

Key to the *Carex* Species of
Newfoundland by
Vegetative Characteristics

by

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Abstract

This key differentiates 70 species of *Carex* native to the forests, barrens and bogs of Newfoundland, based entirely on descriptions of vegetative characteristics. It contains all species normally encountered on the island. Not included are a few rare species with a very restricted range on Newfoundland and all the species of salt marshes with the exception of *Carex paleacea* Wahlenb.

Resumé

Cette clef établit la distinction entre 70 espèces de *Carex* indigènes des forêts, des landes et des fondrières de Terre-Neuve, uniquement d'après leurs caractéristiques végétatives. Elle mentionne toutes les espèces qui croissent ordinairement dans l'île. Sont excluse de la clef quelques espèces rares dont la distribution est très restreinte dans Terre-Neuve et toutes les espèces qui ne se trouvent que dans les salines, sauf le *Carex paleacea* Wahlenb.

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Key to the *Carex* Species of Newfoundland by Vegetative Characteristics¹

by

A. W. H. Damman²

Introduction

In describing vegetation it is sometimes necessary to identify species which are not flowering. With a little experience it is not difficult to recognize most herbs and shrubs in the vegetative condition, but grasses and sedges present more difficulties in this respect. It is impossible, using available manuals, to identify sedges in the vegetative condition, and indeed it is often difficult to identify them even when they are flowering or fruiting but do not yet have mature perigynia.

The genus *Carex* includes a large number of species whose ecology and geographical distribution varies greatly; owing to their specialized ecological requirements, some are valuable indicator species with respect to climate or soils, whereas others are ubiquitous. Valuable information about site conditions is ignored if in plant ecological studies, the sedges are not taken into account simply because they do not happen to be in the condition that allows identification. This key was compiled to provide a means of identifying *Carex* species by vegetative characteristics. It should be kept in mind that fruiting material can be identified more reliably with an ordinary botanical manual, and it is advisable to use such a manual whenever the appropriate material is at hand.

In 1952, Neumann³ published a key to the German *Carex* species based on vegetative characteristics only. He used a

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³Neumann, A. 1952. Vorläufiger Bestimmungsschlüssel für *Carex*-arten Nordwestdeutschlands in blütenlosen Zustände. Mitt. Flor.-Soz. Arb. Gemeinschaft., NF-3, pp. 44-77.

number of characteristics, such as shape of margin and the fraying and tearing of the sheaths, which have also been used in the present work.

This present key allows identification of 70 species, the majority of which were collected and described during the course of vegetation studies in the forests of Newfoundland in the summers of 1957 to 1959. A few rare species which could not be collected during this period were described from areas outside the island of Newfoundland. Although the key is not complete, it deals with all species which one can expect to find in the forests, bogs and barrens of Newfoundland and it also includes several rare species. Not included are a few species restricted to the sub-arctic bogs and barrens of the Northern Peninsula and all those of the salt marshes, with the exception of *Carex paleacea*.

The key is dichotomous consisting of a series of paired and contrasting statements. After deciding which of the characteristics mentioned applies to the specimen, one should proceed to the number following this statement and continue in this way until a species name is reached.

The author wishes to express his gratitude to Dr. E. Rouleau of the Institut Botanique, Université de Montréal, who supplied valuable information on the distribution of several species on the island of Newfoundland, and to Dr. A. E. Porsild of the National Museum, who supplied valuable criticism on the draft of this publication.

Description and Explanation of the Terms Used in the Key



It should be stressed here that in order to use the key it is necessary to collect complete specimens, as the underground parts are often necessary for a definite identification. The characteristics can best be seen on fresh material. It is often difficult to recognize the original colour of the leaves in herbarium specimens, when the green and greyish-green colours are especially difficult to separate. Also, lustrous leaves usually become dull after drying, and it is not easy to reconstruct the original folding of the leaves after the sedges are pressed.

Leaves


The colour of the leaves is usually green or greyish-green but several sedges have yellow-green leaves (*Carex flava*, *C. folliculata*), and glaucous leaves occur in a few species (*C. livida*,

C. panicea). The leaves of species with greyish-green leaves are almost without exception dull, although in some species the older leaves may become lustrous. The sedges with glaucous leaves and practically all those with greyish-green leaves are species of open habitats; the species with green leaves occur both on open and shaded sites, although dark green species are normally forest species.

An important characteristic is the folding of the leaves. Two types are recognized:

- a) Plicate leaves—Once folded, longitudinally channelled leaves; cross section: 
- b) Double-folded leaves—Twice folded, longitudinally channelled leaves; cross section: 

In addition the following leaf shapes were distinguished.

- c) Gutter-shaped leaves—Longitudinally channelled but not folded; cross section: 
- d) Involute leaves—Very narrow, longitudinally channelled leaves with the leaf margin rolled inward; cross section:



- e) Bristle-like leaves—Very narrow leaves, rounded or triangular in cross section, and only very slightly or not at all longitudinally channelled; cross section:



The first two types are the common leaf shapes of most sedges. Gutter-shaped leaves are restricted to species with obtusely angled culms found only in a rather small number of species (e.g. *C. saxatilis*); involute leaves are also restricted to few species (e.g. *C. lasiocarpa*). The bristle-like leaves can be long and wire-like (e.g. *C. exilis*) or short and awl-shaped (e.g. *C. microglochin*). In addition, revolute leaves are mentioned in the key; these do not occur in fresh material, but in some species (e.g. *C. bigelowii*) the leaves become revolute—the margin rolls outward—when they are dried.

The folding—most distinctly seen in young leaves—may become less distinct with age, although in most species it can be discerned even in the dead leaves. Usually flat leaves have originally been folded. There are a number of species in which the folding is not very clear or in which it changes during the vegetation season; for instance the plicate leaves of *C. rostrata* become almost double-folded in late summer. For such species the folding of the leaves has not been used in the key.

The roughness of the leaf margin is a useful characteristic which can best be detected with the lips. The margins of older leaves are, as a rule, less scabrous than those of young leaves. In almost all species the margin feels scabrous downward (with fine ascending teeth) in the upper half or near the leaf tip, and smooth below the middle of the leaf, but in some species the margin is scabrous to the very base (e.g. *C. vesicaria*). The leaf margin can also be upwardly (retroscaly) scabrous in the basal part, a character of special indicative value since it occurs in only a few species. In North America it was found only in the sub-section *Laxiflorae* of which *C. leptonevia* is the sole representative in Newfoundland.

The leaves of some species are contracted into an acicular leaf tip of varying length; the long acicular leaf tip is a good key characteristic. Auricles at the leaf base are rare; *C. silicea* is the only Newfoundland species having them.

The width of the leaves mentioned in the key is that of the basal leaves or the leaves of sterile shoots. It should always be measured in the lower one-third of the leaf.

Ligule

The ligule is a projection of the sheath above the base of the leaf blade; it is usually transparent or milky white. In grasses the ligule is as a rule well-developed and distinct; in contrast to this the ligule of sedges is usually only a very low rim on the base of the blade. There are three characteristics of the ligule which have been used: a) length, b) colour, and c) mark left by the ligule on the leaf base. In the key this mark of the ligule on the base of the blade is also referred to as "ligule" and the following shapes are recognized: 1) longer than broad; 2) as long as broad; 3) broader than long; 4) straight; 5) concave (See Figure 1).

