenzie where Dutilly collected his number 8305 in 1940 (QFA). The range of the species has been amended accordingly.

65. C. concinnoides Mack. -- Stigmas usually 4 and about as long as the perigynium. Resembling the previous, but about twice as large. Stem smooth throughout or scabrous near the summit. Bract reduced to a narrowly triangular lanceolate and coloured structure which is barely sheathing at base. Scales with a broad membranous margin and a broad, deep purple-red center. Perigynia short-hirsute, pale green to red-spotted. First half of summer. Mountain woods to timberline. -- swAlta-BC, wUS.

66. C. Richardsonii Br. -- Lower ¼ of the stem bearing two or three bladeless leaves reduced to reddish sheaths. Long stoloniferous. Stem nearly round, strongly scabrous all around and from base to summit. Bracts reduced to elongate purple-red sheaths with a broad membranous margin. Perigynia shorter than the membranous purple-red scales. Late spring and early summer. Sandy soils in open to lightly wooded areas. -- swMack, cQ-BC, nUS.

24. RUPESTRES

Inflorescence small and blackish. An unspecialized type related to the last few and next few sections: perigynium not hairy; style not bulbous; bractless, or the bracts sheathless or nearly so.

67. C. rupestris Bell. (C. Drummondiana Dewey) -- Small alpine species with a single androgynous spike and leaves which become spirally curled at tip when very old. Around 1 dm high and stoloniferous. Leaves 1-3 mm wide, marcescent. Scales with a wrap-around base, nearly sheathing the rachis. Spring. Dry and rocky tundra, arctic or alpine, especially on limestone. -- G-Y-(Aka), L-NF, Q, nMan, swAlta-eBC, (wUS, Eur).

68. C. glacialis Mack. -- A small, densely tufted species, with a small and strongly two-toned inflorescence. Usually 2 or 3 pistillate spikes, each bearing only (1)-3-(6) perigynia. Scales dark purple, often with a broad membranous margin. Perigynia about 2 mm long, 1 mm wide, the green body subglobose, abruptly contracted to a short stipe and ringed in deep purple around the base of the beak. Late spring. Alpine tundras in the Rockies and arctic or subarctic tundra in northern Manitoba and Saskatchewan. -- G-Aka, L-wNF, nQ-nMan-nS-swAlta-nBC, Eur.

Some eastern material was segregated specifically in 1942 as C. terraenovae Fern., reduced to a variety by Boivin 1967. We now have at hand some 15 collections of this segregate and we must admit that we do not find it to be a tenable distinction when the reputed differences are applied coldly. Some differences, such as the caducous scales, are only exceptional events, while others, such as the colour of the base of the tuft, are of erratic occurrence and not obviously linked; we find it difficult to identify these specimens as a varietal segregate without undue attention on their geographical origin.

25. FIRMICULMES

Inflorescence reduced to a single spike which is mostly staminate with few or only one perigynium at its base. Perigynium filled with spongy tissue below the stipitate achene.

69. C. Geyeri Boott -- With a single spike and typically with a single rather large perigynium at its base. Loosely tufted, the leaves as long or longer than the stems. Scales rather large, 6-11 mm long. Perigynium 5-6 mm long, broadly oblanceolate, somewhat removed from the rest of the spike. Spring. Dry slopes near timberline: Waterton. -- swAlta-seBC, US.

26. ALBAE

Like the last four sections, but unlike most of the following, the perigynium is trigonous because it fits closely over the trigonous achene with flat to concave sides. Bracts reduced to their sheaths. Base of style (or top of achene) enlarged in a manner reminiscent of Eleocharis.

70. C. eburnea Boott -- Delicate forest species with very fine foliage forming a lax carpet. 1-2 dm high. Bracts reduced to membranous sheaths. Spikelets very small, typically 3, of which the terminal one is staminate and sessile or shorter than its peduncle, and is overtopped by at least one of the pistillate spikelets. Perigynia few, 1.5-2.0 mm long, conspicuously trigonous, becoming membranous with the blackish achene visible through at maturity. Early summer. Woods, especially near watercourses in calcareous areas. -- Mack-Aka, NF, NS, NB-BC, US.

27. BICOLORES

Differs from the next few and last few sections by its lenticular achene topped by only 2 stigmas. Surface of the perigynium minutely (under X 30) granular-bullate, usually white to golden yellow, rarely whitish to partly purplish. From this section to the end, the perigynium does not usually fit tightly over the perigynium and there is an air space over the achene. From here to 42. Cryptocarpae the style is of a different colour and softer texture than the achene, hence the style is mostly deciduous. From here to 36. Ferrugineae the lowest bract is sheathing at base and its sheath is rarely less than 5 mm long.

71. C. rufina Drejer -- A small plant, less than 1 dm high, the short stems overtopped by the leaves. Leaves less than 1 mm wide, canaliculate and falcate, with a whitish or light tan sheath, auricles, and ligule. Scales brown, with a green midnerve, overtopped by the very short-beaked perigynium. Stigmas short, about 1 mm long. Just before mid summer. Marshy tundra: Lake Nueltin. -- G, K, nwMan-(nwS), nwEur.

A very rare plant, or perhaps merely small and overlooked, known only from Iceland, Greenland, Thaanne River and Lake Nueltin, reported by Hudson in 1978 from Thomson Bay on Lake Athabaska. Our plant is perhaps an undescribed variety. See Hudson p. 133-4.

72. C. bicolor Bell. -- Spikes strongly bicolour, the terminal one obscurely gynandrous, being mostly pistillate with a few staminate flowers at the base. Small plant, usually around 1 dm high, the stem overtopping the leaves. Spikelets crowded and nearly sessile or short pedunculate, the

inflorescence usually less than 1 cm long. Perigynia pale green, minutely whitish-granular. Scales dark brown with a wide central green band and broadly rounded tip. Early summer. Tundra and wet montane forests. -- G-Mack-(Y)-Aka, NF, Q-nO-nMan-nS-swAlta, Eur.

Highly sporadic and known in our area only from Churchill (CAN, DAO, QFA, SASK), lake Hashbala (DAO, SASK) and the Rockies (DAO).

73. C. aurea Nutt. (C. Garberi Fern., var. bifaria Fern., C. Hassei AA.) -- Perigynia conspicuous, being at first whitish green and granular as in the above, but usually ripening dull orange and becoming fleshy. Spikelets drooping on elongate peduncles, the inflorescence commonly 2-10 cm long. Terminal spike entirely staminate, or more commonly with a few terminal perigynia. Scales often largely membranous, or brownish with a green center and a membranous margin, obtusish to cuspidate at tip. Early summer. Wetter places, usually forested, or marly meadows. -- seK-Aka, (L)-NF, NS-BC, US.

Subdivided in two species on the basis of the colour and fleshiness of the perigynium, the length of the sheath of the lower bracts, the shape of the upper edge of these same sheaths, the colour of the scales and their shape at the tip, the length and sex of the terminal spike. These characters occur throughout the range in a sporadic fashion and without being clearly linked inter se.

In any fair-sized institutional collection it should be easy to demonstrate that C. Garberi is only an earlier stage of C. aurea. Sort out the specimens according to date of collecting or as to stage of maturity. On the average, specimens identified C. Garberi will have been collected about three weeks earlier than those named C. aurea. Nearly all specimens mature enough to have begun loosing their fruits will be filed under C. aurea, but the spikelets will be undecimated in most specimens labelled C. Garberi. We have used this technique of date sorting in this and quite a few other cases, often with satisfyingly conclusive results.

Ledingham 1943 noted that C. Garberi resembles immature C. aurea, and for our part we have been unable to detect C. Garberi as a distinct population in the field. W.J. Cody had the same experience in Mackenzie district. J.H. Hudson has paid special attention to this segregate and his experience is similarly negative. He writes: "I can't find a population in the field. If C. Garberi be a species, it ought to have some kind of ecological niche, different from that of C. aurea where the ranges overlap, where an experienced field observer could find it with some degree of regularity". See Hudson 1978 for comparative descriptions and further discussion.

Until C. Garberi can be ecologically individualized in the field, its distinction will remain mechanical in the herbarium, with no evidence that the resulting segregate is a natural entity of some significance.

28. PANICEAE

Not a strongly differentiated section. Long stoloniferous and phyllopodic, that is, the new stem (except var. Woodii) arises from the center of an old sterile tuft hence the base of the flowering shoot is clothed with the ± withered remnants of old leaves. The sections following, up to 36. Ferrugineae, are all of tufted plants, except the 32. Sylvaticae which are aphyllopodic, and except C. Crawei with its spikelets more or less evenly spaced from the base of the stem up.

74. C. livida (Wahl.) W. (var. Grayana (Dewey) Fern.) -- Foliage pale greenish, glaucous. Leaves 1-3-(4) mm wide. Much like the following, but the blades mostly narrower, the scales broadly rounded at summit and the shorter inflorescence usually under 5 cm long. Basal sheaths grayish brown and all or nearly all blade-bearing. Scales conspicuously green and brown. Perigynia pale green and very asymetrical at the beakless tip, the orifice facing outward. Late spring. Coniferous bogs, rare. -- (G, seK-nwMack)-scY(Teslin)-Aka, (L)-NF-SPM, NS-PEI-(NB)-Q-BC, US, (Eur).

75. C. tetanica Schkuhr var. tetanica (C. Meadii Dewey) -- A middling species, long stoloniferous, rather stiffish. Basal sheaths as above. Leaves green, 2-4 mm wide. Spikelets lax, ± remote, the lower often borne towards the middle of the stem. Scales deep brown with a green center, all acuminate or the upper obtusish. Perigynia as above, but sometimes very short beaked, at first narrowly oblong, maturing to broadly obovoid. Mid spring. Wetter prairies from the File Hills eastward. -- O-sMan-ecS, US -- Var. Woodii (Dewey) Wood (C. Woodii Dewey) -- Conspicuously clothed at base with many bladeless deep red sheaths. Sheaths of the lower stem leaves tending to be similarly coloured. Spikelets often still more lax and more remote, and less deeply coloured, the scales partly hyaline. Deciduous woods along the lower Assiniboine: Brandon, Portage. -- O-sMan, US.

A report of C. tetanica for Alberta by Mackenzie 1935, repeated by Ledingham 1943, may be unsubstantiated as we found no corresponding specimen at NY where Mackenzie's herbarium is now preserved. Nor at GH, etc. A similar report by Gleason 1952 was likely based on Mackenzie's.

Modern authors consulted hold C. tetanica and C. Meadii as distinct species. Two good series of Canadian specimens are at hand and were identified by Mackenzie as C. Meadii and

C. tetanica respectively. There is no difference that we can detect between the two series and it seems doubtful that the diagnostic criteria adduced by Mackenzie were actually used in selecting names for these specimens.

Fernald's 1952 classification is the same as Mackenzie's, but his morphological emphasis is different with C. Meadii having somewhat broader leaves and fatter spikes. A few U.S. sheets at hand were identified by Fernald as C. Meadii and they do have somewhat wider leaves and thicker spikes. If these characters be significant, a proposition not evident from the material at hand, then at least all the Canadian sheets examined belong with C. tetanica proper because of their narrow leaves and medium to thin spikes.

Gleason's 1952 classification is different still with C. Meadii and C. tetanica rated as species, but C. Woodii as a mere variety of the latter. Not a very cogent arrangement since on morphological and ecological grounds C. Woodii is a better defined segregate than C. Meadii.

We have accordingly submerged C. Meadii and retained C. Woodii only as a minor variant, just as Wood himself would have it.

76. C. vaginata Tausch (C. saltuensis Bailey) -- Stem much taller than its foliage, bearing remote and leafy-bracted spikelets. Leaves marcescent, the new ones appearing only after flowering. Spikelets very lax and ± erect on their elongate but stiffish peduncles. Bracts long-sheathing, the sheath often as long as the blade. Perigynium ovoid. Beak straight or slightly sigmoid, slightly deflexed outward, obliquely cut at tip and ending into a single point or two very small teeth. Early summer. Mossy coniferous forests. -- G-sF-Aka, L-NF, NB-eBC, neUS, Eur.

29. LAXIFLORAE

Plants tufted. Otherwise resembling the last (Paniceae) and the spikelets similarly lax and drooping on long and thin peduncles, the inflorescence rather elongated, and the perigynium trigonous, being somewhat tight over the trigonous achene.

Manitoba and Saskatchewan reports of C. plantaginea Lam. were discounted by Scoggan 1957 and Breitung 1957 respectively. The justifying collection is labelled: Drummond, between Norway and Cumberland House (K). It is correct as to identification, but in the absence of later confirmation, is considered doubtful as to locality. An apparent duplicate at GH is labelled: Norway House & Rocky Mounts, Herb. Hooker. Both specimens are barely coming into anthesis and were probably collected in the second half of April.

Another reputed Manitoba sheet, I.L. Hargrave, St. Remi, Man., 1882 (MTMG), is also discounted as likely to be mislabelled. Although Hargrave did some collecting in Manitoba, his St. Remi collections should be ascribed to Quebec rather than Manitoba where no such locality exists.

77. C. laxiflora Lam. var. varians Bailey (C. leptonervia Fern.) -- Much like the next, the spikelets remote and leafy-bracted, but the perigynia more strongly beaked and less crowded, only 5-12 to a spikelet. Tufted. Basal leaves 4-10 mm wide. Bracts 5 mm wide or less. Scales hyaline, broadly rounded to truncate, the green midnerve usually excurrent. Perigynia strongly trigonous and weakly nerved, the nerves ± 5 per face and (0.2)-0.3-(0.4) mm apart, the base and the summit about equally tapered, the base spongy, the summit strongly asymetrical and slightly contracted into an ill-defined beak which is about 0.5 mm long and strongly arched outward at about 45°. Late spring. Rare in rich woods in the Whiteshell and on the Porcupine Mountain. -- L-SPM, NS-seMan-cS, neUS.

The only Manitoba collection (CAN, GH, MT) seen was also the basis of a report by Scoggan 1957 and 1978 of C. blanda Dewey from our area. A Brandon collection reported as C. blanda has not been verified. More recent collections from Vassar and Pansy have been revised to C. gracillima.

Also occurs on the Prairie Coteau, at least on the Porcupine Mountain (SASK), where it was collected by J.H. Hudson in 1973 and reported in 1978 as var. blanda.

The more recent listing by Dugle 1969 of C. blanda for the Whiteshell was based on a Pinawa collection (PINAWA) since revised to C. gracillima.

C. laxiflora has been subdivided into about eight weak varieties or very weak species. They overlap quite a lot morphologically and their ranges are largely coincident. Some have basal leaves very broad, up to 2-3 cm wide (= var. latifolia Boott); in another (= var. blanda (Dewey) Boott) the perigynium is nearly beakless and shows 2-3 times more nerves than our var. varians, etc.

30. GRANULARES

Wall of the perigynium thickish, longitudinally ridged on the outside, smooth on the inner face. Spikelets scattered from top to base of the stem. Peduncles not much longer than the enclosing sheaths, hence the spikelets are nearly erect, in contrast with the two adjacent sections where the spikelets are more or less drooping on long pedicels.

78. C. granularis Muhl. (var. Haleana (Olney) Porter) -- Spikelets very remote and subtended by elongate and leaf-

like bracts which give the stem an unusually leafy appearance for the genus. Tufted. Main leaves 5-8 mm wide. Most peduncles very long, but the upper two spikelets, of which one is staminate, are sessile or nearly so and borne very close together. Scales ± acuminate, hyaline or more commonly brown-tinged with a green midnerve. Perigynia smallish and crowded, 1.8-2.8-(4.0) mm long, obovoid and very asymetrical at the very short-beaked tip (= ± 0.1 mm). Early summer. Wet meadows of the Qu'Appelle and Pipestone, from Broadview eastward. -- NB-sMan-ceS, US.

Nearly all Canadian sheets have smaller perigynia, less than 3 mm long and not over 1.5 mm wide. These could be distinguished as var. Haleana. A few (3) sheets at hand from Ontario and the USA have bigger perigynia and could be denoted as var. granularis. But it is not clear from this scanty material if var. granularis is an uncommon extreme of variation or a geographical variant reaching as far north as James Bay. Western specimens seen had the smaller perigynia of var. Haleana, including the Manitoba sheets (QFA) reported by Löve 1959 as var. granularis.

79. C. Crawei Dewey -- Much resembling the above but stoloniferous and the length relations of the peduncles reversed. Peduncle of the terminal staminate spikelet about as long to twice as long as its spikelet and as any of the other spikelets. Peduncles of the pistillate spikelets much shorter and barely protruding from sheaths of the subtending bracts. Leaves 1-4 mm wide. Perigynia acutish and barely asymetrical at tip. Early summer. River gravels and ground seepage areas. -- (NF, NS, NB)-sQ-seS-wAlta-BC, US.

There is apparently a distributional gap between southeastern Saskatchewan and western Alberta.

31. GRACILLIMAE

Spikelets long and drooping, the terminal one gynandrous. Pubescent, as the next section, but the pubescence inconspicuous, being usually confined to the dorsal side of the basal sheaths.

80. C. gracillima Schwein. -- Spikelets elongate, drooping and green, the terminal one with a few perigynia at the tip. Tufted. Spikelets linear on elongate peduncles. Scale membranous with a green midnerve, shorter than the green and beakless perigynium. Mid spring. Wetter deciduous woods. -- NF-SPM, NS-seMan, US.

32. SYLVATICAE

The herbage or the perigynia, or both, pubescent. A rather middling type not easily circumscribed; it turns up at 7 different end points in Gleason's 1952 key. Differs from the last few and next few sections by being stoloniferous. Stems aphyllopodic, being clothed at base with imbricated and deeply coloured bladeless sheaths.

81. C. castanea Wahl. -- Pubescent: leaves pilose below, glabrous above, the stem pilose. Tufted. Spikelets elongate, drooping. Perigynia green, long beaked, glabrous, about twice as long as the brown and ciliolate scales. Late spring. Floodplains: Sandilands. -- L-NF, NS, NB-seMan, neUS.

