THE GENUS CAREX ON THE ARCTIC SLOPE OF ALASKA

THESIS FOR THE DEGREE OF M.S.
MICHIGAN STATE UNIVERSITY

WILLIAM M MALCOLM

1959

THE GENUS CAREX ON THE ARCTIC SLOPE OF ALASKA

an annotated, illustrated species list and key

by

William McLagan Malcolm II

AN ABSTRACT

Submitted to the College of Science and Arts, Michigan State University of Agriculture and Applied Science, in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Department of Botany and Plant Pathology

1959

The geology, climate, soils, and vegetation of the Arctic Slope of Alaska are briefly described.

The species of Carex recorded for the Slope are entered in a dichotomous key and their morphology, habitat, and distributions described.

The ecological ranges of each species along the drainage and soil moisture gradient is noted, and detailed environmental measurements are tabulated for three common species.

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INTRODUCTION

Carex species are often strikingly similar. Fernald (Fernald, 1950) notes '...an exceedingly critical genus, the study of which should be attempted only with complete and mature specimens'. Polunin (1959), in his Circumpolar Arctic Flora, includes 27 species complexes and ill-defined species in the 67 Carices treated.. The confusion is in part a result of 1. inadequate collecting and poor distribution of collecting sites and 2. incomplete descriptions of new taxa by authors lacking field knowledge of arctic sedges.

1. Travel in the Arctic is tedious and expensive. The first collections were from coastal areas only, and the bulk of collecting today is on the coast or near camps in major river valleys serviced by boats or light pontoon planes. Biological interest in arctic regions, however, has increased in the last 20 years, and collecting has stepped up substantially. Uncharted, remote areas are reached more often and their floras adequately sampled.

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2. The general similarity among the arctic sedges demands detailed descriptions of proposed new taxa. Unfortunately, in the early 1800's several critical species were described briefly and in little detail. The authors of these taxa were often not the collectors and therefore were unfamiliar with 1. the range of variation in the natural populations sampled by the collections and 2. with other sedge species. Moreover, the problem of distributing to authors the available descriptions and collections was worsened by barriers of distance and language among arctic taxonomists. As a result, complex synonymy and obscure species limits are common in the literature. The field botanist quickly notes that published species limits often do not 'fit' the variation encountered in the field, and, more important, the separation of similar species is most difficult.

Recently, several authors have published floras of small and large arctic areas of this hemisphere (Polunin, 1959; Porsild, 1951, 1955, and 1957; Hulten, 1941-1948; Bocher, 1950; Duman, 1941; Raup, 1947; and Anderson, 1943-1948). These floras are large tasks and the treatment of species is necessarily general. The genus Carex has received unusual attention because of the abundance and taxonomic difficulty of some species. Love, Love, and Raymond (1957) published a largely cytological study of the Capillares section of the genus. And, Duman (1958) reported introgressive hybridization between two of the common species, Carex

stans and Carex bigelowii. However, there is a pressing need for critical biosystematic study of the arctic species of the genus.

This paper is not a taxonomic treatment, although an effort has been made to unravel two of the so-called species 'complexes' (C. podocarpa and C. lugens). The objectives of the paper are 1. a listing and key for the known Slope Carices, 2. consistent, detailed descriptions of morphology, habitat, and Slope distributions of each species, 3. general descriptions of the ecological range of each species, and 4. detailed discussions of environmental measurements for several common species.

THE AREA

Geology

The Arctic Slope is defined here as the area between the Arctic Ocean and the crest of the Brooks Range. Extending 600 miles from W to E, the Slope is 60 to 230 miles wide and covers roughly 80,000 square miles, one-seventh the area of Alaska, and about the area of Kansas or Minnesota (Spetzman, 1951).

The Arctic Circle and the crest of the Brooks Range are nearly parallel, the Circle lying 95 miles to the south of the Range. (Detterman et al., 1958). The peaks of the Range rise in the east to 9000 feet, and fall progressively toward the west to 3000 feet. Lifting of the Range in the Early Cretaceous followed sedimentation in the Triassic, Jurassic, and Early Cretaceous (Britton, 1957).

The Range and the foothills to the N are formed of the same geologic materials. The foothill ridges trend E-W at the mountain front, and are lower toward the coast.

The coastal plain varies in width from a few miles in the E to 100 miles S of Barrow. The sedimentary materials of the area range in age from Cretaceous to Pleistocene.