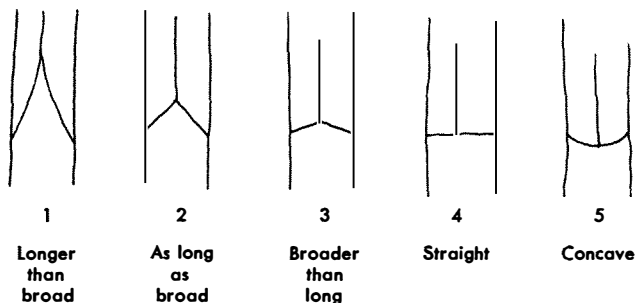


Figure 1. Various shapes of ligulae

The tip of the ligule may be either rounded or angled. A concave ligule is often found on the lowermost leaves of species which normally have a broader than long or straight ligule. The ligule of a species usually covers a range of shapes and in few species is only one type represented. The shape of the ligule should always be studied on vegetative shoots and not on the flowering culms. The ligules of the leaves on the culms belong almost without exception to shapes 3 and 4 (See Figure 1).

Sheaths

Most of the characteristics of the sheaths are concentrated on the inner (ventral) band. Normally, this inner band is hyaline, but in some species it is only partly hyaline and here it is a reliable characteristic. For instance, *C. scoparia* and *C. projecta* have an inner band which is hyaline in the upper part only and in *C. aenea* a hyaline ribbon occurs in the centre of the inner band. Cross-puckering of the inner band can be seen in *C. vulpinoidea* and *C. stipata*, and distinct brown dots occur on the hyaline inner band of *C. diandra*.

The summit of the inner band can be straight, concave, V-shaped, or prolonged (See Figure 2). Sometimes this character may be difficult to see, for in many species the fragile inner band is torn on all older sheaths. Usually there are some younger sheaths in a tussock which show the characteristic of the summit of the inner band.

The inner band tears in two ways. Most common is a simple tearing; it is found in almost all sedges with brown basal sheaths.

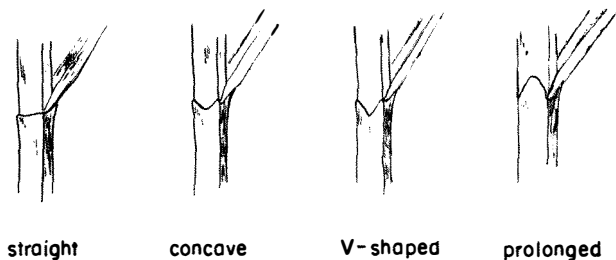


Figure 2. Various shapes of summit of hyaline innerband

In other species the hyaline inner band frays when it becomes older and leaves a peculiar ladder-like pattern (See Figure 3). Sheaths of this type have been called 'ladder-fibrillose' in the key. Ladder-fibrillose sheaths occur in many species with red basal sheaths and in a few with brown basal sheaths; this characteristic is very pronounced in *C. lacustris* and *C. buxbaumii*. The characteristic can best be observed and is usually present only on the old sheaths. Sometimes the ladder-like pattern can be produced artificially by cautiously tearing the inner band.

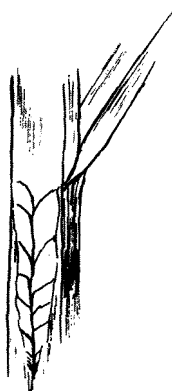


Figure 3. Ladder-fibrillose sheath

Basal Sheaths

The colour of the basal sheaths, usually a very obvious characteristic, varies from yellow-brown and brown to bright red and purple.

There is a great deal of variation in the degree of decomposition of the basal sheaths and bracts. In some species the decomposition commences early and few old sheaths or none are found at the base (e.g. *C. leptonevia*). In other species the decomposition proceeds very slowly (e.g. *C. bigelowii*, *C. lasiocarpa*). Sometimes persistent fibrillose remnants occur as hair-like bristles at the base after decomposition of the basal sheaths (e.g. *C. stipata*).

Underground Parts

The sedges can be conveniently divided into cespitose species and species with stolons and rhizomes. Although this seems a clear distinction, it is often necessary to observe the plants closely since some stoloniferous species are apparently cespitose and many matted species are stoloniferous. The following types have been recognized:

- a) Cespitose species without stolons (e.g. *C. arctata*, *C. lenticularis*).
- b) Stoloniferous species often forming clumps or mats (e.g. *C. deflexa*, *C. disperma*)
- c) Shoots arising in small clumps from a creeping rhizome (e.g. *C. rostrata*, *C. lasiocarpa*).
- d) Shoots arising singly from a creeping rhizome (e.g. *C. bigelowii*, *C. livida*).

The species belonging to the last group have been divided into those with sympodial rhizomes (*C. bigelowii*) and those with monopodial rhizomes (*C. houghtonii*) (See Figures 4 and 5).

Growth Habit

The leaves of many cespitose sedges spread from the base, and consequently the culms arise from a rosette of basal leaves (e.g. *C. trisperma*, *C. pedunculata*, *C. leptonevia*, *C. arctata*). However not all cespitose species have basal leaves. Species with long leaf sheaths such as *C. cephalantha*, *C. scoparia* and *C. michauxiana* have their leaves arranged along the culms or culm-like sterile shoots, whereas true basal leaves are absent. This lifeform, often with very few sterile shoots in the tussocks, is particularly common in the sub-sections *Multiflorae*, *Paniculatae*, *Stellulatae* and *Ovales*. Figures 6 and 7 illustrate these two types: with and



Figure 4. Sedge with creeping sympodial rhizome; shoots develop at tip of rhizome and a lateral bud grows out to form the continuation of the rhizome



Figure 5. Sedge with creeping monopodial rhizome; shoots develop from lateral buds and the terminal bud produces always the continuation of the rhizome. Note difference in rooting habit between species with sympodial and monopodial rhizomes



Figure 6. Sedge without basal leaves (*C. stipata*)



Figure 7. Sedge with a rosette of basal leaves (*C. arctata*)

without basal leaves. Although the types are most pronounced in cespitose species, they can also be recognized in species with creeping rhizomes: *C. scirpoidea*, *C. livida* and *C. bigelowii* are good examples of species with basal leaves, whereas *C. rostrata*, *C. chordorrhiza*, and *C. oligosperma* are good illustrations of species without basal leaves.

The leaves of some sedges are strictly seasonal, whereas those of others remain green in winter and do not die until the next vegetative season. This is a useful characteristic in spring and fall for some species. Winter-green species can usually be recognized in summer since they produce shoots throughout the summer and thus each tussock contains shoots of uneven size and age, whereas summer-green species have even-aged shoots of approximately equal size (Neumann¹ 1952).

Habitat

The sites on which a species normally can be found are indicated for each species. Most of the habitat terms used are self-explanatory. Only the terms bog, marsh, fen and alder swamp need some further definition since there is no generally accepted usage for these words. In this publication the following meaning has been attached to these terms.

Bog—Wet, extremely nutrient-poor organic site with a vegetation in which *Sphagnum* species play a very important role, and the remains of which make up the major part of the organic horizon. It can be conveniently divided into three types. *Carex* species are frequent only in the last type.