82. C. assiniboinensis W. Boott -- Very narrow and elongate pubescent perigynia in very lax spikelets. Herbage glabrous. Flowering stems rather inconspicuous. Spikelets remote, with long peduncles and long leafy bracts. Perigynia turning yellowish at maturity. Beak as long as the body and obliquely cut into a single elongate point. Common and often dominant on the floor of galerie-forests. -- sMan-seS, ncUS -- F. ambulans Bernard -- Producing aerial stolons which are at first erect, then elongate to about 1 m and root at tip. Leaves reversed beyond the mid point. More frequent than the type and probably ecologically conditioned. -- sMan-seS, ncUS.

Earlier reports of C. debilis Mx. were discounted by Scoggan 1957 and 1978. A more recent Churchill report by Louis-Marie 1961 could not be substantiated at QFA in 1965.

33. CAPILLARES

Perigynium nervation as in the next section, i.e. reduced to the two marginal nerves, these quite strongly expressed. But the beak not bidentate at tip, being rather more or less truncate.

83. C. capillaris L. var. capillaris (var. elongata Olney, var. major Blytt) -- A smallish species with small drooping spikelets on elongate capillary peduncles. Tufted and (1)-2-3-(4) dm high with widely scattered spikelets, sometimes borne all the way from the base of the stem. Spikelets short, the staminate less than 1 cm long, the pistillate mostly around 1 cm and often shorter than their peduncle. Late spring and early summer. Wetter and usually shaded places on somewhat acid soils. -- G-Aka, L-SPM, NS, NB-BC, US, Eur -- Var. Krausei (Böck.) Krantz -- Terminal spike gynandrous. Commoner northward. -- G-Aka, nQ-nMan, (Eur) -- Var. Williamsii (Britton) Boivin (C. Williamsii Britton). Generally smaller, the leaves less than 1 mm wide. Inflorescence smaller, more crowded, of shorter and often non-drooping spikelets, the staminate one

frequently overtopped by the upper pistillate spikelet. More northern and rare; perhaps only an ecological variant of more exposed situations. -- F-Aka, L, SPM, Q-neO-nMan, (Eur).

Taller plants occur in shaded habitats and have been distinguished as var. elongata, apparently a normal ecological reaction.

34. LONGIROSTRES

In the last six or eight sections the beak of the perigynium is mostly truncate or emarginate at tip, sometimes obliquely cut into a single point, sometimes bilobed into a pair of obtusish teeth, or more rarely the beak is straight and ends into a pair of short and acute teeth. In this and the next section the beak is arched or deflexed and ends into a pair of straight and very sharp teeth. In this section the perigynium has very few nerves, usually only the two lateral ones, while the teeth of the beak are soft and membranous.

84. C. Sprengelii Dewey -- Conspicuous in deciduous woods, the spikelets long pendulous and the perigynia very long-beaked. In large tufts of divergent stems, less than 1 m high. Perigynia ovoid, slightly asymetrical, being gibbose ventrally towards the base of the beak, shiny, with 2-(4) conspicuous nerves and a beak about as long as the body. Scales long-tapered and about as long as the perigynia. Late spring. Common, especially in galerie-forests. -- nNB-BC, US.

35. EXTENSAE

Perigynia somewhat asymetrical, the lower ones ± spreading, the beaks somewhat deflexed downwards. Differs from the preceeding by its perigynium showing many strong nerves and the beak ending in a pair of very stiff teeth.

85. C. viridula Mx. (C. Oederi AA., var. viridula (Mx.) KÜk.) -- Similar to the next, yet the perigynia shorter, less asymetrical, merely spreading and the beak shorter. Similarly long-bracted. Perigynia mostly (1.5)-2.0-2.5-(3.0) mm long, the beak 1 mm long or less. Early summer. Bogs and shores. -- G, seK-seAka, NF-(SPM), NS-BC, US, Eur.

This used to be called C. Oederi Retzius, but Nelmes 1939 having examined the type pointed out that it belongs with C. pilulifera L. Retzius himself came to realize this equivalence and eventually consolidated the two concepts. C. viridula is then the earliest name now available for what used to be incorrectly called C. Oederi.

86. C. flava L. var. flava (var. fertilis Peck, var. laxior (KÜk.) Gleason; C. cryptolepis Mack.) -- Hedgehog-Grass

-- Short spikelets of conspicuously falcate perigynia, most of them somewhat reflexed. Tufted. Bracts leaf-like and many times longer than the inflorescence. Scales about as long as the body of the perigynium. Perigynia 3-6 mm long, yellowish green, turning brown, the beak at least half as long as the body. Early summer. Wet meadows and shores. -- seK-seAka, NF-(SPM), NS-(PEI)-NB-Man, Alta-BC, US, Eur.

The more eastern var. Nelmesiana (Raymond) Boivin (= C. lepidocarpa A.A.) is glaucous, its lower spikelet remote, and its short perigynium more inflated, the body obovoid. Other varieties have been described but seem to be only extremes of variations of sporadic occurrence. Thus a collection at hand: W. Scott, Banff, July 16, 1893 (TRT), has the perigynia only 3-4 mm long and keys out to the reputedly eastern var. fertilis.

Seems uncommon and perhaps geographically restricted in Manitoba. At any rate we have checked only one collection: Gillett & Scoggan 10152, 20 miles south of The Pas (DAO). Hudson 1978 also reports it from Flin Flon. A previously reported Criddle 1939 collection from Aweme has been revised to C. retrorsa.

36. FERRUGINEAE

Perigynium much larger than the achene but not inflated, being very flat, or at least strongly flattened with a ridge on one face. Otherwise a very diverse group of species, glabrous to pubescent, tufted to stoloniferous, stigmas 2 or 3, etc. Inflorescence dark-coloured.

87. C. petricosa Dewey var. petricosa -- Red-brown perigynia somewhat minutely scabrous puberulent especially towards the tip. Tufted and mostly 2-3 dm high. Inflorescence secund, the spikelets drooping, the terminal androgynous. Perigynia (1.0)-1.5-(1.8) mm wide, ± lanceolate. Scales red brown with a paler midnerve. First half of summer. Alpine cliffs and rocky slopes. -- (wF), Mack-(Y)-Aka, swAlta-seBC -- Var. Franklinii (Boott) Boivin (C. Franklinii Boott) -- Perigynia broader and more obviously puberulent, 2 mm wide or slightly larger. Plant generally taller, mostly 4-6 dm high. River gravels in the mountains. -- (Y)-Aka, swAlta.

A range extension of var. Franklinii northeastward into Mackenzie by Porsild 1968 turned out to be based on specimens from Cli Lake (DAO) and Little Doctor Lake (DAO) with the typically narrower (i.e. 1.3-1.5 mm) perigynia of var. petricosa.

The more northern var. distichiflora Boivin differs from var. Franklinii by its bigger perigynia, 6-7 mm long, in laxer spikelets. The more eastern var. misandroides (Fern.) stat. n.,

C. misandroides Fern., Rhodora 17: 158. 1915, also resembles var. Franklinii, but is generally a smaller plant and its style has only two stigmas.

88. C. misandra Br. -- The blackish perigynia rather narrow, 1 mm wide or slightly less. Stems much taller than the leaves, the latter arching, numerous, marcescent and forming tufts 3-10 cm high. Sheaths ± purplish. Spikelets blackish and drooping, at least the terminal one gynandrous. Early summer. Rocky, Dryas-covered tundra. -- G-Aka, L, Q-(nO-nMan), swAlta(Jasper, Cadomin)-BC, wUS, Eur.

89. C. atrofusca Schkuhr var. atrofusca -- Much resembling the previous but the terminal spike staminate or androgynous and the perigynia broader, 1.5-2.0 mm wide. Early summer. Wet arctic and alpine tundra. -- G-Aka, L, Q-nMan, Eur.

By contrast the alaskan var. major (Böck.) Raymond is a taller plant, 3-6 dm high, with bigger perigynia, 5.0-5.5 mm long, only slightly longer than the scales.

37. VIRESCENTES

In this and the next five sections the sheaths of the bracts are very short, rarely more than 5 mm long, often reduced to a pair of auricles. In this and the next section the herbage is pubescent. Virescentes are tufted while Hirtae are long stoloniferous. Further to this section, the perigynium is small, its beak short or absent, and the inflorescence is overtopped by the lowest bract or the upper stem leaf.

90. C. Torreyi Tuck. -- With the general appearance of C. nigromarginata, but pubescent throughout except the perigynia. Leaves pubescent on both faces. Stem pubescent or ciliate on the angles. Scales puberulent along the midnerve. Perigynia green, ellipsoid, ribbed, with a well marked but very short beak. Late spring and early summer. Chernozems and moister prairie spots from the Prairie Coteau west to Dawson Creek; also at Otterburne. -- seMan-neBC, US.

38. HIRTAE

Pubescent as in the last, but long stoloniferous. Perigynia heavily pubescent.

91. C. Houghtoniana Torrey (C. Houghtonii Torrey, nom. ill.) -- Common and somewhat coarse pioneer species of disturbed sands in Jack Pine forests, the coarse perigynia hirsute. Long stoloniferous. Spikelets ± distant and subtended by leaf-like bracts. Lanceolate scale much shorter than the perigynia, the latter 4.0-6.5 mm long. Late spring to early summer. Light, sandy woods. -- NF, NS, NB-cAlta, neUS.

The spellings Houghtoniana and Houghtonii were both used from the very beginning of the species in 1836, the first spelling appearing slightly earlier. The correction to Houghtonii was proposed by Torrey on the basis that the plant had been named after its discoverer. However, this is not among the reasons recognized by the code as justifying a change of spelling in a name. Hence the return to the original spelling of Houghtoniana.

92. C. lasiocarpa Ehrh. var. lasiocarpa (var. americana Fern.) -- Perigynia densely grayish pubescent, borne in remote, long-bracted, and sessile or near sessile spikelets. A rather tall, thinnish and wiry plant, stiffly erect. Leaves ± 1 mm wide, stiff, long, and thin, appearing cylindric, being tightly folded. Although the edges are scabrous, these are so tightly enrolled that the leaf is smooth to the touch. Sheath light to deep brown ventrally near the top. Scale usually longer than its perigynium, often with a short awn. Perigynia mostly 3-4 mm long, with a short beak and two strong and sharp teeth. Nerves ± obscured by the pubescence. Early summer. Wet places, especially in bogs. -- Mack, sAka, (L)-NF-SPM, NS, NB-BC, US -- Var. latifolia (Böck.) Gilly (C. lanuginosa Mx.) -- Leaves broader and ± flat, 2-5 mm wide, scabrous along the edges. Wet places, especially marshes. The more common type southward. -- (K), Aka, (NF)-SPM, NB-BC, US, Eur.

There is a statistical difference between the Eurasian and American material of var. lasiocarpa; the perigynia and their teeth average shorter in America. These differences, the basis for var. americana, were exagerated by Fernald in 1950 and in fact at least half of the specimens fall in the zones of overlap. In the same manner the perigynia and their teeth of var. latifolia are also statistically shorter than in Eurasian material of C. lasiocarpa. The lowest bract is sheathless in most Eurasian specimens, just as it is in most American specimens.

A collection from the Turtle Mountain, Looman 14435 (DAO, SCS), has unusually large perigynia and the pubescence is much lighter than expected; it could represent a hybrid of C. lanuginosa parentage, the other putative parent not being recognized yet.

39. LIMOSAE

Perigynium strongly flattened, thus suggesting the Acutae, but much larger than the achene, the latter trigonous with 3 styles. Roots abundantly clothed in long yellow root hairs, these rather easily detected as these species are commonly found growing in Sphagnum; roots seem dressed in yellow felt.

93. C. rariflora (Wahl.) Sm. var. rariflora -- Terminal spike staminate and erect, the lateral ones pistillate and drooping, with blackish brown scales strongly contrasting the pale green perigynia. Stoloniferous. Upper pistillate spike usually longer than its peduncle. Scales with a wrap-around base, the pistillate ones darker than the staminate. First half of summer. Boggy tundra. -- G-Mack, Aka, L-SPM, nQ-nMan, (neUS), Eur.

The more western var. pluriflora (Hultén) Boivin has somewhat denser spikes of slightly larger perigynia, 3.5-4.0-(4.5) mm long.

94. C. limosa L. -- Scales golden brown. Stoloniferous and similar to the last. Upper pistillate spikelet usually shorter than its peduncle. Scales not wrapped around the base of the pale green perigynia, the staminate ones as dark or darker. Early summer. Wetter bogs, especially floating ones. -- (sK)-Mack-Aka, L-SPM, NS-BC, US, Eur.

Hudson 1978 reports the existence of hybrids or intermediates to the next.

95. C. magellanica Lam. var. irrigua (Wahl.) BSP. (C. paupercula Mx., var. irrigua (Wahl.) Fern., var. pallens Fern.) -- Roots easily dug up and conspicuously covered with a dense yellow-brown felt of radicels. Loosely tufted, but otherwise resembling the last two. Spikelets all shorter than their pedicels, the terminal staminate. Scales commonly red brown and green, varying to golden brown or purple black. Perigynia tending to be subopposite. (Early summer?). Common in bogs. -- (G), swK-Aka, L-SPM, NS-BC, US, Eur.

In the typical South American phase the terminal spikelet is practically always gynandrous. We have been unable to detect any other subtantial difference for our boreal variant.

40. ATRATAE

Much as the next, but stigmas 3 and the achene trigonous. Inflorescence rather dark-coloured. Terminal spike generally gynandrous, with the pistillate flowers more numerous.

96. C. Parryana Dewey var. Parryana (C. Hallii Olney) -- Habitally similar to C. scirpoidea but with more than one spike. Stoloniferous, the leaves all basal and only half as tall as the stem. Spikelets 2-3-(6), narrowly cylindric, erect, overlapping, all pistillate or the terminal gynandrous to rarely staminate. Perigynia 2-(3) mm long, (1.0)-2.0 mm wide, broadly obovate to elliptic, flattened. Scales reddish to purple brown, with a membranous margin. (Late spring?). Low prairies, mainly in ground seepage areas. -- soY-sAka, sMan-BC, US.

In our area the scales vary from broadly rounded to acutish at tip and from shorter than, to slightly longer than, the perigynia and our plants may be denoted as var. Parryana. By contrast the more southern var. idahoana (Bailey) Boivin (C. idahoana Bailey, Bot. Gaz. 21: 5. 1896; C. idahoa sphalm.) has acuminate scales that are about twice as long as the perigynia. To conform with the International Rules of Botanical Nomenclature the state name Idaho used as an epithet should either be given the form of an adjective (i.e. idahoana) or of a noun in the genetive (i.e. idahonis). We have corrected the plant name accordingly.

More southern plants have also been segregated as C. Halliі on the basis of the terminal spike being unisexual, either staminate or pistillate, and the perigynia being slightly larger. The character of the sexuality of the terminal spike is unlikely to be here a sound specific difference. Further our specimens seem to form a single population and the distinction cannot be implemented except in a very mechanical and unsatisfactory manner. Intermediates seem to occur throughout the range. In 1965 we noted that the two species had been lumped at NY. To which we concur.

In a more recently proposed sorting, Brittonia 21: 55-76. 1969, the two taxa are redefined as follows.

Ssp. Parryana: bearing at least three spikes, at least one of the lateral spikes narrowly cylindric and nearly as long as the terminal spike. Ranges from Manitoba to Alaska, south to Utah.

Ssp. Halliі (Olney) Murray: bearing one or more spikes, but the lateral spikes short cylindric and not more than half as long as the terminal one. Ranges from Manitoba south to Colorado and Nebraska.

Material at hand does not readily conform to the above. Both phenotypes are found together on many sheets, and the Halliі form occurs also in Saskatchewan and Alaska.

Judging from the scanty Nebraska material at hand one could perhaps achieve a satisfactory classification by a more restrictive definition of C. Halliі, in such a way as to include mainly the Nebraska material and so as to exclude most, if not all, of the Canadian specimens.

97. C. norvegica Retz. (var. inferalpina (Wahl.) Boivin; C. media Br.; C. Vahlii AA.) -- The small scales purplish black with a very narrow membranous margin, but without a paler midnerve, smaller than the perigynia. Loosely tufted, the culms about twice as high as the foliage. Terminal spike larger and with only a few staminate flowers at base. Perigynia 2.0-2.5 mm long, green to brownish, often blackening at maturity. Stigmas short, (0.3)-0.5-(1.0) mm. Early summer. Wet meadows

and woods. -- G-Aka, L-(NF), nNB-BC, US, Eur.

Usually subdivided in two varieties or species. Plants to the northeast of us are reported to belong to C. norvegica proper with perigynia about 2.0 mm long, abruptly short-beaked, and tending to be dark-coloured and not much paler than the scales. The more southern and transcontinental var. inferalpina (or C. media) has perigynia longer, 2.5 mm or more, more tapered to the beak, and usually light green to brownish, forming conspicuously two-toned spikelets, but the perigynia may become much darker before falling off. If these criteria are applied strictly, it will be found that most specimens from our area have the smaller perigynia of typical C. norvegica and that this type ranges westward all the way to Alaska; the reputed geographical restrictions disappear. However we must note that the 4 or 5 Greenland sheets at hand all have the shorter and darker type of perigynium.

A dot for C. holostoma Drejer at Churchill on a map by Hultén 1958 has not been investigated.

98. C. podocarpa Br. var. podocarpa (C. montanensis Bailey; C. nesophila Holm; C. spectabilis Dewey; C. Tolmiei Boott) -- A conspicuous species with a secund inflorescence of blackish spikelets, of which the terminal one is staminate, the lateral pistillate and the lowest drooping. Variable, often with last year's leaves marcescent and present at the base of the stem. Scales blackish, acute to cuspidate. Perigynia (3.0)-3.5-(4.5) mm long, ovate to narrowly lanceolate, 1½-3 times longer than wide, green to blackish, with raised marginal nerves, largely covered by the scales. Mid summer. Common in mountain meadows at all altitudes. -- wMack-Aka, swAlta-BC, nwUS -- Var. Paysonis (Clokey) Boivin -- Perigynia broadly ovate, the marginal nerves displaced towards the back and appearing submarginal. Waterton.-- swAlta -sBC, nwUS.

Generally subdivised into a series of 4 or 5 species. As pointed out by Hultén 1942, they have the same type of perigynium, they differ mainly by their scales or on vegetative parts. These characters do not seem to vary in accord and, on the basis of material at hand, will turn out anywhere within the range of collective species. From which we deduce that we are here dealing with a single species with one weak variation as above.