Dwarf shrub bog—relatively dry bog, covered with ericaceous dwarf shrubs and *Sphagnum* species.

Oligotrophic bog—wet, extremely nutrient-poor bog, often ombrotrophic (depending on the precipitation for its growth); dominated by *Sphagnum* species.

Mesotrophic bog—wet, moderately nutrient-poor to poor; *Sphagnum* species abundant but higher plants help to determine the physiognomy of the vegetation. Parts of bog influenced by somewhat richer water. Characteristic sites are: bog borders, surroundings of drainage channels in bogs, and shallow bogs.

¹See footnote 3.

Fen—Meadow-like vegetation, dominated by low sedges; on moderately-rich and rich, wet sites. Sphagnum species normally play a subordinate role or are absent, whereas *Campylium polygamum*, *C. stellatum*, *Scorpidium scorpioides* and *Drepanocladus* spp. are abundant. Two main types are recognized:

Mesotrophic fen—Moderately nutrient-poor fen; greyish-green sedges are predominant, and Sphagnum species occur frequently.

Eutrophic fen—Nutrient-rich fen; green sedges predominate. Sphagnum species are absent and many more exacting species occur. Usually on sites with nutrient-rich telluric ground water.

Marsh—Usually rich sites covered with a high vegetation of sedges and grasses; vegetation of periodically flooded alluvial soils or shore vegetation of nutrient-rich ponds and lakes. A relatively rare habitat in Newfoundland.

Alder Swamp—Vegetation of wet, nutrient-rich, often mucky soils, dominated by alders (*Alnus rugosa*). The nutrient-poorer alder swamps with abundant black spruce and poorly growing alder shrubs have been separated as *mesotrophic alder swamps*. They often occur at bog borders influenced by seepage water.

— Key to the Carex Species

Key Number	Key References
1. Fresh leaves involute, bristle-like or wiry.....	2
— Fresh leaves flat, plicate or double-folded.....	8
2. Plants stoloniferous or with creeping rhizomes.....	3
— Plants densely caespitose without stolons or rhizomes. Leaves bristly, stiffly ascending, dark green, scabrous-margined to close to base, usually up to 20 cm. long. Basal part of leaves with transverse nerves. In habit somewhat resembling <i>Eriophorum spissum</i> . Medium-size sedge of oligotrophic and mesotrophic bogs, sometimes a single poorly growing specimen in dwarf shrub bogs. Common.	
<i>Carex exilis</i> Dew.	
N.B. Very small sedge with plicate to somewhat bristle-like leaves; see <i>C. terrae-novae</i> (27).	
3. Medium to large sedges with long, stiff and wiry leaves, tufted from creeping rhizomes. Upper leaf surface with hyaline ribbon. Leaves septate.....	4
— Very small sedges with soft, flexible leaves without hyaline ribbon.....	5
4. Basal sheaths strongly red coloured with some dark brown sheaths at very base. Sheaths conspicuously ladder-fibrillose and with prominent transverse nerves. Leaves <i>keeled</i> , stiff and long, sometimes up to 65 cm., margin downwardly scabrous in upper part only, hyaline ribbon restricted to lower half of upper leaf surface. Roots white to drab brown, less than 1 mm. thick. Medium to large sedges of open mesotrophic bogs and fens and along ponds and brooks in peaty areas. Common.	
<i>Carex lasiocarpa</i> Ehrh.	
— Basal sheaths drab brown, sometimes slightly reddish tinged. Sheaths slightly ladder-fibrillose, outside of sheaths with inconspicuous transverse nerves. Leaves <i>not keeled</i> , 40-50 cm. long, margin downwardly scabrous to base, clear hyaline ribbon on most of upper leaf surface. Roots yellow to rust brown, 1-2 mm. thick. Medium-size sedge of oligotrophic and mesotrophic bogs. Common.	
<i>Carex oligosperma</i> Michx.	

5. Shoots singly or few from filiform stolons; never apparently caespitose..... 6
- Tufted from creeping rhizomes; tufts close together and therefore apparently caespitose. Leaves soft, 0.3-0.7 mm. wide, up to 11 cm. long (usually 6-9 cm.), margin downward scabrous in upper half only. Outside of sheath hyaline with pale green nerves. Moist to dry, usually calcareous, rocky ledges, gravel, etc. Fairly rare; known only from western Newfoundland and Baie Verte Peninsula.

Carex eburnea Boott

6. Sedges with more than two leaves, no living bladeless sheaths at base..... 7
- Sedge with one or two cauline leaves (very rarely three), basal leaves absent. Lowermost sheaths bladeless. Lower leaf approx. 2 cm., upper leaf 7-9 cm. long. Leaves often not setaceous, but plicate or flat, 1.0-1.6 mm. wide. Summit of hyaline band of sheath concave. Oligotrophic and mesotrophic bogs, but not in ombrotrophic bog centres. Common.

Carex pauciflora Lightf.

7. Culine leaves present. Leaves soft, loosely hanging, less than 1 mm. wide, up to 15 cm. long, upper 1/3-2/3 acicular. Mesotrophic bogs and fens; sometimes in mesotrophic alder swamps. Common.

Carex gynocrates Wormsk.

- Only basal leaves present. Leaves stiff and ascending, less than 1 mm. wide, up to 10 cm. long. Pioneer species on moist, calcareous soil; tolerates frequent disturbances by frost action. Sub-arctic species, restricted to northern section of Northern Peninsula.

Carex microglochis Wahlenb.

8. Basal sheaths reddish or purplish coloured..... 9
- Basal sheaths all brownish coloured..... 32
9. Leaves glabrous on both surfaces..... 10
- Leaves and sheaths densely pubescent; especially young leaves velvety to touch. Leaves green,

double-folded, 3-6 mm. wide, up to 23 cm. long. Sheaths not ladder-fibrillose. Loosely cespitose, medium-size sedge of moist, rich sites. Fairly common.

Carex castanea Wahlenb.

N.B. Leaves pubescent below only: see *C. pallescens* (49) which has very rarely some reddish basal sheaths.

- | | | |
|-----|---|----|
| 10. | Leaves greyish green, usually opaque; older leaves in a few species green and lustrous..... | 11 |
| — | Leaves green or yellow green..... | 18 |
| 11. | Sheaths very obviously ladder-fibrillose. Basal sheaths bright red or purple. Ligule always sharp angled and longer than broad..... | 12 |
| — | Sheaths not ladder-fibrillose or only slightly so.... | 13 |
| 12. | Very large sedge. Leaves and sheaths septate upon drying. Leaves double-folded, 6-15 mm. wide, sometimes over 100 cm. long, dull on both sides, scabrous-margined to base. Basal sheaths purple red. Rhizomes far creeping. Rich, wet sites, often forming zones along shores of beaver ponds and swamps. Very rare, known only from Harry's River in western Newfoundland. | |

Carex lacustris Willd.

- | | | |
|---|---|--|
| — | Medium-size sedge. Leaves and sheaths not septate upon drying. Leaves plicate to double-folded 1.5-5 mm. wide, usually about 15 cm. long, very scabrous-margined above the middle, upper leaf surface of older leaves often green and shiny. Basal sheaths red. Rhizomes not far creeping, often several from each tuft. Fens, open mesotrophic alder swamps, and occasionally in mesotrophic bogs. Common. | |
|---|---|--|

Carex buxbaumii Wahlenb.

- | | | |
|-----|---|----|
| 13. | Cespitose, medium to large species..... | 14 |
| — | Stoloniferous, small to medium-size species..... | 15 |
| 14. | Loosely cespitose; basal sheaths lustrous, dark red. Roots light brown to almost white, smooth. Leaves double-folded, 3.5-7.0 mm. wide, mostly 20-30 cm. long, contracted into short, not always obvious, acicular tip, margin scabrous to below middle and at very base. Medium-size sedge of rich, moist forests. Known only from the Northern Peninsula, north-central, and western Newfoundland. Fairly rare. | |

Carex atratiformis Britt.

- In dense tussocks or stools; basal sheath lustrous dark brown to reddish brown; inner basal sheaths dull, yellow-brown, often with pinkish tinge. Roots yellow, felty, leaves double-folded, 4-12 mm. wide, often over 40 cm. long, both leaf surfaces and margin very scabrous to or close to base; older leaves almost green above. Large sedge of rich, moist to wet sites. (See also 34.) Fairly common.
Carex crinita Lam.
15. Leaves plicate or gutter-shaped. Roots never felty. Sedges with creeping cord-like stolons; ligule slightly longer than broad to broader than long..... 16
- Leaves double-folded to flat, at least some clearly double-folded leaves present. Roots felty; ligule much longer than broad, sharp-angled..... 17
16. Outer basal sheaths brown, persistent, not fibrillose, inner basal sheaths red. Tufted from creeping cord-like rhizomes with brown or sometimes purplish bracts. Leaves plicate to gutter-shaped, 2.5-8 mm. wide, up to 30 or 40 cm. long, margin only slightly scabrous. Medium to large sedge of marshes, pond margins and shallow pools. Occasional, locally very common.
Carex aquatilis Wahlenb.
- Basal sheaths red, extremely persistent, somewhat fibrillose. Tufted or singly from creeping, sympodial rhizomes with persistent reddish bracts. Leaves soft, plicate, 2.0-4.5 mm. wide, usually 4-11 cm. long, revolute when dried, margin scabrous near very tip only. The very persistent rhizomes and basal parts of the tufts can still be found many years after the plant has died. Culms from previous year often still present. Small sedge of subarctic, arctic and exposed maritime barrens. Fairly common.
Carex bigelowii Torr.
17. Basal sheaths light brown, often pinkish tinged, bracts at very base of shoots lustrous, red to reddish brown. In small clumps, usually of 3 to 6 shoots, from short rhizomes. Leaves 2.5-4 mm. wide, usually about 25 cm. long, margin smooth except near leaf top. Roots yellow, conspicuously felty. Medium-size sedge of bog borders and mesotrophic alder swamps. Common.
Carex paupercula Michx.

- Basal sheaths and bracts reddish black to purple, lustrous. Singly or in small tufts of 2 to 3 shoots from sympodial forking rhizomes. Leaves 1.0-2.5 mm. wide, 5-25 cm. long, usually about 12 cm., margin very scabrous in upper half. Roots only slightly felty. Small to medium-size sedge of peaty barrens and borders of bogs at higher elevations. Fairly rare.

Carex rariflora (Wahlenb.) Sm.

N.B. The inner basal sheaths of *C. limosa* (40) are sometimes reddish, and then this species may be sought here; it is clearly characterized by thick stolons, covered with dead, dark brown leaves, which often creep over the bog surface.

18. Hyaline inner band of sheath glabrous..... 19

- Hyaline inner band of sheath puberulent near concave summit. Leaves plicate or double-folded, 1.0-2.5 mm. wide, up to 13 cm. long, lustrous on both sides, margin downward very scabrous in upper half. Sheaths slightly ladder-fibrillose. Rhizome sympodial, segments between shoots short, plants sometimes loosely cespitose, especially on richer sites. Dry, rocky barrens and serpentine areas but also occasionally on moist, gravelly river banks. Fairly common.

Carex scirpoidea Michx.

19. Species with rhizomes or stolons..... 20

- Cespitose species..... 24

20. Stems not spongy at base. Basal sheaths clearly reddish coloured. Medium and small sedges..... 21

- Stems spongy at base. Large sedge; shoots in tufts, or sometimes singly, arising at large intervals from a creeping rhizome. Leaves plicate to slightly double-folded, 2-12 mm. wide, 30-60 cm. and longer, with acicular tip. Basal part of leaf blades and outside of sheaths with conspicuous transverse nerves. Inner basal sheaths often pinkish tinged, outer basal sheaths persistent, dark brown. Sedge of mesotrophic to eutrophic, wet sites; marshes, shallow water and fens; poorly growing specimens in mesotrophic bogs and shaded places. (See also 43.) Common.

Carex rostrata Stokes

21. Rhizomes sympodial, segments between shoots short, rarely exceeding 5 cm..... 22
- Extensively creeping with small tufts of leaves from slender, prolonged, monopodial rhizomes; rhizome segments between shoots at least 7 cm. and often much more. Leaves double-folded to often flat, soft, 2.0-8.0 mm. wide, margin downwardly scabrous but smooth at base. Sheaths slightly ladder-fibrillose. Medium-size sedge of dry, sandy soils. Rare.

Carex houghtonii Torr.

22. True basal leaves present. Leaves plicate or double-folded. Small sedges of dry to moist sites.. 23
- Sedge with long leaf sheaths, and without basal leaves. Leaves gutter-shaped, sometimes involute, 1.5-4.0 mm. wide, usually 20-30 cm. long with acicular tip often exceeding 2 cm., margin downwardly scabrous to base. Rhizome segments between shoots very short. Sheaths slightly ladder-fibrillose. Medium-size sedge of wet, sandy or gravelly sites; river banks, lake shores, occasionally on peaty soils. Common.

Carex saxatilis L.

23. Small and tender sedge; stoloniferous often forming mats, occasionally in small, dense tussocks. Leaves light green, soft, plicate to flat, 1.0-1.5 mm. wide, 5-11 cm. long. Sheaths ladder-fibrillose, outside of blade-bearing sheaths often red at base. Basal sheaths decompose easily. Variety of sites, but not on wet soils. Common.

Carex deflexa Hornem.

- Small and stiff sedge with sympodial creeping rhizome, never forming mats. Leaves dark green, 1.0-3.0 mm. wide, usually about 6 cm. long. Sheaths ladder-fibrillose, outside of blade-bearing sheaths not red. Basal sheaths red to purple, persistent, slightly fibrillose. Polymorphic species; this form, without the pubescence on the inner band (*see* 18), has been found only on dry barrens.

Carex scirpoidea Michx.