C. podocarpa Br. var. Paysonis (Clokey) stat. n.; C. Paysonis Clokey, Am. J. Sc. s. V, 3: 90. 1922.

99. C. Raynoldsii Dewey -- Perigynia only slightly compressed in contrast with the other Atratae. Especially resembles the last, but more leafy and the inflorescence not secund. Perigynia ovoid or ellipsoid, green to brownish, longer than the black scales. Mid spring. Montane prairies in the Rockies and Cypress Hills. -- swS-(Alta)-sBC, wUS.

100. C. atrata L. var. atrata (C. albonigra Mack.; C. atratiformis Britton; C. atrosquama Mack.; C. epapillosa Mack.; C. Raymondii Calder) -- Inflorescence ± blackish and usually of 3 fat, ellipsoid spikelets of which the terminal is gynandrous and the lower tends to droop. Tufted, the stems about twice taller than the foliage. Scales usually shorter than the perigynium, blackish, membranous-pencilled at the margin, the midnerve not colour-differentiated or only weakly so. Perigynia (2.5)-3.0-3.5-(4.0) mm long, frequently minutely granular towards the base of the beak. First half of summer. Alpine or arctic tundras and boggy woods. -- G, Mack-Aka, L-NF, eNS, nNB-BC, US, Eur.

A form with greenish perigynia, f. Wolfii (Kneucker) Kük., (= C. Raymondii) is uncommon and sporadic in the range of the species. But in the northern part of our area it becomes the more common type.

In the more southern var. chalciolepis (Holm) Kük. the scales are larger and they overtop the perigynia.

Our Canadian plant is often called C. atratiformis and may be further subdivided in two or more varieties or species. We have been unable to recognize or detect in our area any phenotype sufficiently constant and discrete to warrant recognition as a species or geographical variation.

101. C. Mertensii Prescott var. Mertensii -- Inflorescence conspicuously secund against the background of a large and stiffly erect bract; the spikelets rather numerous, elongate, and all somewhat staminate at base. Spikelets mostly 6 to 8, drooping on long pedicels, two-toned, the narrow staminate base conspicuously darker than the rest of the spikelet. Scales awnless, very dark to black, the midnerve variable. Perigynia green. Late spring. Along watercourses at edge of coniferous forests. -- Y -Aka, swAlta-BC, (wUS).

The japanese vicariant has aristate scales and may be distinguished as var. urostachys (Franchet) Kük.

102. C. Buxbaumii Wahl. (C. canescens L.; C. Morrisseyi Pors.) -- Generally similar to the last few species but the lateral spikelets more remote and sessile or nearly so, while the longer scales are strongly two-toned. Scales typically longer than the green perigynia, cuspidate to short aristate, with a central green strip and lateral strips dark brown to black. Early summer. Shallow water in boggy places. -- sG, K-Aka, L-SPM, NS, NB-BC, US, Eur.

As pointed out by Nelmes, Reinwardtia 1: 444. 1951, Linné's description of C. canescens fits equally well C. curta and C. Buxbaumii. And the linnean type turned out to be C. Buxbaumii. We have been able to confirm this by a photograph of the type. A change is therefore required in the application

of C. canescens. A rather annoying and even confusing name change, yet it seems unavoidable. As a temporary expedient we are making only a partial change at this time, introducing C. curta for what used to be called C. canescens while still retaining C. Buxbaumii, until the old usage of C. canescens has been abandoned and the new usage can be fully introduced with a minimum of confusion.

41. ACUTAE

Achenes very flat and the stigmas only two. Otherwise quite typical of the subgenus Carex, the terminal spike staminate, the lateral ones pistillate and pedunculate. Perigynia numerous, flat, crowded into dense spikes. Peduncles fairly short, hence the spikelets tend to be ± erect.

103. C. Bigelowii Torrey (f. anguillata (Drejer) Fern.; C. concolor AA.; C. gymnoclada Holm; C. rigida AA.; C. scopulorum Holm) -- Like all members of this section, stigmas 2 and the small perigynia strongly flattened, but the staminate spike under 2 cm. Common and highly polymorphic arctic and alpine type with long and coarse rhizomes. Scales awnless, dark brown to purple black except for the thin and paler midnerve, elliptic to obovate, commonly just about the size and shape of the perigynium, but often smaller. Stem less than 4 dm high, triangular and acute on the angles, phyllopodic with usually purplish or brownish leaf bases. Leaves smooth or the margin scabrous. Bracts typically about as long as the inflorescence and with membranous auricles coloured like the scales, or sometimes more lightly coloured. Spikelets sessile to long pedunculate, crowded to very remote, the lowest sometimes even basal, but always erect or nearly so. Perigynia green to purple black, strongly flattened. Stigmas 2 or a mixture of 2 and 3. Achene lenticular and plump, not grooved. First half of summer. Arctic, subarctic, and alpine or subalpine meadows, usually wettish or rocky, often a pioneer species. -- G-Aka, L-NF, NB-Q, nMan-nS-swAlta-BC, US, Eur.

Readily distinguished from the other members of the Acutae by its single and shorter staminate spike.

Not to be confused with the habitally similar C. salina, especially the smaller individuals and those with non-cuspidate scales. C. salina has a nearly round stem, broadly rounded on the angles, the scales have a broader green central strip, and the achene is deeply grooved transversally on one side. Further all the bracts will easily overtop their spikelet, while in C. Bigelowii only the lowest bract will normally overtop its spikelet.

Oddly enough there seems to be a distributional gap across northern Ontario to James Bay, Quebec. We have come

across no Ontario mention in the botanical literature and the few herbarium sheets encountered have all been revised to other species, mainly to C. salina.

104. C. lenticularis Mx. -- One of the middle spikelets gynandrous, bearing a few staminate flowers at the base, or sometimes staminate at both base and top; terminal spikelet commonly gynandrous, sometimes merely staminate. Otherwise resembling C. aquatilis, but tufted, generally smaller, and the leaves only 1.0-2.5 mm wide. Basal leaves overtopping the inflorescence. Spikes erect. Perigynia short stipitate, 1½-2 times longer than wide, with ± 5 very fine nerves on the dorsal face. Scales small, shorter than the perigynia, brown with a broad green midnerve. Late spring. Lake shores. -- Mack, L-SPM, NS, NB-S-(Alta), neUS.

At NY and some other herbaria we have found C. Kelloggii and C. paucicostata Mack. lumped with C. lenticularis. Apparently, this is how the more eastern C. lenticularis came to be reported from Alberta. We more or less expect that B.C. reports of the latter will turn out to have been also based on specimens of C. Kelloggii. A still more recent report by Scoggan 1978 for northeastern Alberta has not been investigated. The Alberta report by Moss 1959 was based on a Carbondale (ALTA) collection since revised to C. eleusinoides.

105. C. Kelloggii W. Boott (C. Hindsii C.B. Clarke; C. lenticularis Mx. var. limnophila (Holm) Cronq.) -- Small, compressed perigynia abrupted contracted at base and top into a very short beak and a thin stipe about ¼ as long as the body, the latter ovoid, (1.2)-1.5-(2.0) mm long. Resembles the above, but the spikelets never gynandrous, the terminal spikelet staminate. Spikes erect, the lower one 1.5-5.0 cm long. Scale shorter than the perigynium, purple black except for a thin green midnerve and a very narrow hyaline border. Mid summer. Lake shores from Jasper to Waterton. -- sAka, swAlta-BC, wUS.

106. C. eleusinoides Turcz. (C. Enanderi Hultén; C. eurystachya F.J. Hermann; C. kokrinensis Pors.) -- Perigynia as in the last, but the inflorescence smaller and more crowded, the terminal spike about evenly gynandrous. Somewhat smaller plant (1)-2-3-(5) dm high, in looser tufts. In the more crowded extremes somewhat resembling C. norvegica, but the latter has 3 stigmas, sessile perigynia and the scales lack a green midnerve. Inflorescence usually overtopping the basal foliage, the lower spikelet 0.5-2.0 cm long. Scales like the last. (Just before mid summer?). Wet alpine habitats, preferably if disturbed. -- swY-sAka, swAlta-BC, (nwUS).

Has been lately collected at Mt. Dolomite (DAO), Twin Cairn Mt. (TRT), and Mt. Edith Cavell (DAO); to be expected throughout our Rockies. Also at Carbondale (ALTA).

107. C. nebraskensis Dewey -- Rather readily confused with C. aquatilis, but the perigynia more inflated, about half as thick as wide, and with more nerves. Leaves tending to be larger, up to 7 mm wide and scabrous above the middle, but smooth below. Spikes thicker, 5-9 mm wide, because of the more inflated perigynia, the latter slightly bigger, 3.0-3.5 mm long. Beak somewhat longer, ± 0.3 mm long. Around sloughs. Rare: Aden -- scAlta, wUS.

Although recorded as a member of our flora for over a century, the only correctly named collections seen were a rather recent set by E.H. Moss in 1954 from Aden (MTJB) near the Montana boundary. Macoun 1888 and 1890 reported it first as C. Jamesii Torrey, later as C. nebraskensis Dewey var. praevia Bailey, rating it as common from the Alberta Rockies to the Selkirks. But we have located no sheet from the Alberta Rockies and his Kicking Horse Lake collection (CAN, GH, MTMG) has been revised to C. aquatilis. Dawson's collection from the Kootanie Pass (CAN) is a bit young but may be tentatively placed with C. sitchensis. Other reports have not been investigated individually, but their justifying sheets have presumably been revised to other species as nothing else has been found under C. nebraskensis in the various collections consulted.

108. C. aperta Boott -- Much like the next but the foliage shorter, clearly overtopped by the inflorescence. Less variable, 3-5 dm high, the stem more as in C. stricta, sharply triangular, concave on the faces, scabrous on the angles above the middle, clothed at base with some remnants of last year's leaves. Leaves 2-3 mm wide, those of the sterile rosettes produced later and up to 5 mm wide. Typically bearing 4 spikes, of which the terminal is staminate, the next is androgynous, the other two pistillate and 5-8 mm thick. Sometimes with 2 staminate spikelets, of which the lower one is much reduced. Scales lanceolate and longer than the perigynia, at first bicolour as in C. aquatilis, gradually becoming entirely deep purple black. Perigynia not so much compressed, about half as thick as wide. Early summer. Shores of lakes and sloughs in Waterton. -- swAlta-sBC, nwUS.

Only collection known is Breitung's from the shores of Lonesome Lake (ALTA). Other Alberta collections encountered under that name proved to belong to C. aquatilis.

109. C. aquatilis Wahl. (var. altior (Rydb.) Fern., var. stans (Drejer) Boott, var. substricta Kük.; C. stans Drejer; C. substricta (Kük.) Mack.) -- Highly variable and common; typically a very coarse species, deeply and strongly rooted, with long and coarse stolons, the stems solitary or nearly so. Often over 1 m high. Sheaths of basal leaves nerveless on the membranous side (i.e. ventrally), eventually breaking up into irregular pieces. Phyllopodic, that is the base of the stem is clothed with remnants of old leaves, hence the base of the

plant is (5)-10 mm thick and ± spongy. Height varies greatly, (3)-6-10-(15) dm. Stem 1.5-2.5 mm thick, smooth throughout, or scabrous near the top on the angles, the sides flattish. Leaves 2-5 mm wide, scabrous on veins and margin. Lowest bract often twice as long as the inflorescence. Spikelets numerous, long and coarse, typically the upper 2-3 are staminate, the middle ones staminate at tip, the lower ones pistillate. Scales often lanceolate and longer than the perigynia, but usually shorter and broader, bicolour, the median strip green and usually about as broad as the purple brown to purple black margins. Perigynia very numerous, small and strongly compressed, often waferthin. Achene not grooved. Early summer. All kinds of very wet meadows. -- (G)-F-Aka, L-NF-(SPM), NS-BC, US, Eur.

Exceptionnaly variable, particularly as to size. Smaller specimens, especially those from higher latitudes or altitudes, are commonly named C. stans, but the rank of form, f. sciaphila (Holm) Kük., might be more realistic. Taller plants from more congenial habitats are often tagged var. altior or C. substricta.

Has been confused with other species, including C. Bigelowii. The latter is shorter, less scabrous and its scales are stubbier and darker, being purple black with a merely thin and paler midnerve, lacking a conspicuous green mid strip. Further, C. Bigelowii has only one staminate spike and it is less than 2 cm long. Very easily confused with C. stricta from which it differs mainly in its mode of growth. Fragmentary specimens that lack the basal portion of the plant can only be guessed at.

109X. C. halophila Nyl. (C. subsalina Lepage) -- Hybrid with C. salina or perhaps merely intermediate between the two. Scales short and the achenes grooved, or the scales long and cuspidate but the achenes not grooved. Churchill. -- (K-Mack, L)-NF, Q-(O)-nMan, (Eur).

110. C. stricta Lam. (var. elongata (Böck.) Gleason; C. Emoryi Dewey) -- Most basal sheaths, bladeless or not, are thinly membranous on the ventral side and the membrane is reinforced by elongated nerves; soon it disintegrates to a pinnate reticulum of nerves. Stem strongly scabrous from base to top on the angles, the latter sharp and very thin, the sides being strongly concave. A rather large species, up to 1 m high, growing in dense clumps. Leaf bases brown, often fibrillose ventrally. Lowermost leaves reduced to pointed and bladeless sheaths. Inflorescence elongate, of numerous, thin and elongate spikelets, mostly 3-4 mm wide, subtended by elongate leafy bracts. Mid or late spring. Marshy meadows and shores. -- NS, NB-seMan, US, Eur.

Of the reported Manitoba collections: S. Criddle, Treesbank, June 29, 1939 (DAO) and some of the Otterburne collections (MT, QFA) reported by Löve 1959 were revised to C. aquatilis, while Breitung 7595a, Sasaginnigak Lake, July 8, 1949 (DAO) was revised to C. lenticularis. But the Pine Ridge col-

lection (CAN) and one of the Otterburne collections are herewith confirmed and represent the known western limit of the range of the species.

42. CRYPTOCARPAE

Achene constricted across the middle (i.e. obpanduriform) or with a deep transversal groove across one face, or with a deep notch on one angle. As in the last section the achenes are lenticular and the stigmas two, but the peduncles usually longer, hence the pistillate spikelets are drooping.

111. C. crinita Lam. var. crinita -- A large forest species with long aristate scales. Stems ± scabrous, mostly around 1 m high, rising at an angle and forming an open tuft. Inflorescence conspicuously secund, the many greenish spikelets elongate and drooping. Perigynia inflated and abruptly short-stipitate. Late spring. Wet woods. -- (NF-SPM), NS-sMan, US.

Our only voucher is in need of confirmation. It is a W.N. Denike collection in 1940 at Winnipeg (DAO). But some of Denike's labels at DAO appear to record a point of mailing in lieu of a place of collecting. The general distribution of the species suggests that it could occur in southeastern Manitoba where Denike did much of his collecting.

Our variety is less scabrous, at least the leaf sheaths being smooth, and the body of the scale is retuse or truncate at summit. Grades into the more eastern var. gynandra (Schwein.) Schwein. & Torr., the herbage scabrous throughout, the body of the scale acutish at tip, and the perigynia rather strongly flattened.

112. C. paleacea Wahl. -- A seacoast species with long aristate scales. Stem smooth. Up to 1 m high and stoloniferous. Inflorescence secund; all the spikelets on long peduncles and drooping, even the terminal one. Spikelets more deeply coloured because of the scale bodies brown to deep purple. Perigynia strongly flattened. Late spring. Salt marshes at York Factory. -- seK, L-SPM, NS-nMan, neUS, Eur.

An inland report by Hooker 1839 for Cumberland House was based on a Drummond collection. It was quite naturally discounted by Scoggan 1957. Actually, Drummond's collection is labelled "Cumberland House to Hudson's Bay", i.e. York Factory at the mouth of Hayes River. See also under Helianthus divaricatus and Carex plantaginea. Greenland reports are possibly based on a mislabelled Vahl collection (GH).

113. C. salina Wahl. var. salina -- Intermediate between the Acutae and the Cryptocarpae, the scales acutish to cuspidate, but never long aristate, yet mostly longer than the perigynia. Achene (like the last two species) with a deep transverse groove across one of the faces. Highly variable and

resembling C. aquatilis and C. lenticularis. Phyllopodic, coarsely stoloniferous, forming a loose carpet. Mostly 2-3 dm high, the stem smooth, weakly triangular, rounded on the angles. Staminate spike solitary, rarely 2, less than 2 cm long except in some of the larger individuals. Scales with 3 rugose nerves delimiting a central green zone, the margins brown or red brown to deep purple, the midnerve usually excurrent into a short awn, the latter not longer than the body of the scale. Late spring. Saline meadows along the seacoast. -- (sG, K), L-(NF-SPM), Q-nO-(nMan), nwEur -- Var. subspathacea (Wormsk.) Tuck. -- On the tidal flats a small stoloniferous herb with spikelets overtopped by bracts dilated as described below. Generally less than 2 dm high. Staminate spike less than 2 cm long. Lowest bract about 2 mm wide at base, enlarging slightly upwards to about 3 mm and tending to be wrapped about halfway around its spikelet, hence its varietal name. Scales usually smaller and about as long as the perigynia, the tip awnless, merely acutish to short acuminate. Tidal flats. -- G-Aka, (L)-NF, Q-nO-(nMan), Eur.

The only Manitoba (MT) collection seen of C. salina could not be determined positively as to variety.

Not to be confused with members of the Acutae, especially with C. Bigelowii (which see), C. stricta and C. aquatilis. In C. salina the scales are usually cuspidate, the stem is nearly round and the achene is deeply grooved. Occasional achenes will lack this groove and smaller plants may have merely acutish scales. Such smaller plants of C. salina can still be recognized by their darker, thinner, generally monochromous, and slightly clavate spikelets; typically all the spikelets are purple-black because the perigynia are well covered by the scales, these being about as wide and slightly longer than the perigynia, and their green midnerve is quite thin; the pistillate spikelets are only 3-4 mm thick and thickest above the middle, gradually tapered below because the lowermost perigynia barely overlapping; the staminate spikelet is the same colour as the others.