Key Number		Key References
24.	Lower blade-bearing sheaths not red at base.....	25
—	Lower blade-bearing sheaths red to purple at base, outside of sheaths with red nerves. Basal leaves very abundant, dark green, winter-green, dull on upper leaf surface, 2-5 mm. wide, up to 25 cm. long, young leaves yellow-green. Basal sheaths lustrous purple, not ladder-fibrillose. Loosely cespitose species of rich, moist forests. Occasional. <i>Carex pedunculata</i> Muhl.	
	N.B. <i>C. deflexa</i> (23) is sometimes cespitose; it is easily distinguished by the narrow, soft, light green leaves.	
25.	Leaves plicate to flat or gutter-shaped.....	26
—	Leaves clearly double-folded.....	28
26.	Leaves narrow, less than 1.5 mm. wide. Small sedges of dry to wet sites.....	27
—	Leaves 2-5 mm. wide, lustrous green on both sides, plicate to gutter-shaped. Densely cespitose, medium to large sedge of river banks, shores and rich meadows. Rare. <i>Carex lanuginosa</i> Michx.	
	N.B. Somewhat cespitose forms of <i>C. saxatilis</i> var. <i>miliaris</i> (22) sometimes occur on peaty soils and may then be sought here.	
27.	Leaves plicate to bristle-like, 0.5-1.2 mm. wide, 2-4 cm. long, with acicular tip 1.0-1.5 cm. long, margin downward slightly scabrous to base. Very small sedge often with tufts of persistent, dead sheaths at base. Dry, calcareous barrens, restricted to western Newfoundland. <i>Carex terrae-novae</i> Fern.	
—	Leaves plicate to gutter-shaped, 0.8-1.2 mm. wide, usually over 15 cm. long, lower leaf surface with white nerves. Peat bogs; sub-arctic species, restricted to extreme northern part of Northern Peninsula. <i>Carex capitata</i> L.	
28.	Leaves at most 9 mm. wide; leaves narrower than 6 mm. always present.....	29
—	Leaves double-folded, 6-13 mm. wide, lustrous at both sides, margin downwardly scabrous but smooth at base or smooth throughout. Ligule	

longer than broad to as long as broad. Basal sheaths lustrous, purplish red. Plants of rich moist forests growing in dense tufts without stolons or rhizomes. Fairly rare.

Carex arctata Boott

N.B. *C. crinita* (14) has somewhat greyish green leaves with very scabrous margin to base, only slightly reddish coloured basal sheaths and felty roots.

29. Upper leaf surface puberulent near ligule (lens!), at least that of the younger leaves. Plants of rich, moist and shaded sites..... 30
- Upper leaf surface glabrous throughout. Plants of rich and wet sites..... 31
30. Densely caespitose without short rhizomes. Leaves 2-7 mm. wide, up to 25 cm. long, margin downwardly scabrous often to or near to base. Summit of hyaline inner band of sheath V-shaped. Basal sheaths dull red. Medium-size sedge of rich alder swamps and forests. Occasional.

Carex debilis Michx.

- In loose tussocks with very short rhizome segments. Leaves 4-9 mm. wide, usually approx. 20 cm. long, margin downwardly scabrous in upper half. Hyaline inner band straight at summit. Basal sheaths dull, dark purple. Medium-size sedge of rich alder swamps, meadows and forests. Fairly common.

Carex gracillima Schw.

N.B. These two species show much resemblance in vegetative characteristics and preferred habitats. However, *C. debilis* is a much more slender sedge than *C. gracillima*. The best distinguishing characteristics are the summit of the hyaline inner band and the colour of the basal sheaths. Remnants of culms of previous year may also help to distinguish between these two species.

31. Ligule broader than long to as long as broad usually rounded at top, culms rounded and smooth at base. Leaves 2.5-8.0 mm. wide, mostly 20-28 cm. long, margin sometimes downwardly scabrous to base but usually smooth at base. Sometimes not all shoots with obviously red coloured basal

sheaths, but shoots with red basal sheaths always present in a tussock. Sheaths slightly ladder-fibrillose. Cespitose, medium-size sedge. Rich wet forests and alder swamps. Occasional.

Carex intumescens Rudge

- Ligule always sharp-angled, longer than broad. Culms triangular and scabrous at base. Leaves 2-7 mm. wide, mostly 20-35 cm. long, margin downwardly *very* scabrous to base. Basal sheaths reddish purple; sheath clearly ladder-fibrillose. Large, densely cespitose sedge. Meadows, marshes and lake shores, normally in open habitats. Occasional.

Carex vesicaria L.

32. Leaves glaucous or greyish green, dull on both sides. In some species older leaves shiny and green on upper leaf surface..... 33
 — Leaves green..... 41
 33. Large sedges with leaves 4-12 mm. wide and mostly over 30 cm. long. Young leaves greyish green and dull, old leaves shiny and almost green on upper surface..... 34
 — Medium to small sedges with leaves less than 4 mm. wide and only occasionally exceeding 30 cm. in length. Young and old leaves greyish green or glaucous..... 35
 34. Large cespitose sedge. Leaves double-folded, very scabrous margined to base. Ligule much longer than broad, sharp-angled, 1-2 mm. high. Older sheaths ladder-fibrillose (not always obvious). Hyaline inner band *not* prolonged above leaf base. Basal sheaths dark brown to slightly reddish brown, inner basal sheaths yellow-brown often with pinkish tinge. Roots yellow, felty. Rich, moist and wet sites. Fairly common.

Carex crinita Lam.

- Large sedge with cord-like, 4-6 mm. thick, rhizomes. Leaves double-folded, margin downwardly scabrous but smooth at base, margin of older leaves often scabrous above the middle only. Ligule about as long as broad, sharp-angled, 2-4 mm. high. Hyaline inner band prolonged above leaf base. Sheaths not ladder-fibrillose. Basal sheaths dark brown. Roots white, smooth. Salt marshes. Occasional.

Carex paleacea Wahlenb.

<i>Key Number</i>	<i>Key References</i>
35. Densely cespitose species without stolons. Summit of hyaline inner band concave.....	36
— Species with stolons or rhizomes, shoots singly or in tufts. Summit of hyaline inner band variously shaped.....	37
36. Densely cespitose, often forming stools. Roots yellow, felty. Leaves plicate, older leaves sometimes double-folded, 1-3.5 mm. wide, margin downwardly scabrous to or near to base. Shoots often thickened at base (can best be seen when shoot is pulled out of tussock). Ligule longer than broad, sharp-angled. Medium-size sedge of wet, open sites; river banks, lake shores. Common. <i>Carex lenticularis</i> Michx.	
N.B. <i>C. nigra</i> var. <i>strictiformis</i> (Bailey) Fern. also forms stools but it lacks the felty roots, has stolons and is larger than both <i>C. canescens</i> and <i>C. lenticularis</i> .	
— Densely cespitose but not forming stools. Roots smooth, usually brownish. Leaves plicate to flat, 2-4 mm. wide, margin downwardly scabrous near top only. Ligule always much longer than broad, sharp-angled. Medium-size sedge of open and shaded mesotrophic sites; bog borders, mesotrophic alder swamps, fens and wet forests. Common. <i>Carex canescens</i> L.	
37. Leaves greyish green, not glaucous. Summer-green species.....	38
— Leaves glaucous, dull, plicate to flat, soft, 3-5 mm. wide, lower leaf surface with dark green nerves (three on each side of midrib), margin downwardly scabrous near top only, at least some leaves winter-green. Shoots singly from yellow, sympodial, creeping rhizomes. Ligule as long as broad to broader than long, sharp-angled to rounded. Basal sheaths yellow-brown to brown, decompose easily. Medium to small sedge of fens, especially mesotrophic fens. Common. <i>Carex livida</i> Willd.	
N.B. The introduced <i>C. panicea</i> L. is somewhat similar to <i>C. livida</i> but its leaves are less glaucous. It is restricted to a few localities on the Avalon Peninsula.	