In C. stricta and C. aquatilis, the terminal spikelet is paler: brown or straw-coloured; the pistillate spikelets are often thicker, and cylindric, the perigynia being much more crowded and uniformely so; further the pistillate spikelets are bicolour, the green perigynia being only half covered by the shorter and narrower scales, these red brown or purple red.

The european C. salina var. mutica Wahl. (= C. halophila Nyl. nm. flavicans (Nyl.) Boivin) was reported from Greenland, Hudson Bay and Cumberland House by Hooker 1839 and Macoun 1888. The exact basis of the Greenland and Hudson Bay reports has not been determined. The Cumberland House report was likely based on a misidentification, C. salina being strictly a seacoast species.

There is a fair amount of disagreement at present about the segregates of C. salina. Gleason 1952 does not even mention them. Fernald 1950 recognizes four varieties. Scoggan 1978 recognizes three varieties. Mackenzie 1935 recognizes three species. In 1967 we recognized two varieties. Tentatively we now recognize four varieties connected by numerous intermediates: var. salina, var. tristigmatica Kük, var. subspathacea, and var. kattegatensis (Fries) Almq. Alternately we could recognize three species and one variety: C. salina var. salina, var. tristigmatica, C. subspathacea and C. recta Boott; the intermediates would become a network of six interspecific hybrids. Obviously such a weak genetic barrier does not militate in favour of recognition at specific level.

43. ORTHOCERATES

In previous sections the style is of a different texture and colour from the ovary. As the achene matures, the style withers, as abscission layer is formed and the style, or its upper part, frequently falls off along with the stigmas. In this section and all the following ones, the style is of the same colour and texture as the achene. At maturity the style hardens and remains on the achene, although the stigmas may break off. In this section the inflorescence is reduced to a single androgynous spikelet which lacks a bract at its base.

114. C. microglochin Wahl. var. microglochin -- Closely resembling the next, but smaller, and the rachilla present. Stem trigonous or more commonly polygonal (6 angles). Leaves all basal, the 2 or 3 main ones subequal in lenght and nerveless ventrally. Perigynia more numerous, containing a rachilla which protrudes at the beak as a sharp point exserted by 1-2 mm. Perigynium only 3-4 mm long, but seemingly 4.0-5.5 mm long if the rachilla tip is included. Late spring to early summer. Bogs and wet places over shallow bedrock. -- G-(seF)-K-Aka, (L)-NF, Q-nMan, swAlta-eBC, wUS, Eur.

Quite rare in our area and we have checked specimens only from Churchill (DAO), Eisenhower Junction (DAO), Sunwapta Pass (DAO), Kananaskis Lake (DAO) and Lake Louise (DAO). From the Equator south to Tierra del Fuego it is replaced by the taller var. oligantha (Boott) Kük. with a laxer spike and stipitate perigynia.

115. C. pauciflora Lightf. -- A noticeable small bog species with a single terminal spike bearing a few elongate perigynia which become reflexed at maturity. Stoloniferous and sparse species with nearly filiform leaves, these strongly heteromegueth, the main one being 2-5 times longer than the next, and finely nerved ventrally, with the upper face showing a whitish band in lieu of the midnerve. No rachilla, only the brown style may protrudes from the beak by up to 1 mm. Scales

soon deciduous. Late spring. Sphagnum bogs, rare: Lac-du-Bonnet, Caribou Bog, Reindeer and Athabaska lakes, Fedorah. -- (swY)-sAka, L-SPM, NS, NB-BC, nUS, Eur.

44. FOLLICULATAE

Perigynium narrow, lanceolate or narrower, and long attenuate into a poorly defined beak, thus resembling the last section, but there is more than one spikelet. In the sections that follow the perigynium is commonly ovoid and abruptly contracted into an obvious beak. In this and the remaining sections the bracts are relatively large, the lowest one will almost always overtop the inflorescence and is usually not much narrower than the basal leaves; also the perigynia are fairly long, hence the spikelets are rather fat, 1 cm thick or more. In this and in 48. Lupulinae the perigynia are longest, 10 mm long or more.

116. C. Michauxiana Böck. -- Perigynia narrowly lanceolate and second longest, mostly 10-12 mm long and ± 2 mm wide. Spikelets typically 3, the staminate one hidden between the pistillate, the latter two crowded into a globular cluster. A fourth spikelet is often present and usually remote by 5-10 cm. Bracts long overtopping the inflorescence. Perigynia tapered into a long beak. (Early summer?). Very wet bogs, especially boggy shores. -- L-SPM, NS, NB-O, nwS, neUS, (eEur).

Known by only two collections in our area: Argus 491-63, Lake Athabaska, east of William River, bog island, 31 July, 1963 (DAO, SASK) and Tenier & Jasieniuk 2237 collected in 1973 at the south end of Reindeer Lake (SASK). Apparently a range disjonction of more than eight hundred miles from Lake Superior region. Or perhaps this species is only overlooked across the northern parts of our area since it is a denizen of the wettest and softest pioneering fringe of bogs.

45. PSEUDO-CYPERAE

Pistillate scales aristate, the awn usually as long or longer than the blade. In related sections the scales are awnless or the awn is very short. Only one staminate spike in this and the last section, but in the remaining sections there is usually 2-3 staminate spikes. Perigynia numerous and crowded, widely divergent to somewhat reflexed, especially the lower ones. Lowest bract not more than twice as long as the inflorescence.

117. C. hystricina Muhl. (C. hystericina sphalm.) -- ± pendulous spikelets of green and widely spreading perigynia. Tufted. Scales with a short body hidden between the perigynia and abruptly contracted into a usually longer and scabrous awn, the latter protruding between the perigynia. Beak of the peri-

gynium thin, ± 2 mm long. Late spring. Mainly springy places; infrequent. -- NF, NS-S-(Alta)-BC, US.

It seems fairly obvious that the original spelling hystericina was a lapsus calami for hystricina since the original place of publication provides a rather descriptive German equivalent (Stachelschweinartige Segge), which corresponds roughly to C. hystricina (porcupine-like), but not to C. hystericina (hysterical), of obscure connotation, unless it be a misspelling.

118. C. Pseudo-Cyperus L. -- Pretty much like the previous, but the perigynia falcate, somewhat flattened, more or less reflexed and more gradually tapering into a shorter and poorly defined beak. Early summer. Rather rare: shaded shores and swampy places; lake Eden eastward. -- NF, NS-Alta, US, Eur, (Afr).

46. PALUDOSAE

Perigynium wall thickish and firm, with numerous (15-20) and strongly marked nerves. Lowest bract up to twice as long as the inflorescence. Almost invariably with 2 or more staminate spikelets.

119. C. lacustris W. var. lacustris -- A coarse species with fusiform perigynia and 2-3 spikelets of each sex. Stem thick and rather easily crushed below, the lower part of the plant often up to 1 cm thick. Rather tall, tufted and often around 1 m high. Basal sheaths eventually disintegrating as in C. rostrata. Pistillate spikelets coarse, ascending, remote, subtended by large leaf-like bracts, the lowest of which overtops the inflorescence. Scales with a broad green center and lateral bands in purple brown. Perigynia green, lanceolate, with 15-20 nerves, gradually tapering into an ill-defined and very short beak, about 1 mm including the teeth, the latter usually triangular and around 0.5 mm long. Early summer. Shores and wet ground, frequent. -- (NF), NS-Alta, US.

The more eastern var. laxiflora Dewey barely enters Canada in southwestern Ontario. It has larger perigynia, ± 7 mm long and ± 2.5 mm thick and the scales ending in a short awn reaching about the top of the perigynium.

120. C. laeviconica Dewey -- Teeth of the perigynia subulate and rather elongate, 0.8-1.8 mm long. Otherwise much as in the preceeding, but tending to be smaller, mostly 5-6 dm high, the stem thinner and firmer, the base of the plant usually 4-6 mm thick, the sheaths disintegrating as in C. vesicaria, the perigynia fatter, rather similar to those of C. atherodes, ellipsoid-lanceolate, 5-7 mm long, often obscurely puberulent, the nervation coarser, the nerves tending to become as thick as the internerves, the beak longer, more obvious, and usually

2-3 mm long including the teeth. Late spring. Infrequent in marshy places, usually in alluvial woods, from the Lake of the Woods west to Moose Jaw and Big Meadow -- wO-sMan-seS, cUS.

One collection dated 1888 is labelled Lake of the Woods, Canada (MT). It has never been confirmed and, for the lack of a more precise location, cannot be assigned to a particular province, or state.

121. C. atherodes Sprengel -- A coarse and pilose species, common about sloughs. Around 1 m tall. Densely pilose near the top of the sheaths and on the back of the leaves near the base. Bracts nearly as large as the leaves. Perigynia 7-9 mm long, lanceolate, the beak ending into 2 very sharp and usually recurved teeth 1.8-3.0 mm long. Early summer. Common on muddy shores in non saline areas. -- Mack-Aka, swQ-BC, US, Eur -- F. imberbis (Gray) Boivin (f. glabra AA.) -- Herbage glabrous throughout; possibly an ecological reaction to higher water levels. Recorded from Park Bay. -- (Mack-Y), O, (S), (Eur).

One collection from Sifton, Sask. (MT) is unusual in its slightly pilose perigynia.

F. imberbis (Gray) stat.n., Carex trichocarpa Muhl. var. imberbis Gray, Man., ed. 5: 597. 1867. Not f. glabra (Uechtr.) Lepage which belongs with the paleogean C. aristata Br.

The Yukon report of f. glabra was based on pilose material (DAO).

C. atherodes is easily recognized by its unusual pilosity, but the occasional glabrous specimen is apt to be confused with C. laeviconica. The latter tends to be a smaller plant, mostly 5-6 dm, hence merely doubled up on the herbarium sheets, and the leaves are usually 5 mm wide or less. C. atherodes is usually bent over twice and its leaves are mostly over 5 mm wide. Better criteria are derived from the length of the perigynium and its teeth. Further, the perigynium of C. atherodes is so gradually narrowed into the beak that it is difficult to say how long the beak is, while in C. laeviconica there is a definite change in curvature at about one mm below the base of the teeth.

47. VESICARIAE

Closely related to the last section from which it differs mainly by its perigynium being thin-walled and with only 8-10-(12) expressed nerves. Lowest bract varying from somewhat shorter to twice longer than the inflorescence.

122. C. saxatilis L. var. saxatilis (var. miliaris (Mx.) Bailey) -- Stigmas 2 and the achene lenticular, otherwise resembling the next few species. Pistillate spikes tending to be short, usually less than 2 cm long, or even less than 1 cm, dark

purplish and erect to ascending on fairly short peduncles. Perigynia 2.5-4.0 mm long. Scales dark purple, but hyaline at tip for the last half milimeter or so. Early summer. Open shores and peaty margin of montane or arctic pools. Waterton and from northern Saskatchewan eastward. -- G-sMack, L-NF-(SPM), NS, NB-O-(Man)-nS-swAlta, (neUS), Eur -- Var. major Olney (var. rhomalea AA., ssp. laxa Kalela; C. physocarpa Presl) -- Lower spikes on longer peduncles and drooping. Often a larger plant with longer spikelets, mostly 2-3 cm long. Darker, the perigynia and scales entirely or mostly purple black. Perigynia bigger, 3.5-5.0 mm long. -- F-Aka, L, nQ-nO-nMan-nS-swAlta-BC, nwUS, Eur.

There is much integrading between our varieties, yet taken as a whole the material from west and north of our area has the drooping and fatter (i.e. longer perigynia) spikelets of var. major, while the specimens from eastward have the thinner and ascending spikelets of the typical phase. Most specimens seen from northern Saskatchewan were intermediate one way or another. As pointed out by Hudson 1978 the material from our area seems to form a single population and the recognition of two varieties in our range is clearly arbitrary. However the distinction is maintained because it becomes significant elsewhere.

123. C. vesicaria L. (C. inflata Hudson; ? C. Raeana Boott) -- A coarse species rather similar to C. rostrata, especially the scales and perigynia. Loosely tufted, the stem scabrous in the upper third. Leaves tending to be narrower, not over 5 mm wide, and usually not obviously nodulose to the naked eye. Sheaths membranous and nerved on the ventral side, eventually disintegrating on that side, but the nerves more persistent and holding together in a herringbone pattern because they are pinnately connected to the stronger midnerve. Perigynia 4-7 mm long, commonly 5-6 mm, the body 3-4-(6) mm long, ovoid or ellipsoid, abruptly contracted into a well defined 1-2 mm beak, the nerves set 0.7-1.0 mm apart and mostly 3 to each face (i.e. exclusive of the pair of marginal nerves, hence 5 nerves are usually visible simultaneously). Late spring. Marshes. -- L-SPM, NS-seMan, US.

At first there were so many sheets from our area filed as C. vesicaria and so many printed reports that it was expected to be a common species. But, only one sheet proved correctly identified: A.J. Breitung 7630, Sasaginnigak Lake, 1949 (DAO). All other western Canadian sheets at DAO were revised in 1964 to C. exsiccata (the B.C. collections) or C. laeviconica, but mostly to C. rostrata. The Manitoba collections at WIN were mostly (including Buller at Winnipeg) of C. laeviconica, with one sheet each of C. atherodes, C. rostrata (i.e. Bisby at Norway House) and C. retrorsa. The Saskatchewan reports of Fraser 1937 and Russel 1954 were based on sheets (DAO, SASK)

since revised to C. rostrata. The Ledingham 1943, Russell 1944 and Breitung 1957 mentions were based on a Trossachs (SASK) collection revised by J.H. Hudson to C. laeviconica. More recent collections at SASK were also revised to C. rostrata.

At TRT we found one sheet from Manitoba, two from Saskatchewan, and one from Alberta, all have been revised to C. rostrata. At MTMG an Alberta sheet from the Rockies was revised to C. saxatilis var. major. Four Alberta sheet at CAN were revised to C. rostrata and so was one B.C. sheet, Macoun 63 303, Rossland, 1902, which had been named C. vesicaria by Mackenzie. Five more B.C. sheets at CAN were revised to C. exsiccata, including one named by Mackenzie: Macoun 63 301, Sophia Mt., Cascade, 1902. Another B.C. report by Macoun 1888 (sub. C. monile) was based on Macoun 31163, Donald, 1885 (CAN) later revised by Fernald to C. Grahamii Boott and more recently revised to C. anticostensis (Fern.) Lepage, the putative hybrid of C. saxatilis X vesicaria. And the many Alaska reports were referred by Hultén 1942 to C. rostrata or C. membranacea. Calder 1968 failed to find any B.C. material in the herbaria he visited. At QFA a Saskatchewan and 2 Manitoba sheets were revised to C. rostrata, while a B.C. sheet was also revised, but record was not kept of its final disposition.

The Alberta report by Moss 1959 was based on two Waterton collections: Porsild & Breitung 15102 (ALTA) and Breitung 17124 (ALTA), the latter also the basis for a report by Breitung 1957. Both specimens have perigynia 5-7 mm long, but the first one has diseased perigynia and the second one is largely sterile, with the longer perigynia being the sterile ones. Both belong to C. rostrata.

Thus, with the exception of the first Breitung collection cited above, and despite a wide variety of reports to the contrary, we have yet to come across tangible evidence of the occurrence of C. vesicaria in our area. Our west or northwest of it.

C. Raeana was originally described from Methye Portage, but has never been recollected in the type region. It is customary to associate C. Raeana with C. vesicaria either as a variety or a mere synonym; this now seems an unlikely solution since C. vesicaria does not appear to reach as far west as the Red River. The type of C. Raeana should be reexamined; it could prove to belong to C. rostrata or to one of the minor variants described by Hudson 1978.

124. C. rotundata Wahl. var. rotundata. -- Lowest bract sharply bent at the base of the blade and spreading to reflexed. With the general characteristics of the last few and next few species, but the scales darker and the perigynia shorter. Leaves 1-3 mm wide, channelled or the margin involute. Scales with a green central band and two marginal bands red-brown or

darker. Perigynia 3-4 mm long, spreading or more commonly reflexed. First half of summer. Wet tundra. -- sF-Aka, nL, nQ, nMan, Eur.

In north America and in eastern Siberia the range of variation in leaf width is greater than in the rest of the eurasian range of the species. On that basis two varieties have been distinguished. The typical phase is narrow-leaved. Var. compacta (Br.) Boivin (= C. membranacea Hooker; C. membranopacta Bailey) will designate such plants as have broader leaves, the larger ones up to 3-5 mm wide and flattish, or channelled towards the base only. This second variety is expected to turn up in our area sooner or later, since both varieties seem essentially sympatric in the North American part of their range. There is also a visually important statistical intervarietal difference in the number of spikelets. True, the range of variation is about the same in each: 2 to 4 spikelets in var. rotundata and 2 to 5 spikelets in var. compacta. But the frequency is not the same and by far. In a very large majority of the specimens var. rotundata has only 2 spikelets, one staminate, one pistillate, while var. compacta will most commonly bear 3 spikelets, one staminate, two pistillate.

Early reports of C. membranacea from Churchill were repeated by Scoggan 1978 although they were discounted earlier by Scoggan 1957. Perhaps an error of compilation.

Carex exsiccata Bailey is another species with a reported range far in excess of herbarium justification. Its inclusion by Moss 1959 in his Flora of Alberta was a speculative entry, while the listing by Boivin 1967 was based on a diseased specimen of C. rostrata: E.H. Moss 679, Akamena Pass, 1939 (DAO), originally identified as C. vesicaria. The Saskatchewan reports of Russell 1954, Breitung 1957 and Boivin 1967 were based on a somewhat atypical collection of C. retrorsa: G.F. Ledingham 1106, Lac-la-Ronge, bank of Montreal River 1958 (DAO). The Mackenzie report by Louis-Marie 1961, querried by Boivin 1967 and Scoggan 1978, was based on a sheet of C. rostrata: A. Dutilly 8036, Fort Smith, 1940 (MTJB, QFA). Earlier Alaska reports were discounted by Hultén 1942, but Calder 1968 reinstated it on the basis of a Ketchikan Lakes collection (DAO). Said specimen if far from typical: the perigynia are very short, often slightly arched outward, the elongate spikelets, 7-8 cm long, are drooping and borne on elongate pedicels, yet it is probably best left associated with C. exsiccata. Thus C. exsiccata is definitely known in Canada only from B.C.