38. Ligule usually broader than long, about 0.5 mm. high. Roots white to yellow-brown, smooth. Leaves plicate to flat. Summit of hyaline band of sheath, concave to straight..... 39
- Ligule much longer than broad, about 1 mm. high. Roots yellow, felt-covered. Leaves double-folded to flat. Summit of hyaline band of sheath V-shaped..... 40
39. Leaves plicate, 1.5-4 mm. wide, very soft and flexible, margin smooth throughout or slightly scabrous near top. Ligule straight to as long as broad. Hyaline band of sheath weak, straight at summit, but usually torn, outer band colourless with green nerves. Basal sheaths dull, brown, decompose rapidly. Rhizomes yellow to white, 0.5-1 mm. thick, branching at plants, with almost *hyaline bracts* with fine *brown nerves*. Roots smooth, *white*, about 0.5 mm. thick. Small slender sedge of moist, usually calcareous meadows, often also on trails and little used roads. Probably restricted to western Newfoundland. Occasional.

Carex aurea Nutt.

- Leaves plicate, 1-4.5 mm. wide, margin downwardly scabrous in upper half, young leaves sometimes scabrous-margined to or almost to base. Ligule as long as broad to almost straight. Hyaline inner band of sheath with straight summit. Basal sheaths light to dark brown, often lustrous, decompose *rather slowly*. Rhizomes yellow-brown, 1-2 mm. thick, with *brown bracts*. Roots *yellow to brown*, 0.5-1 mm. thick. Small to medium-size sedge of wet sites; bog borders, fens, meadows, also in wet forests. Very variable species. Common. The var. *strictiformis* (Bailey) Fern. is densely cespitose and forms stools.

Carex nigra L.

- N.B. Slightly greyish green forms of *C. tenuiflora* (45) may be sought here. It is loosely cespitose with tufts of shoots connected by rhizomes and the leaves are contracted in an acicular tip.
40. Culms and shoots arising singly from thick yellow green stolons covered with persistent dark brown, dead *leaves*; stolons often creeping over or close beneath bog surface. Leaves plicate to double-folded, 2-4 mm. wide, scabrous-margined along

whole margin or above middle and near base. Ligule variable. Sheaths often ladder-fibrillose. Basal sheaths dark brown, inner basal sheaths often reddish coloured. Medium to small sedge of wet parts of oligotrophic and mesotrophic bogs, and peaty fens. Fairly common.

Carex limosa L.

- In small tufts, usually of 3-6 shoots, with rhizomes. Leaves double-folded to flat, 2.5-4 mm. wide, margin smooth except near top. Ligule much longer than broad, sharp angled. Sheaths not ladder-fibrillose. Basal sheaths lustrous, reddish brown, inner basal sheaths sometimes pinkish. Medium-size sedge of bog borders mesotrophic bogs and alder swamps. Common. (See also 17.)

Carex paupercula Michx.

41. Species with elongated rhizomes..... 42

- Cespitose species (the tufted *C. silicea* (52) often has a rhizome consisting of many old but very persistent, short rhizome segments.)..... 49

42. True rhizomes or stolons present..... 43

- No true rhizomes or stolons present but cord-like stems acting as such; often almost vertically growing to keep up with peat growth. Shoots arising from the axils of previous year's leaves. Leaves gutter-shaped to plicate, lustrous on both sides mostly 1-2 mm. wide. Ligule hyaline, 1.0-2.5 mm. high, rounded, broader than long to as broad as long. Stems terete, with many nodes. Fens and mesotrophic bogs. Restricted to Northern Peninsula.

Carex chordorrhiza Ehrh.

43. Stems not spongy or pinkish tinged at base. Medium to small sedges..... 44

- Stems spongy at base, often pinkish coloured. Large sedge with tufts of shoots from creeping rhizome. Leaves usually green but sometimes greyish green, 2-12 mm. wide, margin downwardly very scabrous to base, up to 60 cm. long. Outside of blade-bearing sheaths green, with conspicuous transverse nerves. Fens, marshes, shallow water, and bog borders; rarely in shade. (See also 20.) Common.

Carex rostrata Stokes

44. Leaves plicate to flat, less than 2 mm. wide..... 45
 — Leaves double-folded, 2-5 mm. wide, up to 30 cm. long, downwardly scabrous margined above the middle, winter-green, old leaves dark green, young leaves light grey-green. Lower cauline leaves with inflated sheaths and very short blades. Outside of blade-bearing sheath milky white with green-margined nerves. Ligule soon disappearing, sharp-angled. Basal sheaths decompose very rapidly. Rhizome slender, about 1 mm. thick, yellowish white to white with light brown bracts. Wet forests, mesotrophic alder swamps and bog borders, also on raw humus covered limestone knolls. Common, especially in central and western Newfoundland.

Carex vaginata Tausch

45. Leaves without or with short acicular leaf tip not exceeding 4 cm. in length..... 46
 — Leaves contracted into long acicular leaf tip, up to 8 cm. long. Leaves plicate to flat, green to slightly greyish green, 1.0-2.0 mm. wide, up to 15 cm. long, margin downwardly scabrous in upper half only. Ligule about as long as broad. In small tufts with slender, 0.5-1 mm. thick, yellow rhizomes. Usually many dead leaves present. Small sedge of bog borders, mesotrophic alder swamps and peaty lake shores. Fairly common.

Carex tenuiflora Wahlenb.

N.B. *C. canescens* (36) is somewhat similar to *C. tenuiflora* but the latter can be easily distinguished by the long acicular leaf tip and the presence of the slender rhizomes.

46. Many basal leaves present..... 47
 — Culms with two cauline leaves, basal leaves absent. Leaves 1.0-1.6 mm. wide, 2-9 cm. long, shiny on both sides, smooth-margined, contracted in short acicular tip (up to 1.5 cm. long). Lower-most sheaths bladeless. Very small and tender sedge of bogs and other Sphagnum-rich vegetation. (See also 6.) Common.

Carex pauciflora Lightf.

47. Plants in small tufts from creeping rhizomes. Leaf tips curled and often dead. Very small sedge of dry, often exposed, arctic and sub-arctic barrens. Restricted to western Newfoundland.

Carex rupestris Bellardi

- Plants often forming dense mats. Leaf tips sometimes dead but not conspicuously curled. Species of wet sites..... 48
48. Leaves strongly ascending, scabrous-margined in upper one-quarter only. Rhizomes yellow-green. Few dead leaves at base. Leaves 0.5-1.3 mm. wide, up to 20 cm. long, simulating the leaves of *Juncus* species of the sub-genus *Poiophylli*. Small sedge of wet, often rich sites both in forests and fens. (See also 62.) Common.
- Carex leptalea* Wahlenb.
- Leaves drooping to all sides, margin downwardly slightly scabrous sometimes to very base. Stolons dirty dark yellow. Many dead leaves at base. Leaves plicate, 0.8-1.3 mm. wide, up to 20 cm. long. Small sedge of wet and damp woods, not on rich sites. Common.
- Carex disperma* Dew.
- N.B. Strongly resembling *C. trisperma*; for distinguishing characteristics, see 53.
49. Leaves and sheaths glabrous..... 50
- Sheath and lower surface of leaves pubescent. Leaves double-folded, 2-5 mm. wide, usually 15-20 cm. long, scabrous-margined to near base. Summit of hyaline band of sheath V-shaped. Ligule much longer than broad. *ciliate* at margin. Moist to dry sites; road sides, grasslands, rarely in closed forests. Fairly common.
- Carex pallescens* L.
50. Sedges without a rosette of basal leaves, only culms and/or culm-like shoots present..... 51
- Sedges with a rosette of basal leaves, leaves spreading from base..... 61
51. Inner band of blade-bearing sheaths hyaline in central or upper part only..... 52
- Inner band of blade-bearing sheaths entirely hyaline..... 55
52. Leaf base without auricles; densely cespitose species..... 53
- Leaf base with rounded auricles. Plants in small, loose tufts. Leaves thick, stiff, plicate, 3-4 mm. wide, lustrous on both sides, margin downwardly very scabrous in upper half. Ligule about as long

as broad, 0.5-1.0 mm. high, rounded. Inner band of sheaths prolonged above leaf base, hyaline in uppermost part only. Basal sheaths persistent, bristle-like fibres left after decomposition. Medium-size sedge of dry coastal sands and dunes. Fairly rare.

Carex silicea Olney

53. Sheath close; culms and shoots rounded. Ligule about as long as broad..... 54

— Sheath loose, triangular and slightly winged in cross-section. Leaves double-folded, 2.5-8 mm. wide, usually around 25 cm. long, scabrous-margined to or close to base. Ligule much longer than broad. Outside of blade-bearing sheaths pale to white with conspicuous green nerves. Medium-size sedge of rich alder swamps and marshes. Fairly rare.

Carex projecta Mack.

54. Inner band of blade-bearing sheaths hyaline at summit. Ligule as long as broad to longer than broad. Leaves plicate to flat, 1.0-3.5 mm. wide, scabrous-margined in upper half. Medium-size sedge of open moist to dry sites. Fairly common.

Carex scoparia Schk.

— Inner band of blade-bearing sheaths with hyaline ribbon in centre. Ligule as long as broad to broader than long. Leaves plicate to gutter-shaped, thick, stiff, 2-4 mm. wide, shiny at both sides, scabrous-margined but smooth at base. Sheaths with thick green nerves. Medium-size sedge of dry and sandy soils. Fairly rare.

Carex aenea Fern.

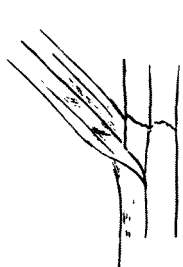
55. Hyaline band of sheath cross-puckered and prolonged..... 56

Hyaline band of sheath smooth, not cross-puckered; with dark brown dots in one species (*C. diandra*)..... 57

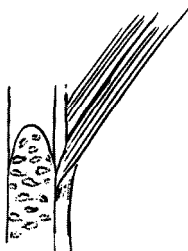
56. Leaves rather soft, double-folded to flat, 4-8 mm. wide, on upper surface strongly ribbed, somewhat wrinkled, slightly lustrous. Ligule longer than broad, rounded at top, approx. 1 mm. high. Old basal sheaths dark brown, decompose slowly leaving persistent bristle-like fibres. Large sedge of rich, wet sites, mostly in alder swamps. Occasional.

Carex stipata Muhl.

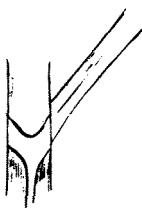
- Leaves very stiff, plicate to gutter-shaped, 2.2-5.0 mm. wide. Upper leaf surface without ribs, lustrous. Ligule straight or even concave, less than 1 mm. high. Wet sites. Very rare.
Carex vulpinoidea Michx.
57. Hyaline inner band of sheath without dark brown dots..... 58
— Hyaline inner band of sheath with dark brown dots. Leaves plicate, 1.0-3.0 mm. wide, mostly 25-40 cm. long, lustrous green on both sides, margin downward scabrous to or almost to base; gradually contracted into acicular leaf tip, up to 8 cm. long and very scabrous. Basal sheaths dark brown to black. Medium to large sedge of fens and quagmires. Occasional.
Carex diandra Schrank.
58. Sterile shoots without nodes..... 59
— Sterile shoots with nodes. Leaves plicate, lustrous green, 2-4 mm. wide, scabrous-margined above middle. Ligule hyaline, about as long as broad, up to 0.5 mm. high. Roots brown; well-developed roots 1.0-1.5 mm. thick. Medium-size sedge of nutrient poor, dry to moist sites. Introduced, mainly restricted to road sides and grasslands. Occasional.
Carex leporina L.
59. Medium to large sedges with leaves at least 2 mm. broad..... 60
— Small to medium-size, cespitose sedges. Leaves plicate to flat 1-3 mm. wide, lustrous green on both sides, contracted into acicular tip. Ligule about as broad as long, up to 0.5 mm. high. Summit of hyaline band of sheath concave. Species of wet sites. The following species are vegetatively very similar, and usually cannot be definitely identified without perigynia:
C. interior Bailey—Leaves 1.0-3.0 mm. wide, up to 30 cm. long, usually 12-15 cm., margin downwardly scabrous to base, sometimes smooth near middle. Outside of sheath hyaline to white with green-bordered nerves. Fairly rare; seems to prefer richer sites than the other three species.



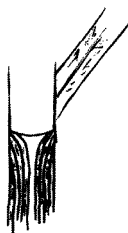
Carex paleacea



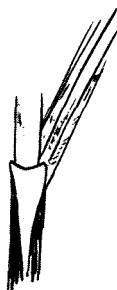
Carex stipata



Carex scoparia



Carex aenea



Carex projecta



Carex diandra



Carex silicea

Figure 8. Characteristics of sheaths and basal part of leaf blades of some Carex species

C. schinata Murr. —Leaves 1.0-3.5 mm. wide, usually 15-20 cm. long, margin downwardly scabrous to base or sometimes smooth at base, outside of sheaths hyaline with green nerves. Wet to moist, peaty sites; bog borders and poor fens. Probably rare.

C. cephalantha (Bailey) Bickn.—Leaves 1.5-2.8 mm. wide, up to 30 cm. long, usually 15-22 cm., margin downwardly scabrous above middle and at base. Outside of sheaths *pale green* with darker green nerves and scattered transverse nerves. Great variety of wet sites ranging from mesotrophic bog borders and poor alder swamps to rich fens. Common.

C. angustior Mack.—Leaves 0.7-2.0 mm. wide, up to 27 cm. long, usually 16-20 cm., margin very scabrous in upper half or two-thirds of leaf. Outside of sheath hyaline with green nerves. Prefers somewhat wetter sites than *C. cephalantha* but these species occur frequently together. Much less common than *C. cephalantha*.