125. C. rostrata Stokes (C. inflata Hudson, var. utriculata (Boott) Druce) -- A rather coarse species with the foliage obviously and abundantly septate-nodulose. Long stoloniferous, otherwise similar to C. lacustris by its thick, soft and spongy bases and its inflorescence, and to C. vesicaria by its perigy-

nia. Basal bladeless sheaths usually absent. Stem smooth throughout or nearly so, obtusish on the angles. Leaves very variable, commonly 5-8 mm wide and usually overtopping the inflorescence, as do the leaf-like bracts. Sheaths membranous and nerveless on the ventral side, the weaker part breaking up into irregular plates. Perigynia 4-5 mm long, rarely more, with the nerves about 0.5 mm apart and mostly 5 to each face, hence 6-8 nerves are usually visible simultaneously. Teeth (0.2)-0.3-0.5-(0.7) mm long. Early summer. Swampy places. -- sG, seK-Aka, L-NF-(SPM), NS-BC, US, Eur.

Larger plants have been segregated as var. utriculata (Boott) Bailey, smaller ones as var. borealis Kük. Both extremes may be little more than the effect of ecological conditioning; both have essentially the range of the species, but the one becomes more common southward, the other more frequent northward. The inverse correlation of size and latitude is the usual signature of an ecological response.

Rather similar to C. vesicaria and readily confused with it, especially in the herbarium. C. rostrata produces single stems (sometimes paired) that are borne 1 dm or more apart along a coarse rhizome. C. vesicaria is more gracile and loosely tufted or borne less than 1 cm apart along a thinner and much less deeply buried rhizome.

In the herbarium the distinction is less obvious since both species are hard to dig up and nearly all specimens, especially those of C. rostrata, will lack a convincing piece or rhizome. C. rostrata is usually recognized by its smooth stem and commonly larger leaves and bracts: the beak of the perigynium has usually shorter teeth; the body of the perigynium has more nerves, hence they are more closely set. And the nodulosity of the foliage is more conspicuous in C. rostrata. But each of the latter criteria will fail on occasion.

126. C. retrorsa Schwein. -- Coarse spikelets of retrorse perigynia, subtended by very long bracts 2-6 times longer than the inflorescence. Otherwise a coarse species, much as in C. rostrata but tufted. Spikelets very coarse, somewhat crowded, or the lower 1-2 sometimes remote and borne on pedicels rather short. Perigynia large, 7-10 mm long, somewhat falcate, the body ovoid, the beak about half as long. First half of summer. Wet woods and shores. -- swMack, NS-BC, US.

127. C. oligosperma Mx. var. oligosperma -- Perigynia rather large but not ending in a pair of sharp teeth, merely emarginate at tip and ending into a pair of small roundish lobes. Mostly (4)-6-(8) dm high. Rather similar to the last few species but the foliage narrow, the staminate spike solitary, the pistillate spike only one or sometimes two, ovoid to subglobular, mostly ± 1 cm long, small, few-flowered, very remote, sessile or short pedunculate and subtended by a seta-

ceous yet elongate bract. First half of summer. Wetter bogs in the extreme north. -- (Mack), L-SPM, NS, NB-O-(Man)-nS-(neAlta), neUS.

Far Eastern reports are referable to var. tsuishikarensis (Koidz. & Ohwi) Boivin (stat. n., C. tsuishikarensis Koidz. & Ohwi, Journ. Fac. Agr. Sapporo 26: 273, 1931). This vicariant has not been recognized by all Japanese authors because it intergrades with the typical phase in all its diagnostic criteria; granted. However it seems sufficiently well characterized for recognition at the varietal rank. Far Eastern specimens will be usually distinct by their somewhat smaller size (2)-3-(5) dm, the inflorescence of a darker colour because of the broadly purplish scales, the spikelets more often two than one, the lower one ellipsoid and mostly 1.5-2.0 cm long.

48. LUPULINAE

Perigynia longest, 10-20 cm long. Otherwise much like the last section, the perigynia similarly inflated and the bracts leaf-like, the lowest usually 2-4 times longer than the inflorescence. Staminate spike sometimes solitary, commonly 2-(4). Perigynia with more nerves, usually 12 or more.

128. C. intumescens Rudge (var. Fernaldii Bailey) -- Perigynia longest, mostly 12-15 mm long and about 5 mm thick, in 1-3 globose to ovoid spikelets. Tufted. Bracts leaf-like and very long. Mid spring. Wet woods. -- NF-(SPM), NS-seMan, US.

The Norway House record seems unlikely.

An earlier Manitoba report of C. lupulina Muhl. was discounted by Scoggan 1957. There is also an unreported sheet labelled I.L. Hargrave, St. Remi, Man., 1882 (MTMG), but we are inclined to think that this and other similarly labelled Hargrave collections (e.g. C. plantaginea, etc.) more likely came from Saint-Rémi, Quebec.

Order 72. GRAMINALES

126. GRAMINEAE (GRASS FAMILY)

The Grasses were originally scheduled for a separate publication, but they will likely be published as part V of this flora along with the general index, the bibliography and the glossary.

However the various taxonomic innovations in the Grasses will be presented immediately in order to lessen the awkwardness of names being used in the herbarium long before their actual publication.

Agropyron Bowdenii hybr. n., verosimiliter hybridus A. spicatum X trachycaulum. Differt ab A. trachycaulo foliis inferne laevibus, superne dense puberulentibus; glumis oblanceolatis, nonnunquam glabris; lemmatibus aristatis, aristis valde divergentibus. Differt ab A. spicato glumis majoribus, 7-11 mm long., arista (si adest) exclusa; aristis lemmatum amplioribus, (1.0)-1.5-2.0 cm long.; antheris 1.5-2.5 mm long. Typus: Dore & Breitung 12224, 5 miles SW of Twin Butte, Alta., natural submontane dry meadow, tufted species, many culms to a clump, Aug. 1, 1950 (DAO).

Isotypes were distributed as A. Bakeri (ALTA, G, US).

Agrostis borealis Hartman var. californica (Vasey) Koyama, stat. n., A. Hallii Vasey var. californica Vasey, Contr. U.S. Nat. Herb. 3: 74. 1892; A. alaskana Hultén; A. borealis Hartman var. paludosa (Schribner) Fern., A. melaleuca Hitchc.; A. oregonensis Vasey.

Agrostis borealis Hartman var. recta (Nash) stat. n., A. tenuiculmis Nash var. recta Nash, Mem. N.Y. Bot. Gard. 1: 32. 1900; A. idahoensis Nash.

Digitaria sanguinalis (L.) Scop. var. rhachiseta (Henrard) stat. n., D. adscendens (HBK.) Henrard var. rachiseta Henrard, Mon. Gen. Dig. 11. 1950.

Festuca occidentalis Hooker var. oregona (Hackel) stat. n., F. ovina L. var. oregona Hackel ex Beal, Grasses N.A., 2: 599. 1896.

Melica Hitchcockii sp. n. sectonis Bromelicae, Herba 5-8 dm alt, omnino leavis nisi foliis scaberulis in margine et dorsaliter ad summas. Caespitosus, culmis parum si vero ad basas bulbosis. Folia omnia caulinaria, 12-17 cm long., 5-7 lat., ad basas gradatim dimidio attenuata. Ligula ± 3 mm long., ovata. Inflorescentia 7-12 cm long., simplex, clausa, racemosa, spiculis 5-8. Pedunculus 2-4 dm long., gracilis, elongatus, subequans partas foliosas culmi . Pedicelli (0.4)-1.5-(4.0) cm long., appressi. Spiculae alternae vel pro parte minora geminatae, praecipue viridules sed modo purpureo suffusae. Flores 4-3 in spicula. Gluma inferna ± 7 mm long., ± 1 mm lat., anguste triangulari-lanceolata, uninervia, glabra nisi in medinervo ciliata. Gluma superna ± 8 mm long., ± 2 mm lat., lanceolata, trinervia, ad nervos ciliata, ceteris laevis. Rhachis ad extus dense ciliatus. Lemma princeps ± 10 mm long., 2.0-2.5 mm lat., lanceolatum, quinquenervium, laeve per plagas, pilosum prope marginem et secundum medinervum ad basas, atque secundum nervos externos ad summas, bifida, aristata. Arista circa 1 cm long. Lemma sterilis ± 5 mm long. Antherae 2.0-2.3 mm long. Typus: C.L. Hitchcock & L.S. Martin 7931a, Alberta, Waterton Lakes Park, in forest ca ½ mile east of Cameron Lake, elev. ca. 5,600 ft, Aug. 7, 1941 (WTU).

Probably to be searched for along the Rockies of Montana and adjacent British Columbia.

Melica bulbosa Geyer var. spectabilis (Scribner) stat. n., M. spectabilis Scribner, Proc. Ac. Nat. Sc. Phil. 37: 45. 1885.

Panicum lanuginosum var. papillosum (Schmoll) stat. n., P. ferventicola var. papillosum Schmoll, Madroño 5: 94-95. 1939.

Poa abbreviata Br. var. Jordalii (Pors.) stat. n., P. Jordalii Pors., Can. Field-Nat. 79: 82-83. 1965.

Poa stenantha Trin. var. Sandbergii (Vasey) stat. n., P. Sandbergii Vasey, Contr. U.S. Nat. Herb. 1: 276. 1893. This has often been confused with the chilean P. secunda Presl, a similar but possibly distinct plant discussed in Am. Journ.Bot. 28: 78-81. 1941.

Schizachne purpurascens (Torrey) Swallen var. callosa (Turcz.) stat. n., Avena callosa Turcz. ex Led., Fl. Ross. 4: 416. 1853.

Stipa comata Trin. & Rupr. var. falcata var. n. Arista 1-2 dm, internodo terminale falcato vel curvato, nec spirali, Type: Carlston & Holstein (N-29) 1718, near Yerington, Nevada, 5-8-39 (DAO).

Stipa spartea var. intermedia (Scribner & Tweedy) stat. n., S. comata var. intermedia Scribner & Tweedy, Bot. Gaz. 11: 171-2. 1886.

Torreyochloa pallida (Torrey) Church var. natans (Kom.) stat. n., Glyceria natans Kom., Rep. Sp. Nov. 13: 86. 1914.

FLORA

OF THE PRAIRIE PROVINCES

Bernard Boivin

Part IV

(concluded)

Order 73. ARALES

Inflorescence much reduced and functioning like a single flower. Flowers small and crowded into a receptacle-like rachis termed "spadix". Inflorescence subtended and more or less enveloped by a bract termed "spathe". These two structures exhibit a very wide range of morphological variation.

a. Terrestrial; normal flowers present ..... 127. Araceae
aa. Floating aquatics; flowers highly reduced and normally absent ..... 128. Lemnaceae

127. ARACEAE (ARUM FAMILY)

Type family of the order. Flowers with the normal components of perianth, stamens and/or ovary. Spathe usually petaloid and showy.

a. Leaves trifoliate ..... 3. Arisaema
aa. Simple.
b. Leaves ensiform ..... 1. Acorus
bb. Broadly cordate ..... 2. Calla

1. ACORUS L. CALAMUS

Flowers perfect. Perianth of 6 segments.

1. A. Calamus L. -- Sweetflag (Belle-Angélique, Radote) -- Long, ensiform leaves tufted, mostly around 1 m high, with a somewhat off center midnerve. Spathe seemingly continuing the stem in the manner of some Scirpus or Juncus, the stem-part triangular-flattened, the spathe-part flat and not enclosing, but equitant. The stem-spathe unit is leaf-like, with the spadix arising at an angle from the junction. Early summer. Freshwater shallows. -- sMack, NS-BC, US, Eur.

2. CALLA L. WATER-ARUM

Flowers all or mostly perfect. Perianth lacking.

1. C. palustris L. -- Calla, Wild Calla (Choucalle) -- Spathe showy, nearly white ventrally, green dorsally, 3-6 cm long, oblong to broadly ovate, long-caudate at tip. Leaves around 1 dm across, broadly ovate, alternate on an elongate rhizome. Somewhat fleshy, especially the stem and petioles. Early summer. Bogs and marshy shores. -- Mack-Aka, L-NF, NS-BC, US, Eur.

Symplocarpus foetidus (L.) Nutt. was reported from Winnipegosis by Scoggan 1957 on the basis of a specimen preserved at the Manitoba Provincial Museum in Winnipeg. It is a sample of Lysichiton americanum Hultén & St John and in all likelihood came either from a garden or from a planting in the wild. An earlier report of Jackson 1922 is not substantiated by any specimen that Scoggan or ourself could locate and is herewith discounted as improbable.

3. ARISAEMA Mart. INDIAN TURNIP

Flowers unisexual. Perianth absent. Spadix prolonged beyond the flower-bearing base.

1. A. triphyllum (L.) Schott var. triphyllum (A. atrorubens (Aiton) Blume) -- Jack-in-the-Pulpit, Indian Turnip (Petit prêcheur, Oignon sauvage) -- Perennial herb from a corm, with 1-2 large, basal, trifoliate leaves. Leaflets up to 2 dm long, ± ovate, the lateral ones strongly asymetrical. Spathe less than 1.5 dm long, hooded, brown-purple with the reticulate nervation outlined in pale green. Late spring and early summer. Rare in rich deciduous woods: Emerson and Dufferin. -- NB-sMan, US.

Grades eastward into var. Stewardsonii (Britton) Stevens with a spathe tapered at base into the peduncle, its tube more strongly corrugated, the throat striped in white and purple on the inner face, the hood green.

128. LEMNACEAE DUCKWEED FAMILY

Free-floating aquatics, very small and normally sterile, reproducing mainly by budding. Inflorescence, when present, reduced to 2-3 minute flowers. Staminate flower reduced to a stamen. Pistillate flower reduced to an ovary. The leaf-like structure is termed "thallus". Flowering very rare or very rarely observed.

The recently published monograph of Lemnaceae by E.H. Daubs, Ill. Biol. Mon. 34: 1-118, 1965, is not to be trusted, especially its distribution maps. These are made up mainly of imaginary dots, mostly equidistant. We have also come across a few similar maps in some other genera, Arnica, Lupinus, Rumex,

etc. Such maps may have the outward appearance of painstaking scholarship, but they lack its substance, the essential dot to specimen correlation.

a. Rootlets fascicled ..... 1. Spirodela
aa. Rootlets none or only one per leaf-like unit ..... 2. Lemna

1. SPIRODELA Schleiden

Roots in a small fascicle arising at the near end and underneath the leaf-like thallus.

1. S. polyrhiza (L.) Schleiden -- Duckweed, Water-Flaxseed -- (Lentille d'eau) -- Smallest in our flora but for Lemna minor. Thalli about 5 mm across, leaf-like, clustered, green above with an off center purple spot and radiating purple nerves; purple below, the cluster of rootlets attached opposite the purple spot. Free floating at the surface of quiet waters in company of Lemna minor and normally less abundant than the latter. -- NS-BC, US, (CA), Eur, (Afr, Oc).

2. LEMNA L. DUCKWEED

Rootless or the root arising from the far end of the thallus.

a. Rootlet present ..... 2. L. minor
aa. Absent; thalli larger and connected by stipe-like bases ..... 1. L. trisulca

1. L. trisulca L. -- (Canillée, Cannetée) -- Floating under water and forming loose, open networks up to 1 dm across. Thalli 4-10 mm long, lanceolate, green, finely white-punctate, seemingly trilobed when budding. Stipe about as long as the limb. Quiet waters. -- K-Aka, NS-BC, US, (CA), Eur, (Afr, Oc).

2. L. minor L. -- Duckweed (Lentille d'eau, Merde de grenouille) -- Our smallest plant, its thallus only 1-3 mm long and growing in clusters less than 1 cm across. Rootlet 1-2 cm long, simple and pendant from under the far end of the thallus, the latter pale green and nerveless. Free floating at the surface of quiet waters, often in huge numbers towards the end of the summer. -- K-Aka, SPM, NS-BC, US, (CA, SA).

Order 74. TYPHALES

Reduced type of the preceeding order. Flowers unisexual and often without perianth, hence reduced to an ovary or stamen(s). Fruit an achene. Spathe green and leaf-like, fugaceous.

a. Flowers in globose heads ..... 129. Sparganiaceae

aa. In dense, cylindric heads ..... 130. Typhaceae

129. SPARGANIACEAE (BURREED FAMILY)

Perianth of 3-6 tepals. Monotypic.

1. SPARGANIUM L. GOOSE-GRASS

Aquatic herbs with the flowers in globose heads in a moniliform inflorescence on a sinuous rachis.

a. Stigmas 2, the style being bifid ..... 1. S. eurycarpum
aa. Only one stigma, the style entire.
b. Fruiting head 1.2 cm wide or less, the beaks 1.5 mm long or less; staminate heads only 1-2; inflorescence simple.
c. All heads (or peduncles) axillary; beaks 0.5-1.5 mm long ..... 7. S. minimum
cc. At least one of the pistillate heads borne half way up an internode ..... 8. S. hyperboreum
bb. Fruiting head larger, up to 3.5 cm wide, the beaks mostly over 1.5 cm long; staminate heads 2 or more, except S. glomeratum.
d. Inflorescence of 2 or more branches, each bearing 2 or more heads.
e. Styles all or mostly bifid .... 1. S. eurycarpum
ee. Styles entire ..... 2. S. americanum
dd. Inflorescence simple and spiciform to racemiform below.
f. Pistillate heads (or their peduncles) all axillary ..... 2. S. americanum
ff. At least one pistillate head borne about half way up an internode or opposite a leaf or bract.
g. Staminate heads only 1-2, less numerous than the pistillate ones and contiguous to the upper pistillate head; in fruit the rachis is barely, if at all, prolonged beyond the upper pistillate head ..... 3. S. glomeratum
gg. Staminate heads more numerous and forming a moniliform inflorescence on a very long rachis which persists in fruit.
h. Leaves 5-10 mm wide; beaks 2.5-3.0 mm long. Normally an emersed and erect plant .... 6. S. multipedunculatum
hh. Leaves mostly narrower, less than 7 mm wide.

i. Normally submerged with only the inflorescence protruding above water; beaks ± 2 mm long; lower head usually pedunculate ..... 5. S. angustifolium

ii. Normally emersed and stiffly erect; beaks (2)-4 mm long; all or nearly all heads sessile or nearly so .... 4. S. chlorocarpum

Aquatic plants of shallow waters and exundated shores are normally subjected to drastic ecological variations and may respond by equally drastic morphological adaptations, hence their identification may present some unusual difficulties. This is especially the case with our species of Sparganium and their identification is largely based on characters drawn from the inflorescence. The following general characterizations may help the beginner. One species is rarely introduced, S. glomeratum, and is readily spotted by the different arrangement and ratio of pistillate and staminate heads. Two species, S. hyperboreum and S. minimum, are generally smaller with smaller heads and shorter beaks. The largest species, S. eurycarpum, has rather long stigmas and most of them are paired (always single in our other species). Also the inflorescence is branched (simple in the others, except sometimes S. americanum) and the mature achene is obconical (ovoid to ellipsoid or fusiform in the other species). The other four species center around S. americanum and will be discussed under the latter name.

Our treatment will be found to be fairly congruent with those of Fernald 1950 and Gleason 1952. But there are quite a few dissonances with the more recent text and illustrations of Hitchcock 1969.

Sterile leaves of submerged forms are often mistaken for Vallisneria. In Sparganium the leaf cells are unusually large, mostly 0.5-1.0 mm long and 0.2-0.3-(0.5) mm wide, thus their outline is readily observed by the unaided eye. In Vallisneria they are only 1/10 as big and barely detectable with a hand lens.

1. S. eurycarpum Eng. -- Styles all or mostly bifid, the stigmatic branches 2-3 mm long. Largest and coarsest, mostly around 1 m high, the leaves around 1 cm wide. Style, including the stigmas, about 5 mm long. Achene obconical, truncate at summit. Early summer. Muddy shores. -- NF-(SPM), NS-BC, US.

Porsild 1943 extended the range to Fort Norman, Mackenzie, but we have found no justifying specimen at CAN or elsewhere.

2. S. americanum Nutt. (S. androcladum (Eng.) Morong; S. fluctuans (Morong) Rydb.) -- The variable and nondescript species of the genus: styles entire, of middle size, and the heads

(or branches, or peduncles) axillary. Not quite so coarse as the first. Heads numerous, both the staminate and pistillate, the fruiting ones 1.5-2.5 cm across. Beaks 2-(4) mm long. Achene fusiform, usually with a faint constriction around the middle. First half of summer. Mostly around sloughs and shores with a fluctuating water level. -- (L-SPM), NS-O, S-BC, US.

Usually subdivided further into three species. Lesser plants with shorter stigmas, perianth and anthers, smaller heads, etc. are then termed S. fluctuans. The correspondingly larger plants are then S. androcladum, while the more average plants are retained as S. americanum.

Morphologically S. americanum is a central type and is best detected by elimination. If its inflorescence is branched, it is usually separated from S. eurycarpum on the basis of the number of stigmas or the shape of the achene.

If the inflorescence is a single zigzag spike (racemose or not at base) of heads, it is placed in S. americanum if all the pistillate heads are axillary, the lower 1-(2) being usually pedunculate while the others are sessile. Typically the heads are all sessile and axillary or nearly so in S. chlorocarpum, but for the lowermost head which is borne halfway up the internode. In S. angustifolium the lowermost head is also interaxillary, but it is commonly pedunculate, although it may be sessile. And in S. multipedunculatum, a somewhat broader-leaved species, the lowermost head is typically pedunculate and axillary, while the next head is sessile and interaxillary.

The variation in size of fruiting heads is not random but there are broad zones of overlap. The smaller heads belong to S. angustifolium, the larger ones to S. multipedunculatum.

The leaves are narrower in S. angustifolium and S. chlorocarpum, mostly 3-5 mm wide. They are broader in S. americanum and S. multipedunculatum, the main ones mostly $\pm$ 7 mm wide. The spacing of the nerves is related to the width of the leaves.

S. angustifolium is typically a submerged plant with long and flaccid leaves reaching the surface. The others are normally shore plants. S. chlorocarpum has a rather short stem, the leaves are stiff and somewhat channelled, and the beaks tend to be over 3 mm long. S. multipedunculatum tends to be of average height and S. americanum is the tallest of the series.

All these characters vary and not always in unisson. It may be that specific rank is not justified for all these taxa. But we are retaining the present classification for want of a better one.

3. S. glomeratum Laest. -- Inflorescence very short, of 3-6 pistillate heads and only 1-2 staminate ones. About as large

as the last. Rachis of the inflorescence not prolonged beyond the upper pistillate head, or prolonged by only a few mm, hence the staminate head(s) is contiguous with the upper pistillate one. Lower head often borne opposite a leaf. Fruiting heads crowded, about 1.5 cm across. Beaks 1.5-2.0 mm long. First half of summer. A rare and apparently introduced plant of quiet waters: Glenevis. -- Aka, L, (Q)-O, Alta-BC, US, Eur.

The following localities have been checked: Big Delta (DAO), College (DAO), Goose Bay (DAO), Black Sturgeon Lake (SFS), Glenevis (ALTA, DAO), Graham Island (DAO), Kathlyn Lake (DAO), and from Minnesota.

4. S. chlorocarpum Rydb. (var. acaule (Beeby) Fern.; S. acaule (Beeby) Rydb.) -- Stem short, usually only 1-3 dm high, much overtopped by at least as much again by the stiff and nearly erect leaves. Sometimes submerged and with flaccid leaves, but normally emerged and the leaves carinate and ± conduplicate. Lowest head typically sessile and borne half way up the internode or sometimes opposite a leaf. Fruiting heads 1.5-2.5 cm across, all sessile or subsessile. Mid summer. Frequent in wet places and shallow water. -- L-SPM, NS-O, S-BC, US.

5. S. angustifolium Mx. -- Goose-Grass (Rubanier) -- The common submerged aquatic type with the leaf tips floating at the surface and the inflorescence partly emerged. Sometimes stranded and erect, the leaves then rounded on back. Lowest bract usually some 50% broader towards the base and also quite often membranous margined. Lowest head on an obvious peduncle which arises half way up an internode. Fruiting heads 1.2-2.0 cm across. First half of summer. Common in quiet waters, usually in less than 1 m deep. -- (G, K)-Mack-Aka, L-SPM, NS-(PEI)-NB-BC, US, (Eur).

6. S. multipedunculatum (Morong) Rydb. (S. simplex AA.) -- Like a larger version of S. chlorocarpum. Stem taller and not so conspicuously overtopped by leaves. Fruiting heads 2-3 cm wide, the lower one often pedunculate and axillary, the second one usually sessile and interaxillary. First half of summer. Near water's edge. -- (Mack)-Y-Aka, NF-(SPM), NS-PEI-(NB)-Q-(O)-Man-BC, US.

The name S. simplex Hudson has largely fallen into disuse. British botanists now use S. emersum Rehm. and North-Americans generally prefer S. multipedunculatum. We have not yet investigated the basis for regarding the American plants as a distinct species. Authors of the last century used S. simplex in quite a broad sense and older records should not be accepted without checking the justifying sheets.

In a recent paper J.L. Reveal (Taxon 19: 796-7. 1970) has clearly pointed out that S. simplex Hudson is superfluous, hence illegitimate, and the correct name for the European plant is

S. emersum Rehm. With this nomenclature we agree. Then Reveal proceeds to distinguish the American plants as S. emersum var. multipedunculatum (Morong) Reveal without explaining the basis for his taxonomy, although there is a hint that he may have accepted the treatment of Hitchcock 1969.

The recent treatment by Hitchcock 1969 does not dovetail well with our own sorting. Hitchcock would recognize S. simplex as widespread in North America along with a var. multipedunculatum equally widespread. The discrepancy with our text is perhaps only a matter of names, S. simplex sensu Hitchcock being partly equivalent to our S. americanum. The latter taxon is not mentioned by Hitchcock although it seems to be a part of his illustration of S. simplex.

7. S. minimum (Hartm.) Fries -- Heads few and only about 1 cm across. Stem rather thin and weak. Leaves variable, usually less than 5 mm wide. Just before mid summer. Shallow and cool waters. -- seK-Mack, Aka, L-(NF), NS-(PEI)-NB-BC, US, Eur.

8. S. hyperboreum Laest. -- Like the last but the style and stigma shorter, neither over 0.3 mm long, and the heads not all axillary. Just before mid summer. Shallow, acid, cold waters. -- G, K-Aka, L-SPM, NS, Q-nO-nMan, (swAlta), Eur.

130. TYPHACEAE (CATTAIL FAMILY)

Flowers further reduced to their stamens or ovary and a number of subtending bristles. Monotypic.

1. TYPHA L. CATTAIL

Staminate and pistillate flowers borne in separate parts of the spike. Spathe soon deciduous.

a. Leaves all or mostly 1.0-1.5 cm wide ..... 1. T. latifolia
aa. Narrower, only (0.4)-0.5-0.8-(1.0) cm wide ..... 2. T. angustifolia

1. T. latifolia L. -- Cattail, Bulrush (Quenouille, Massette) -- A conspicuous and taller marsh plant, with a compact and dark brown inflorescence ± overtopping its foliage. About 1.5 m high. Inflorescence continuous, the pistillate part 1.0-1.5 dm long, becoming 2.0-2.5 cm thick at maturity, the staminate part shorter. Early summer. Common in ditches and in marshy shallows, not very tolerant of alkali. -- seK-Aka, NF, NS-BC, US, (CA), Eur.

IX. T. glauca Godron -- Hybrid of our two species and growing with its parents; more or less variable and intermediate in height, width and length of the leaves and pistillate spikes, and discontinuity of the staminate spike. Rare: Vita, Otterburne. -- NS, Q-Man, US, (CA, Eur).

2. T. angustifolia L. -- Cattail (Quenouille, Massette) -- Quite similar to the first and often growing with it. Somewhat taller. Leaves narrower and overtopping the inflorescence. Pistillate part of the inflorescence 1-2 dm long, paler brown, becoming 1.0-1.5 cm thick at maturity. Staminate spike usually longer and separated from the first by an interval of 1.5 cm or more. First half of summer. Rare in marshy places: Gimli, Otterburne, Vita. -- NS-seMan, US, Eur, (Afr).

This species is perhaps currently extending its range.

Sub-class 4. ACHENIDAE

Carpels free, or only one, maturing into one-seeded achenes.

a. Carpels 4 or more.
  b. Carpels very numerous ..... 131. Alismataceae
  bb. Only 4 carpels.
    c. Leaves opposite ..... 136. Zannichelliaceae
    cc. Alternate, but the upper sometimes opposite.
      d. Flowers 2 on an axillary rachis ..... 135. Ruppiaceae
      dd. Flowers more numerous and forming a terminal spike ..... 133. Potamogetonaceae
aa. Carpel solitary.
  e. Leaves all basal ..... 134. Lilaeaceae
  ee. Borne on the stem.
    f. Leaves opposite ..... 137. Naïadaceae
    ff. Alternate ..... 132. Zosteraceae

Order 75. ALISMATALES

Monotypic.

131. ALISMATACEAE (WATER-PLANTAIN FAMILY)

With numerous free carpels maturing into as many achenes and obviously resembling Ranunculus, but the flowers trimerous, with 3 sepals and 3 petals.

a. Carpels disposed in a single verticil ..... 1. Alisma
aa. Not verticillate and more numerous in a dense globose head; flowers larger ..... 2. Sagittaria

1. ALISMA L. WATER-PLANTAIN

Fruit a verticil of achenes.

1. A. Plantago-aquatica L. (var. americanum R. & S., var.

brevipes (Greene) Farw., var. parviflorum (Pursh) Farw.; A. brevipes Greene; A. Geyeri Torrey; A. gramineum K.C. Gmelin. A. subcordatum Raf.; A. triviale Pursh) -- Water-Plantain, Mud-Plantain (Plantain d'eau, Flûteau) -- Leaf nervation of (5)-7 longitudinal main nerves connected ladder-wise by numerous small nerves. Annual or tufted perennial with the leaves all basal and ovate, varying to nearly linear. Panicle lax, its branching verticillate. Flowers less than 1 cm across, white to pinkish. Summer. Frequent on muddy shores and shallows. -- (NF), NS-BC, US, (CA), Eur, (Afr).

Quite variable and often subdivided in 2 to 5 species. Commonly the name A. Plantago-aquatica will be restricted to the paleogean plants and the neogean ones will then be called A. triviale. The latter may be further restricted to plants with larger leaves and flowers, while A. subcordatum will designate smaller-flowered plants, A. lanceolatum the narrower-leaved plants, and A. gramineum the very narrow-leaved and ± submerged plants. All characters grade into one another and appear to be neither geographically restricted nor clearly correlated. Much of the variation in leaf width is obviously related to water levels. The degree of branching of the inflorescence and the number of grooves on the back of the achene have also been adduced as diagnostic criteria. The grooving of the back of the achene is perhaps related to maturity. Submature achenes usually show two grooves between three dorsal ridges. Fully mature achenes are more likely to exhibit a single central ridge. The branching will vary with the size of the inflorescence and in more vigorous plants the lower branches may bear 2-(3) verticils of flowers, while in smaller plants all branches will bear a single terminal verticil or umbell of flowers.

The flower colour is not always obvious in herbarium specimens and is rarely anything but white or nearly so. Anthers vary in size but not always the way they are expected to.

As long as we cannot correlate clearly these various diagnostic character, we are inclined to regard Alisma Plantago-aquatica as a single plastic species with four main ecological forms.

Here is our understanding of the variation within this species. Usually it is an annual plant. Seeds deposited on the mud in the fall will germinate under water the following spring and will produce filiform or narrowly ribbon-like leaves. These leaves are more or less evanescent. If the water level remains high, the later leaves will also be ribbon-like, but longer and larger, up to 1 cm wide, and will resemble those of Vallisneria or Sparganium angustifolium. If the water level is slow in receeding, the later leaves will likely be lanceolate, but if the water receedes earlier the leaves will grade

to lanceolate then to ovate by flowering time. More vigorous plants will tend to produce ovate to cordate leaves that may be up to 1.0-1.5 dm long, they will also tend to develop a basal corm that will often overwinter and produce rather vigorous plants the following season.

Earlier leaves are more or less evanescent and herbarium specimens showing transitional forms are not common since most plants are collected when they are already flowering or fruiting and the water level has already completely or largely receeded.

Our understanding of the variations of this species may be expressed at the rank of form as follows.

1. F. Plantago-aquatica. Leaves emerged and narrowly ovate to oval or cordate, (3)-5-12-(15) cm long, (2)-3-8-(12) cm wide.

2. F. emersum Boivin. Plants at first submerged, and producing filiform leaves, these evanescent and, as the water level recedes, replaced by ± lanceolate leaves, (2)-4-6-(8)cm long,(0.5)-1.0-2.0-(3.0) cm wide. Forma nova, in primis submersa, deinde emersa et foliis ± lanceolatis. Typus: M.-Victorin 20410, Québec, Longueuil, sur les grèves du Saint-Laurent, en face de l'Île Plate, 29 sept. 1924 (QFA). Paratypi varii in QFA servantur.

3. F. vallisneriifolium Boivin. Plants submerged all summer, producing long and flaccid leaves partly floating at the surface, up to 1 m long, mostly 5-10 mm wide. Forma nova, foliis partim fluitantibus, ad 1 m long., saepius 5-10 mm lat. Typus: Louis-Marie, Québec, Longueuil, 1 sept. 1924 (QFA 1786). Paratypi varii servantur in QFA.

4. F. filiforme Boivin. Foliage completely submerged all summer, the inflorescence tending to be partly emersed. Leaves ± filiform, 1-3 mm wide. Forma nova, omnino submersa vel inflorescentia partim emersa, foliis angustissimis, 1-3 mm lat. Typus: Cinq-Mars & Raymond 615, Québec, co. Iberville, Sabrevois, bords vaseux du Richelieu, 29 août 1953 (QFA). Paratypi inveniuntur in QFA.

2. SAGITTARIA L. ARROWHEAD

Like Alisma, but with more numerous carpels in a globose head.

a. Lower flowers subsessile ..... 1. S. rigida
aa. All flowers on similarly elongated pedicels.
  b. Bracts deltoid to elliptic, shorter than the sepals ..... 2. S. latifolia
  bb. Bracts triangular-lanceolate to linear-lanceolate and longer than the sepals; achene

beak very short .....3. S. cuneata

1. S. rigida Pursh -- Scape ± arched and rather sharply bent at the base of the inflorescence, the latter erect. Leaves overtopping the inflorescence, mostly lanceolate and usually cuneate at base. Pedicels dimegueth, the flowers of the lowermost verticil being pistillate and subsessile, the other flowers staminate and borne on pedicels 1-3 cm long. Mid summer. Muddy shores and shallow receding waters; Sanford and in the extreme southeast corner. -- Q-sMan, US, (Eur).

2. S. latifolia W. var. latifolia (var. obtusa (Muhl.) Wieg.) -- Wapato, Arrowhead (Wapatou, Flèche d'eau) -- Inflorescence a raceme of verticillate flowers, sometimes compound at the base. Herbage glabrous. Leaf conspicuously sagittate, with the basal lobes about as long as the body of the blade. Nervation as in Alisma, but the main nerves more numerous, some of them recurved and ending in the tip of the lobes. Flowers white, showy, 2-4 cm across. Achene 2.5-3.5 mm long, conspicuously winged, its beak mostly 1.0-1.5 mm long and horizontally deflexed. Mid summer. Marshy places and shallow waters. -- NS-BC, US.

In the southeastern USA, barely entering Ontario, there is a pubescent var. pubescens (Muhl.) J.G. Sm. Otherwise S. latifolia is quite a variable plant, like the first, and many extremes of variation and ecological forms have received names, usually at the varietal level.

3. S. cuneata Raf. -- Wapato -- Similar but tending to be smaller. Petals ± 2 cm long. Achene only 2.0-2.5 mm long, flattened rather than winged, its beak subapical, erect, 0.1-0.4 mm long. Mid summer. Around sloughs and along creeks. -- (K-Y), L, (NF), NS, NB-BC, US.

Order 76. APONOGETONALES

Flowers borne on one side of a flattened axis or spadix.

132. ZOSTERACEAE (EELGRASS FAMILY)

Flowers much reduced, bearing only one tepal and either one stamen or one carpel.

1. ZOSTERA L. EELGRASS

Monoecious.