60. Large sedge. Leaves 5-10 mm. wide, margin very scabrous to base, winter-green. Culms sharply triangular and scabrous, even at base. Sheaths slightly ladder-fibrillose. Marshes, shores of nutrient-rich ponds, ox bows, etc. Rare, probably owing to the scarcity of suitable sites.

Carex pseudocyperus L.

- Medium-size sedge. Leaves 3.0-5.5 mm. wide, usually not exceeding 25 cm. in length, contracted into 1.5-4.0 cm. long acicular tip, margin smooth except for the acicular tip; leaves plicate but slightly double-folded above the middle in order to become contracted into the acicular tip. Culms smooth and slightly rounded at base. Outside of blade-bearing sheaths white with many green nerves. Sheaths not ladder-fibrillose. Basal sheaths brown. Mesotrophic bogs and fens, wet river banks and lake shores. Common.

Carex michauxiana Boeckl.

61. Loosely cespitose species of wet sites, often forming mats; stolons present. Leaves soft, 0.5-2.0 mm. wide..... 62
- Densely cespitose species without stolons or rhizomes..... 63

62. Stolons yellow-green with dark brown bracts. Leaves strongly ascending, plicate, lustrous green, 0.5-1.3 mm. wide, up to 20 cm. long, usually much shorter, margin smooth except for the 2-4 cm. long acicular leaf tip. Outside of the blade-bearing sheaths green without white dots. Small sedge of wet, moderately rich to rich sites; wet forests, alder swamps, fens. (See also 48.) Common.

Carex leptalea Wahlenb.¹

- Stolons yellow-white to straw-coloured. Leaves double-folded to flat, drooping to all sides, 1-2 mm. wide, sometimes over 20 cm. long, scabrous-margined to or almost to base. Outside of blade-bearing sheaths with white dots. Culms from previous year often still present as triangular strips up to 50 cm., long. Small sedge of wet, moderately rich to poor sites, usually forested mesotrophic and oligotrophic bogs, mesotrophic swamps and wet forests; not in ombrotrophic bog centres. Common.

Carex trisperma Dew.

- N.B. *C. disperma* (48) is very similar to *C. trisperma*. However, in *C. disperma* the shoots arise in small tufts or singly from a stoloniferous base, the leaves are plicate and the blade-bearing sheaths lack the characteristic white dots. *C. brunnescens* (64) is densely caespitose without stolons and has plicate leaves. The white dots are restricted to the upper part of the blade-bearing sheaths in contrast to *C. trisperma* where they occur on the major part of the sheaths.

63. Leaves plicate; small species..... 64
 — Leaves double-folded; small to large species..... 65
 64. Outside of blade-bearing sheaths without white dots. Leaves 1.5-4.0 mm. wide, contracted into a short, less than 0.5 cm. long, acicular tip, scabrous-margined above the middle only, upper leaf surface dull. Damp and wet, usually rich sites; forests, meadows, fens. Occasional; distinctly more common in limestone areas.

Carex capillaris L.

¹Actually *C. leptalea* does not belong in this section but because it often forms dense mats it may on superficial examination be easily taken for a caespitose species.

- Outside of blade-bearing sheaths in upper part with white dots. Leaves 1-2.5 mm. wide, up to 25 cm. long, contracted into a 1-3 cm. long acicular tip, scabrous-margined except for base. Hyaline band of sheaths roomy, wrinkles when twisted, concave at summit. On variety of moist and wet sites both in the forests and in the open. Common.

Carex brunnescens (Pers.) Poir.

N.B. Yellow-green species with short acicular leaf tip: See under 69. *C. brunnescens* may be confused with *C. trisperma* or *C. canescens*. For distinguishing characteristics see *C. trisperma* (62). *C. canescens* (36) is characterized by the absence of the white dots on the outside of the blade-bearing sheaths and the dull and more greyish green leaves.

65. Leaves green or yellow green, less than 7 mm. wide, rarely a single leaf broader. Small and medium-size species.....

66

- Leaves yellow green, 7-15 mm. wide, summer-green, very lustrous on both sides, rather abruptly narrowed at tip, scabrous-margined in upper third. Outside of blade-bearing sheaths and basal part of leaves with obvious transverse nerves. Sheaths decompose very rapidly. Large sedge of wet, rich to moderately rich sites; alluvial marshes, river banks and open alder swamps. Fairly common in eastern and southwestern Newfoundland, rather rare elsewhere.

Carex folliculata L.

66. Sheaths close. Leaves with greatest width near base, margin never upwardly scabrous at base.....

67

- Sheaths very loose, hyaline band usually torn. Leaves with greatest width just below middle, margin *upwardly* scabrous in lower one-quarter of leaf and downwardly scabrous above middle, 4-7 mm. wide, lustrous, deep green, winter-green. Ligule short, disappears soon. Basal sheaths decompose very rapidly. Rich, moist to wet forests, alder swamps, and mountain maple thickets. Common.

Carex leptonevia Fern.

67. Outside of blade-bearing sheaths with white dots (Also in *C. trisperma* and *C. brunnescens*). Leaves not contracted into acicular tip, 2-5 mm. wide, length usually not exceeding 20 cm., shiny at both sides, scabrous-margined above the middle; upper surface of young leaves often wrinkled near top.

Ligule about as long as broad. Rich, moist forests. Rare; restricted to western Newfoundland.

Carex deweyana Schw.

- Outside of blade-bearing sheaths without white dots. Leaves yellow-green, contracted into acicular leaf tip. (*C. flava* s. l.)..... 68
68. Leaves 1-3 mm. wide. Small sedges..... 69
- Leaves 3-8 mm. wide. Medium-size sedges..... 70

69. Leaves strongly ascending, 1-2.5 mm. wide, usually 5-15 cm. long, acicular leaf tip about 2 cm. long, plicate to double-folded. Ligule with rounded top, about as long as broad to longer than broad. Small, usually 7-18 cm. high, species of calcareous fens. Occasional, most common in western Newfoundland.

Carex viridula Michx.

- Leaves spreading, 1-3 mm. wide, usually 3-10 cm. long, double-folded to flat. Ligule with rounded top, broader than long to almost straight. Small, usually 7-15 cm. high, species with great pH-range, oftenest on acid soils. Usually in open vegetation on moist to wet sites. Fairly rare.

Carex serotina Mérat

N.B. These two species cannot always be identified with certainty in vegetative condition.

70. Leaves 3.0-5.5 mm. wide, margin downwardly scabrous to middle or somewhat below middle. Summit of hyaline band of sheath concave to straight. Ligule broader than long. Moderately rich, slightly acid, wet sites; fens, wet meadows, and lake shores, also in open forests. Common.

Carex demissa Hornem.

- Leaves 3-8 mm. wide, usually 25-38 cm. long, margin downwardly scabrous to, or to below, middle. Summit of hyaline band of sheath concave to slightly V-shaped. Ligule as long as broad to rarely longer than broad. Wet, rich, circum-neutral soils; rich fens, meadows, springy places in forests. Common.

Carex flava L.

N.B. These two species can rarely be positively identified in vegetative condition. *Carex flava* is slightly larger and prefers richer sites than *C. demissa*, but the two species can occur together. Remnants of old culms may give additional information on the identity of these species.

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