1. Z. marina L. -- Eelgrass, Grass-Wrack (Mousse de mer, Herbe à Outardes) -- Quite similar to a narrow-leaved Potamogeton with a very flat stem but without stipules. Lower leaves with a tubular sheathing base. Inflorescences not obvious,

superficially similar to a leaf and about as wide, the leaf-like spathe folded over the spadix. Leaves 3-4 mm wide and mostly over 1 dm long. Early summer. Submerged in sheltered sea-coast shallows just below tide level: Churchill. -- G, K, (Aka), L-NF-(SPM), NS-Q-(nO)-nMan, BC, US, Eur.

The neogean plants are said to differ by their narrower leaves with fewer nerves, but this reported difference did not come out clearly in the material at hand.

Order 77. POTAMOGETONALES

Flowers more or less reduced like the last but subverticillate in a terminal spike, not on a spadix.

a. Carpel solitary; leaves all basal ..... 133. Lilaeaceae
aa. Carpels 4; stem leafy.
  b. Inflorescences terminal; achenes sessile ..... 132. Potamogetonaceae
  bb. Inflorescences axillary; achenes very long stipitate ..... 134. Ruppiaceae

133. POTAMOGETONACEAE (PONDWEED FAMILY)

Submerged aquatics with spikes of tetramerous flowers. Perianth lacking. No spathe or spadix.

1. POTAMOGETON L. PONDWEED

The only genus. Stipules present, usually elongate, fused together to form a sheath, sometimes also fused with the leaf base to form a sheathing base similar to the leaf-sheath of the Grasses.

The emphasis of our treatment is deliberately on habit and gross morphology; this should be adequate for positive identification of full grown colonies and the bulk of herbarium material. Many diagnostic characters have been derived from the details of the flowers and fruits, from the anatomy of stems and leaves; these will be found in monographs and manuals of aquatic plants; they should provide for the positive identification of sterile shoots, fragments, and even seeds from an animal stomach or winter buds from a muddy bottom.

a. Leaves minutely serrulate.
  b. Leaf blade divergent from the summit of its sheathing base ..... 4. P. Robbinsii
  bb. Leaves diverging right from the node and free from the stipular sheath ..... 5. P. crispus
aa. Entire.
  c. Floating leaves absent or similar to the submerged ones.

d. Leaves narrow, less than 4 mm wide ..... Group A
dd. Broader ..... Group B
cc. Leaves dimorphic, the floating ones different from the submerged.
e. Submerged leaves reduced to their coarse and elongated petioles ..... 15. P. natans
ee. Submerged leaves with distinct limb and often sessile ..... Group B

Group A

Leaves all submersed and narrow.

a. Leaf with fused stipules forming a sheath and ligule, like a Grass, the blade divergent from near the middle or the summit of the sheath.
b. Leaves linear, (3)-5-(8) mm wide ..... 4. P. Robbinsii
bb. Leaves filiform and narrower.
c. Stigma borne on the side of a short and broadly triangular beak; leaf tips attenuate .... 3. P. pectinatus
cc. Stigma broad and sessile on the top of the achene; leaf tips acute to rounded.
d. Leaf and stipules adnate for 2 cm or less, the sheath margins also fused along the ventral side ..... 1. P. filiformis
dd. Main leaves and their stipules adnate for 2-5 cm into a broader sheath which is open ventrally ..... 2. P. vaginatus
aa. Leaf free from the stipules and diverging from the node.
e. Stem very flat and over 1 mm wide, more than half as wide as the leaves .....6. P. zosteriformis
ee. Stem not so flat or narrower.
f. Achene 3-4 mm long; leaves 2-4 mm wide with a conspicuous whitish midnerve ....10. P. obtusifolius
ff. Achene shorter; leaves narrower (except sometimes P. Friesii).
g. Spike 3-5 mm long, on a peduncle less than 1 cm long ..... 7. P. foliosus
gg. Spike and peduncle longer.
h. Larger leaves 2-3 mm wide, rounded and mucronate at tip ..... 8. P. Friesii
hh. Larger leaves not so wide and usually acute ..... 9. P. pusillus

Group B

Leaf blades broad, over 5 mm wide and often dimorphic.

a. Leaves sessile, cordate or clasping at base, all submerged.

b. Leaves linear and of uniform width, (3)-5-(8) mm wide ..... 4. P. Robbinsii
bb. Leaves ovate to narrowly lanceolate, the main ones at least 1 cm wide.
c. Stipules 2.5 cm long or more, conspicuous and persistent ..... 16. P. praelongus
cc. Shorter, 2 cm long or less, and evanescent or soon reduced to fibrous shreds..... ..... 17. P. perfoliatus
aa. Leaves rounded or cuneate at base, often petiolate or dimorphic.
d. Submerged leaves 2 cm wide or more, often petiolate; stipules 3 cm long or more.
e. Leaves conduplicate-falcate, with 12 or more longitudinal nerves to each half of the limb ..... 13. P. amplifolius
ee. Leaves straight and flat or crisp-margined; longitudinal nerves fewer ..... (P. illinoensis)
dd. Leaves narrower and mostly sessile; stipules less than 4 cm long.
f. Peduncle about twice as thick as the stem; leaves (2)-3-5-(8) cm long ..... 14. P. gramineus
ff. Peduncle barely, if at all, thicker than the stem; submersed leaves usually longer.
g. Floating leaves present, 2-3 times wider than the submerged ones, the latter less than 1 cm wide ..... 11. P. epihydrus
gg. Floating leaves usually lacking, or if present about as wide as the submerged ones, the latter mostly 1.0-1.5 cm wide ..... 12. P. alpinus

1. P. filiformis Pers. (var. borealis (Raf.) St. John, var. Macounii Morong; P. interior Rydb.) -- Of a bushy growth and dark green to blackish, being very branchy with numerous filiform leaves longer than the internodes. Leaves mostly around 1 dm long and usually less than 1 mm wide, acute to obtuse at tip, adnate to the sheath of stipules for less than 2 cm, the latter also fused on the ventral side for at least part of their length when young, forming a tube mostly less than 1 mm wide. Inflorescence ± moniliform with the lowest cluster remote, the lowest internode being about as long as 1/3 of the inflorescence. Achene 2-3 mm long. Stigma broad and flat, sessile on the summit of the achene. First half of summer. A bottom dweller, usually in shallow waters, quiet to fast flowing, over sandy bottom. -- G-Y-(Aka, L)-NF, NS-(PEI)-NB-BC, US, Eur.

Spikes of american plants average smaller, the internodes tending to be shorter (= var. borealis). But this is only a statistical variant as the range of variation is nearly the same

on both sides of the Atlantic. Another commonly recognized variety is the larger-leaved var. Macounii, an extreme of variation of sporadic occurrence.

2. P. vaginatus Turcz. -- Like the first but the sheaths broader and obvious, the main ones usually 2-5 mm across, the edges free on the ventral side, but the leaf adnate for 3-8 cm. Leaf blades 1-2 mm wide, obtuse or rounded and mucronulate at tip. Inflorescence with more numerous and nearly equidistant clusters. Achenes larger, 3.0-3.5 mm long. Early summer. Usually in cold and quiet water less than 1 m deep. -- seK-Y-(Aka, L)-NF, NS-(PEI), Q-Alta-(BC, US, Eur).

3. P. pectinatus L. -- Sago -- Achene produced into a short conical beak, less than 1 mm long, bearing the stigma on one side. Leaves mostly around 1 mm wide, adnate to the stipular sheath for 1-3 cm, tapered to a long, acute tip. Sheaths less than 1 mm across, tightly enclosing the stem or subtended branch. Inflorescence like P. vaginatus. Achene 3.0-3.5 mm long. Early summer. Quiet, muddy waters. -- (Mack)-Y-(Aka), NF-SPM, NS-BC, US, (CA, SA), Eur, (Afr, Oc).

4. P. Robbinsii Oakes -- Foliage conspicuously pectiniform, the leaves stiff, distichous, divergent at about a 45° angle and closely set. Not very branchy. Leaves dark green, long linear, less than 1 dm long and less than 1 cm wide, adnate to the stipular sheath for less than 1 cm, finely serrulate, but the serrations deciduous. Sheaths overlapping, disintegrating to whitish fibers. Inflorescence usually a lax corymb of spikes. Early fall or perhaps usually sterile. Mostly in quieter and calcareous waters around 1 m deep. -- NS, NB-BC, US.

Rare or perhaps merely overlooked because it is a bottom dweller and commonly sterile. For our area we know of no specimens other than those at DAO. The localities are: Bissett, Wildnest River, Limestone Lake and Glenevis.

5. P. crispus L. -- Usually sterile, but the leaves serrulate and ± oblanceolate. Stems pinkish, strongly contrasting the dark green leaves, the latter crisp-margined, all alike and submerged, with only 3 longitudinal nerves, and free from the stipules. Achene weakly contracted into a beak more than half as long as the body. Shortly before mid summer. Locally naturalized in larger rivers: Saskatoon and The Elbow at Calgary. -- (NS), Q-O, S-BC, US, Eur.

6. P. zosteriformis Fern. (P. compressus AA.; P. zosterifolius AA.) -- Stipules especially obvious, whitish, about as wide as the leaves, although shorter, and free from one another and from the leaves. Stem strongly flattened. Leaves ribbon-like, 1-2 dm long and 2-4 mm wide, obtusish and short-acuminate at tip. Early summer. Clear, quiet water, up to 1½ m deep. -- Mack, (Aka), NS, NB-BC, US.

Quite similar to the paleaogean P. compressus L. (or P. zosterifolius Schumacher), the two differing in a number of minor ways, of which the more obvious is in the stipules. In the American plant the conspicuous stipules are nearly white and persist most of the summer. In the European plant the stipules are much less colour-obvious and soon they disintegrate.

7. P. foliosus Raf. (var. macellus Fern.) -- Spike and peduncle shortest. Herbage of this and the next three species quite similar to P. zosteriformis but much smaller throughout; stem strongly flattened but less than 0.5 mm wide, etc. Resembles P. pusillus, but in the latter the 3-4 upper pairs of leaves are opposite. Leaves usually all alternate except the uppermost pair, acute at tip, without basal glands. Stipules 1 cm long or less, filmy and fragile, but not disintegrating to fibrous shreds. Achene with a narrow and undulate dorsal wing. Early summer. Quiet streams and larger lakes. -- sMack, NS-BC, US, (CA).

The range was extended to Yukon by Roland 1947, repeated by Boivin 1967. But Yukon was not included in the range by Roland 1966 and one may suppose that the 1947 report may have been based on some misidentification or due to a lapsus calami.

8. P. Friesii Rupr. -- Like the last but the achenes rounded on back and the larger leaves somewhat more than 2 mm wide. Glands usually present at the base of the leaf. Stipules 1 cm long or less, soon disintegrating to whitish fibrous remnants. Spike 7-15 mm long, on a peduncle 1.5-5.0 cm long. Achene 2-3 mm long. Early summer. Freshwater lakes. -- seK-(Mack), Aka, (L)-NF, NS-PEI-(NB)-Q-O-(Man)-S-Alta-(BC), US.

9. P. pusillus L. var. pusillus (var. minor (Biv.) Fern. & Schub., var. mucronatus (Fischer) Graebner; P. Berchtoldii Fieber, var. polyphyllus (Morong) Fern.) -- A middling type in relation to the next and the last three. Leaves less than 1 dm long, 2 mm wide or less, acute to obtuse or mucronulate at tip, with a pair of prominent, and somewhat translucent basal glands, these sometimes obscure. Stipules 0.5-1.5 cm long, filmy, often evanescent, but not disintegrating to shreds. Achene not ridged on back. Early summer. Sloughs and slow moving waters. -- G, sMack-(Y)-Aka, L-(NF), NS-BC, US, (CA), Eur, (Afr) -- Var. pseudorutilus Benn. (var. rutiloides (Fern.) Boivin; P. strictifolius Benn.) -- Stipules with stronger nerves, soon disintegrating to fibrous shreds. Basal foliar glands usually lacking. -- seK-(Mack-Y), Q-O-(Man)-S-(Alta), US.

According to R.R. Haynes in Rhodora 76: 598-9. 1974 var. pseudorutilus has priority at varietal rank, hence the nomenclature adopted above. Both of our varieties are largely sympatric, but var. pseudorutilus seems less widely distributed.

10. P. obtusifolius Mertens & Koch -- Like the last with

larger leaves and a more conspicuous midrib, whitish and about 0.5 mm wide towards the base. Leaves less than 1 dm long, rounded and mucronulate at tip, with a pair of bulging, marginal and translucent glands at base. Stipules rather conspicuous, 1-2 cm long, at least half as wide as the leaves, whitish and filmy, not disintegrating to fibers. First half of summer. Small ponds and quiet waters. -- (NF), NS, (NB)-Q-BC, US, Eur.

Our only known Manitoba (TRT) collection was originally reported as P. Friesii by Baldwin 1953 and Scoggan 1957.

11. P. epihydrus Raf. (var. Nuttallii (C. & S.) Fern.) -- Stem and petioles strongly flattened, about 4 times wider than thick. Leaves dimorphic, the submerged ones ribbon-like, distichous, 1-2 dm long and 5-10 mm wide. Achene with a narrow dorsal wing and concave sides. Mid summer. Mostly in lakes, rare: Lily Pond and other lakes in the southeast corner, then at The Pas and Denare Beach. -- Aka, L-SPM, NS-S, BC, US, (Eur).

12. P. alpinus Balbis var. subellipticus (Fern.) Ogden -- (var. tenuifolius (Raf.) Ogden) -- The whole plant tinged reddish-brown, growing in acid waters which are often also tinged red. Stem almost invariably simple. Leaves narrowly lanceolate, the upper gradually longer and commonly around 1 dm long, about twice as long as the lower. Upper leaves ± rounded at tip. Floating leaves usually lacking, if present shorter than the submerged leaves, ± oblanceolate, tapered to a petiole which is usually less than half as long as the blade. Body of the achene 3.0-3.5 mm long. Mid summer. Frequent in boggy creeks. -- G, K-Mack-(Y)-Aka, L-NF, NS-BC, US.

The typical phase is European and differs in a weak sort of a way by its smaller fruits and longer leaves. Body of the achene 2-3 mm long. Upper submerged leaves usually 1.2-1.5 dm long.

12X. P. alpinus X gramineus -- Has been reported from Churchill. -- (O-nMan).

13. P. amplifolius Tuck. -- Submerged leaves largest, conduplicate-falcate and petiolate, the upper 1-2 dm long, 3-5 cm wide, broadly lanceolate. Floating leaves often present, with a much longer petiole and rather like those of P. natans except for the finer and more numerous nerves. Stipules 5-12 cm long. Mid summer. Deeper lake waters at Bisset, Limestone Narrows, and possibly elsewhere. -- NF, NS, NB-eMan, BC, US.

The basis for the Saskatchewan reports by Breitung 1959 and Russell 1944, 1954 was a collection by O.C. Furness from Waskesiu Lake (SASK). It has been revised to P. natans.

13X. P. methyensis Ar. Benn. -- Hybrid of the following, possibly with the preceeding. Submerged leaves sessile, the upper about 2 dm long and 2 cm wide, flat and with 7-9 nerves,

the lower leaves gradually smaller down to about half. Stipules 3-6 cm long. Methye Portage. -- NS, S.

This unusual collection (CAN) looks like a hybrid of dubious parentage. P. gramineus could be one of the parents, but the other is less obvious. It might be P. amplifolius or P. illinoensis if either were known from the area around Methye Portage.

14. P. gramineus L. (var. graminifolius Fries; P. heterophyllus AA.) -- Leaves strongly dimorphic, the submerged ones light green, less than 1 cm wide and mostly around 5 cm long, the floating ones at least twice as broad. Stem rather thin, strongly contrasting the thick and short peduncle. Usually branchy, and often very much so, the leaves then dimegueth, the rameal ones being only half as long as the stem leaves. Mid summer. Stagnant waters. -- (G), K-Aka, L-SPM, NS-(PEI)-NB-BC, US, Eur.

P. illinoensis Morong (P. angustifolius AA.; P. lucens AA.) -- Rather similar to P. amplifolius but the leaves not quite so large, narrowly lanceolate, flat and with fewer nerves. Submerged leaves all sessile or the upper on a petiole usually under 2 cm long. Peduncle thickened and often very long. Late summer and early fall. Still waters, 2-3 m deep. -- sMack, (NS), Q-O, (BC), US, (CA).

This species was originally included in our text because of earlier Manitoba reports later discounted by Cody and Porsild in the Blue Jay 25: 28-29. 1967. An entry by Moss 1959 was merely speculative. While this species is not definitely known to occur in our area, its known distribution surrounds us in such a way that it appears likely to turn up in the eastern or northern parts. On a speculation we have retained it in the key and in the text, although unnumbered.

15. P. natans L. -- (Epi d'eau, Herbe à la Perchaude) -- Submerged leaves reduced to their petiole (0.5)-1.0-(2.5) dm long, the floating ones elliptic. Stem typically simple. Petioles longest, longer than the blades, becoming thinner, paler and a bit crooked in the last few millimeters near the junction with the blade. Stipules 4-10 cm long, pale and conspicuous. Leaves all or mostly subcordate at base. Summer. Quiet waters of muddy-bottomed lakes, up to 3 m deep. -- (G), sw-Mack, Aka, NF, NS-BC, US, (SA), Eur, (Afr, Oc).

16. P. praelongus Wulfen -- Leaves all submerged, the longer ones at least 1 dm long and shallowly cordate-clasping at base. Stem very light green to whitish, usually simple or nearly so. Leaves up to 2 dm long, lanceolate or narrower, crisp, rounded at tip. Peduncle usually 1-3 dm long. Early summer. Deeper (up to 5 m) lake waters. -- (G, swK)-Mack, (Aka, L-NF), NS-BC, US, (CA), Eur.

17. P. perfoliatus L. var. Richardsonii Benn. (P. Richardsonii (Benn.) Rydb.) -- Like the last with the leaves smaller, not over 1 dm long and deeply cordate clasping. Stem often branchy above and bearing many inflorescences. Stipules soon disintegrating into a group of whitish fibers. Leaves distichous, ± lanceolate and crisp-margined. Early summer. Common and ubiquitous submerged aquatic. -- Mack-Aka, L, NS, NB-BC, US.

In our variety the leaves are more elongate, commonly 5-10 cm long, ± lanceolate, broadest at the clasping base, gradually tapered to the acute tip, crisp-margined; stipules soon turning whitish and disintegrating to fibrous remnants. Grades imperceptibly into, and only arbitrarily separable from, the more eastern and Old World var. perfoliatus (including var. bupleuroides (Fern.) Farw.) with suborbicular to elliptic leaves 2-5 cm long, usually obtuse or rounded at tip, little if at all crisp-margined; stipules filmy and evanescent.

134. LILAEACEAE (LILAEA FAMILY)

Flower reduced to a single stamen and/or ovary. Fruit a single achene which arises from an ovary possibly unicarpellate or perhaps compound of 3 carpels.

1. LILAEA Humb. & Bonpl.

Some of the flowers subtended by a small appendage which is either a bract or a lone sepal. Flowers partly unisexual. Pistillate flowers of two kinds, those from the lower part of the spikes have sessile stigma, those from among the leaf bases have filiform styles longer than the leaf sheaths.

1. L. scilloides (Poiret) Haum. -- Inconspicuous and soft, pale green, tufted herb. up to 3 dm high. Leaf with a whitish sheath 2-5 cm long. Flowers mostly in greenish spikes borne on scapes about half as high as the leaves. Fruits from the basal flowers 3-pronged at summit. Summer. Mud of drying arroyos and shores; rare or overlooked. -- sS-sAlta-BC, wUS, (CA, SA).

We have seen Canadian specimens from Bélanger (DAO), Spring Valley (DAO), Trossachs (DAO, MT), Cypress Hills in Alberta (DAO), Manyberries (DAO, GH), Alberni (CAN, GH, UBC, V) and Pitt River (GH, UBC, V).

The relationships of this monotypic family are in much doubt. In a recent paper K. Larsen, Bot. Not. 119: 496-7. 1966, has given a plausible argument for placing it near Triglochin.

135. RUPPIACEAE (DITCH - GRASS FAMILY)

Perianth lacking. Carpels many, becoming very long stipitate at maturity.

1. RUPPIA L. DITCH - GRASS

Inflorescence a spike reduced to 2 flowers on a filiform rachis which elongates greatly. Flower of 2 stamens and of 4 or more carpels.

a. Leaves 1-2 dm long; sheaths 1.5-4.0 cm long ..... 2. R. occidentalis
aa. Leaves and sheaths shorter ..... 1. R. maritima

1. R. maritima L. -- Ditch-Grass, Widgeon-Grass (Persil d'eau, Rupelle) -- Carpel on a filiform stipe which elongates to 0.5-2.0 cm at maturity. Habitally similar to Potamogeton pusillus, with filiform leaves and stipular sheaths, but the leaf adnate to the sheath and the reduced inflorescences axillary. Peduncle of the inflorescence 1-5 cm long, rarely longer, little if at all coiled. Achene ovoid, about 2 mm long. Early summer. Alkaline slough at Mortlach and possibly also elsewhere. -- L-SPM, NS-O, S, wBC, US, (CA), Eur.

For our area we have been able to check the Mortlach (DAO) collection, but the Lestock (DAO) specimen reported by Russell 1937, 1944 and Breitung 1957 has been revised to R. occidentalis.

2. R. occidentalis Watson -- The filiform peduncle of the inflorescence well over 1 dm long and soon becoming spirally coiled, the numerous coils about 1 cm in diam. Stipe of the fruit 1-6 cm long. Early to mid summer. Alkaline sloughs, in shallow to deeper (2 m) water. -- Aka, sMan-S-(Alta-BC), US.

Order 78. NAIADALES

Perianth lacking, each flower subtended a sheath-like bract. Stamen solitary and the inconspicuous flower otherwise reduced to its bare essentials.

a. Carpels many; leaves not broader at the base ..... 135. Zannichelliacea
aa. Carpel solitary; leaves with a broadened base ..... 136. Naiadaceae

136. ZANNICHELLIACEAE (ZANNICHELLIA FAMILY)

Leaves opposite. Carpels usually 4.

1. ZANNICHELLIA L. HORNED PONDWEED

Perennial with axillary flowers.

1. Z. palustris L. -- Horned Pondweed (Alguette, Chenillée) -- Resembling Potamogeton pusillus with opposite leaves and

axillary flowers. Leaves filiform, less than 1 dm long. Achenes usually 4, oblanceolate; somewhat falcate. Early to mid summer. Quiet alkaline waters. -- seK, Aka, (NF), NS-BC, (US, SA), Eur, (Afr.).

137. NAIADACEAE (NAIAD FAMILY)

Very much reduced type: each flower reduced to either a single stamen or a single carpel containing a single ovule.

1. NAIAS L. NAIAD

Base of the flower enclosed in a tubular sheath.

1. N. flexilis (W.) Rostk. & Schmidt -- Submerged aquatic with opposite leaves, ribbon-like, but dilated at base into a broadly ovate blade. Annual, mostly around 1 dm long. Leaves 1 mm wide or less, finely serrulate. Fruit axillary, ellipsoid, with a filiform beak about half as long. Early summer. Rare or overlooked in freshwater lakes; a bottom dweller. -- NF, NS, NB-BC, US, Eur.

Rarely collected in Manitoba and Saskatchewan, and the few collections are very widely scattered. It could be a rare plant, but it is an inconspicuous bottom dweller and we speculate that it has been largely overlooked. First reported from our area by Macoun 1888 on the basis of a Fort Pitt (CAN) collection that we have checked in 1962. A second report in Can. Field-Nat. 45: 100. 1931 proved to be a typical hip-pocket specimen of some sterile herb from Hill Island Lake (CAN). It has been revised to Stellaria calycantha but the leaves are verticillate and Galium might be a better guess. A second collection is our own (DAO) in 1955 some 30 miles north of Candle Lake. These records were overlooked by Russell 1937, 1944, 1954 and Breitung 1957, but acknowledged by Boivin 1967. A more recent report by Argus 1968 from Big Sandy Lake has not been checked. From Manitoba we have seen only the two collections (DAO) reported by Scoggan 1957.

ARTIFICIAL KEY

This artificial key to the Monopsids is supplementary to the more or less natural keys that will be found at the beginning of the Folliculids (page 4) and of the Achenidae (page 169).

a. Very small plants, free floating in water and not rooted, normally sterile ..... 128. Lemnaceae, p. 162
aa. Plants anchored by a root system.
b. Leaves opposite or verticillate ..... Group A
bb. Alternate or all basal, rarely lacking.

c. Flowers with normal perianth present.
d. Ovary superior (or semi-inferior in Zygadenus) ..... Group B
dd. Inferior ..... Group C
cc. Perianth absent or reduced to a single petal or to some very small bracts or mere bristles or setae.
e. Nearly all terrestrial plants, the perianth lacking or insignifiant and replaced by scaly bracts or the whole inflorescence subtended by a large perianth-like bract ..... Group D
ee. Both perianth and bracts much reduced or lacking; nearly all submerged aquatics...Group E

Group A

Leaves opposite or verticillate.

a. Terrestrial with only 2 (opposite) or 3 (verticillate) large leaves.
b. With only 1 flower or the flowers few and umbellate ..... 119. Liliaceae, p. 7
bb. With a terminal raceme ..... 123. Orchidaceae, p. 25
aa. Submerged aquatics with numerous small leaves.
c. Leaves 3-10 cm long; carpels and achenes 2-4 ..... 136. Zannichelliaceae, p. 181
cc. Shorter leaves; fruit a single carpel or a compound ovary.
d. Perianth lacking; fruit a single carpel; leaves much enlarged at base.137. Naiadaceae, p. 182
dd. Normally sterile and the leaves of uniform width ..... 115. Hydrocharitaceae, p. 5

Group B

Herbs with normal and obvious flowers and a superior compound ovary.

a. Perianth small and chaffy ..... 124. Juncaceae, p. 40
aa. Perianth large or at least with one of the verticils petaloid.
b. Carpels free or nearly so.
c. Carpels numerous, maturing into so many achenes ..... 131. Alismataceae, p. 169
cc. Only 3-6 carpels.
d. Flowers in an umbel .... 114. Butomaceae, p. 4
dd. In a raceme.
e. Raceme bracted.116. Scheuchzeriaceae, p. 6
ee. Bractless ..... 118. Juncaginaceae, p. 7

bb. Carpels fused into a compound ovary.
f. Sepals green; petals blue.117. Commelinaceae, p. 6
ff. Sepals similar to the petals and more or less of the same color.
g. Leaves long, stiff and sharp-pointed, like so many bayonets ... 121. Agavaceae, p. 24
gg. Leaves mostly smaller and not spinescent ..... 119. Liliaceae, p. 7

Group C

Like Group A, but the ovary inferior.

a. Deeply submerged aquatic with long, flaccid ribbon-like leaves ..... 115. Hydrocharitaceae, p. 5
aa. Terrestrial with firm leaves.
b. Flowers strongly zygomorphic .. 123. Orchidaceae, p. 25
bb. Flowers regular.
c. Stamens 3; herbage glabrous.. 120. Iridaceae, p. 22
cc. Stamens 6; herbage villous ..... 122. Hypoxidaceae, p. 24

Group D

Flowers in dense spikes and closely wrapped or covered by one or more bracts or the whole spike when young partly wrapped into a ± enclosing bract (= spathe); nearly all terrestrial plants; fruit variable, but mostly of 2 or more fused carpels.

a. Individual flowers subtended by scally bracts.
b. Stem solid, mostly triangular .. 125. Cyperaceae, p. 55
bb. Hollow an cylindric; each floret subtended by a pair of opposite bracts ..... 126. Gramineae, p. 158
aa. Inflorescence very compact, subtended and often more or less surrounded by a bract.
c. Inflorescence of 2 or more globular heads ..... 129. Sparganiaceae, p. 164
cc. Flowers in a single spike.
d. Bract showy and persistent all summer ..... 127. Araceae, p. 161
dd. Deciduous at anthesis ..... 130. Typhaceae, p. 168

Group E

Perianth and bracts lacking or reduced to 4 minute sepals or a single petal. Fruit is usually a single achene, or else a group of not more than 6 achenes.

a. Leaves all basal ..... 134. Lilaeaceae, p. 180
aa. Stem leafy.

b. Inflorescence an emersed spike
..... 133. Potamogetonaceae, p. 173
bb. Inflorescence not a spike, often submerged.
c. Carpels 4, maturing into an umbel-
liform group of achenes .... 135. Ruppiaceae, p. 180
cc. Pistillate flower reduced to a
single carpel which remains
enclosed in the leaf sheath;
leaves larger ..... 132. Zosteraceae, p. 172

ADDENDA AND CORRIGENDA

Pages 3 and 4 -- The pagination in the key refers to the manuscript. The printed equivalents are as follows.

Achenidae 169	Juncales 797 = 40
Cyperales 808 = 55	Liliales 763 = 7
Graminales 879 = 158	Agavales 782 = 24
Arales 976 = 161	Page 4:
Typhales 980 = 163	Orchidales 783 = 25
Butomales 758 = 4	Iridales 780 = 22
Juncaginales 762 = 6	Haemodorales 783 = 24
Scheuchzeriales 761 = 6	Butomaceae 758 = 4
Commelinales 761 = 6	Hydrocharitaceae 759 = 5

Page 11, line 10 from the bottom -- For "1-2 mm" read "1-2 dm".

Pages 41 and 45 -- Juncus effusus L. is to be added as follows: On page 41, lines 4 and 5 from the bottom should be amended to read as follows:

cc. Inflorescence borne in the upper quarter.
d. Tepals (1.5)-2.0-3.0-(4.0) mm high ..... 7a. J. effusus
dd. Perianth larger, the tepals 4.0-6.0 mm
high ..... 8. J. arcticus

And on page 45 the following description should be added.

7a. J. EFFUSUS L. -- Soft Rush, Bog-Ruch (Jonc à mèches, Têtes de femme) -- Similar to the next, but coarser and forming dense tussocks, yet the flowers smaller. Stems (6)-8-10-(12) dm high, mostly 2-3 mm thick, stiffly erect, often more than 100 to a clump, clothed at base with brown and bladeless sheaths. Inflorescence compact to very lax, (1)-3-5-(10) dm long. Tepals mainly green, but the margin hyaline and usually with a submarginal line in reddish brown. Capsule small, 2 mm high, brown, usually overtopped by the perianth. First half of summer. Very wet places, mostly at the edge of ponds and streams; rare: Yellowhead Pass. -- (Aka), NF-(SPM), NS-O, swAlta-BC, US, (SA), Eur, (Afr, Oc).

The only known collection (DAO) was made in 1971 along an old road. Said roads runs on top of an abandoned railway grade built in the last century. We speculate that the clump of Juncus effusus was inadvertently introduced long ago with earth fill during the construction of the railway embankment.

Page 43 -- JUNCUS COMPRESSUS Jacq. -- Also at Mink River, Man. (Herb. Krivda) and North Pine River (Herb. Krivda), both collected by M.E. Tyler and presumably duplicated in the Brandon University herbarium.

Page 77 -- Carex sitchensis Prescott is to be inserted as follows in the key.

c. Scales exserted, being longer than the perigynia.
z. Lowermost spikelet (5)-8-(12) cm long and drooping on very long pedicels ..... 108a. C. sitchensis
zz. Lowermost spikelet ascending to erect and usually shorter.
d. Perigynia ...

Page 84 -- The key to group J is faulty, it should read as follows.

a. Terminal spike gynandrous ..... 88. C. misandra
aa. Staminate or androgynous.
b. Spikelets red brown, mostly over 1 cm long ..... 87. C. petricosa
bb. Spikelets black, mostly 1 cm long or shorter ..... 89. C. atrofusca

Page 146 -- Insert the following paragraph between C. aperta and C. aquatilis.

108a. C. sitchensis Prescott -- Very tall and coarse, its thin and drooping spikelets longest. Usually 1.0-1.5 m high and its deep brown base 1 cm thick or more. Coarsely and deeply stoloniferous. Main leaves (2)-4-6-(8) mm wide, its sheath more or less tinged in red on the ventral side. Inflorescence 2-3 dm long, overtopped by the lowest bract. Spikelets 5-8, of which the upper 2 or 3 are usually staminate, the lowermost strikingly thin and long, becoming moniliform towards the base. Scales broadly lanceolate, somewhat narrower and about half longer than the perigynia, the latter much as in C. aquatilis for size, shape, lack of ventral or dorsal nerves and the mere suggestion of a stipe, about 0.1 mm long. First half of summer. Marshy flats along crecks and around lakes. Cavell Lake. -- sAka, wcAlta-BC, wUS.

Page 142, line 26 -- For "narrowly lanceolate", read "broadly lanceolate".

Page 145 -- The following hybrid was recently detected among specimens formerly filed (DAO) with C. halophila.

103X. C. ungavensis Lep. -- Hybrid of C. Bigelowii X C. salina. About 3 dm, rather coarse and generally similar to C. Bigelowii, but the spikelets longer and the achene sometimes notched. Plant base not deeply rooted and deep red brown at base. Bracts much overtopping the inflorescence. Staminate spikelet mostly 2-3 cm, the pistillate ones mostly 3-4 cm long. Scales blackish with a thin paler midnerve. Churchill. -- (G, L), Q-nMan.

Page 145 -- Carex lenticularis Mx. has been confirmed (DAO) for northeastern Alberta. At GH all BC specimens were revised to C. Kelloggii. We are now inclined to think that the western limit of C. lenticularis is roughly coincident with that of the precambrian outcrops.

Page 146 -- Carex nebraskensis Dewey -- A collection from Morley, Alberta cited as C. Jamesii by Macoun 1888 has been located at GH; the inflation of some of the perigynia was obviously caused by a parasite and the specimen has been revised to C. aquatilis Wahl.

Pages 148-9 -- Carex salina Wahl. -- Both varieties described appear to belong in our area. Some Churchill (DAO) collections have been checked as var. salina, others as var. subspathacea. A Drummond collection (GH) of var. salina probably comes from York Factory. This last collection is labelled "Cumberland House's and Hudson's Bay", but no doubt came from the Hudson Bay coast and presumably from York Factory. Var. salina is also represented from Churchill in the Krivda herbarium.

Some intermediates between C. aquatilis and C. salina occur in our area and elsewhere and some of these could be of hybrid origin. They may be filed as X C. halophila Nyl. and will comprise on the one hand larger plants with most of the characters of C. salina, but with grooved achenes, on the other hand smaller plants with the appearance of C. salina, but the achenes lacking a groove.

The distinction of C. aquatilis vs. C. salina var. salina is usually simple enough because of difference in habitat and because C. aquatilis is often taller (salina: 2-4-(6) dm), its leaves often wider (salina: 1-3 mm), its inflorescence usually longer (salina: 6-15 cm, excluding the bracts), its spikelets commonly longer (salina: 1-2-(3) cm), its scales light brown to

purple-black (salina: deep brown to blackish). But smallish specimens of C. aquatilis do not stand out clearly from the run-of-the-mill C. salina var. salina. Positive identification of C. salina requires liberating a mature seed (not always easy and not always mature) to check for the presence of a groove or notch. On occasion the groove may be shallow and some inflorescences may carry a mixture of grooved and ungrooved achenes.

CONTENTS OF PART IV

INDEX OF GENERA IN PART IV

PROVANCHERIA

1. Dédicace: L'abbé L. Provancher, 1820-1892. — L. Cinq-Mars.

   L'Herbier de l'avenir. — Louis-Marie Lalonde, o.c.s.o.

   Mise au point sur les Violettes (*Viola* spp.) du Québec.
   — L. Cinq-Mars.

2. Flora of the Prairie Provinces. Part 1. — B. Boivin.

3. Flora of the Prairie Provinces. Part 2. — B. Boivin.

4. Flora of the Prairie Provinces. Part 3. — B. Boivin.

5. Flora of the Prairie Provinces. Part 4. — B. Boivin.

6. Enumération des plantes du Canada. — B. Boivin.

7. La flore vasculaire du golfe de Richmond,
   baie d'Hudson, Nouveau-Québec. — S. Payette et E. Lepage.

8. La flore vasculaire de la région du lac Minto,
   Nouveau-Québec. — S. Payette, A. Légère et R. Gauthier.

9. La flore du Canada en 1708. — B. Boivin.