Topographic map of the Slope in 1000-foot contours.

sea level to 1000 feet

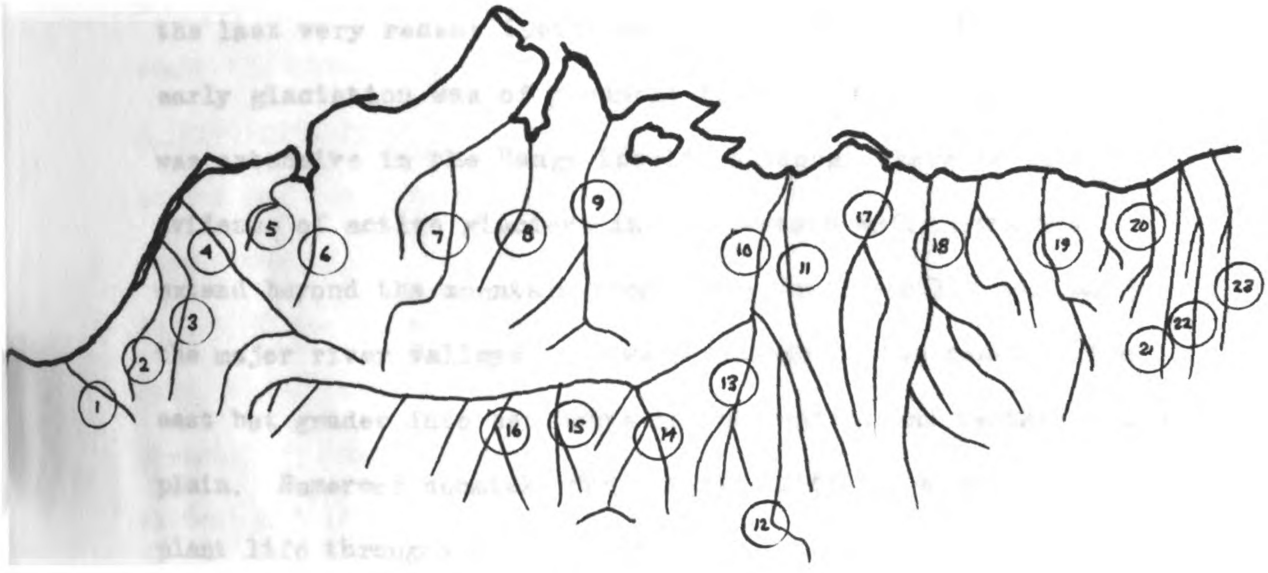
1000 to 2000 feet

2000 to 3000 feet

3000 to 6000 feet

over 6000 feet

Major rivers of the Slope, numbered roughly W to E.



1 Pitmegea
2 Kukpowruk
3 Kokolik
4 Utokok
5 Kuk
6 Kaolak
7 Meade
8 Topagoruk
9 Ikpikpuk
10 Colville
11 Itkillik
12 Anaktuvuk
13 Chandler
14 Killik
15 Kurupa
16 Etivluk
17 Kuparuk
18 Sagavanirktok
19 Canning
20 Sadlerochit
21 Hulahula
22 Okpilak
23 Jago

At no time has the Slope been covered by a continental ice sheet, but six glaciations are recognized, the last very recent (Detterman et al., 1958). At least one early glaciation was of piedmont type. Pleistocene glaciation was extensive in the Range itself, although there is little evidence of active glaciers in the western end. Moraines extend beyond the mountain front into the foothills and mantle the major river valleys. Outwash extends to the coast in the east but grades into sediments in the central and western coastal plain. Numerous nunataks and a large driftless area harbored plant life throughout Pleistocene.

The major rivers flow N through broad glacial valleys in the mountains, cut N (E in the case of the Colville) through the E-W trending ridges of the foothills, and meander and braid on the coastal flats (Detterman et al., 1958). Rivers fed by current glacial melt-off are opaque with silt in the foothills, and deposit raw alluvium far into the coastal plain during spring floods.

Climate

Only fragmentary climatic data are available for the Slope----------most weather stations are coastal and are manned only during the summer months (Britton, 1957).

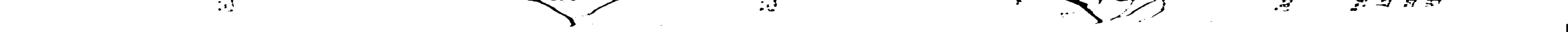
1. Temperature. In general, the 9 winter months are cold and the 3 spring, summer, and autumn months cool. Freezing temperatures may occur at any time, but July is the warmest month,

followed by August and June. Conover (1955) mapped the July and January normal isotherms reproduced on p. 9. Both diurnal and annual temperature extremes are greater inland than at the coast (Britton, 1957).

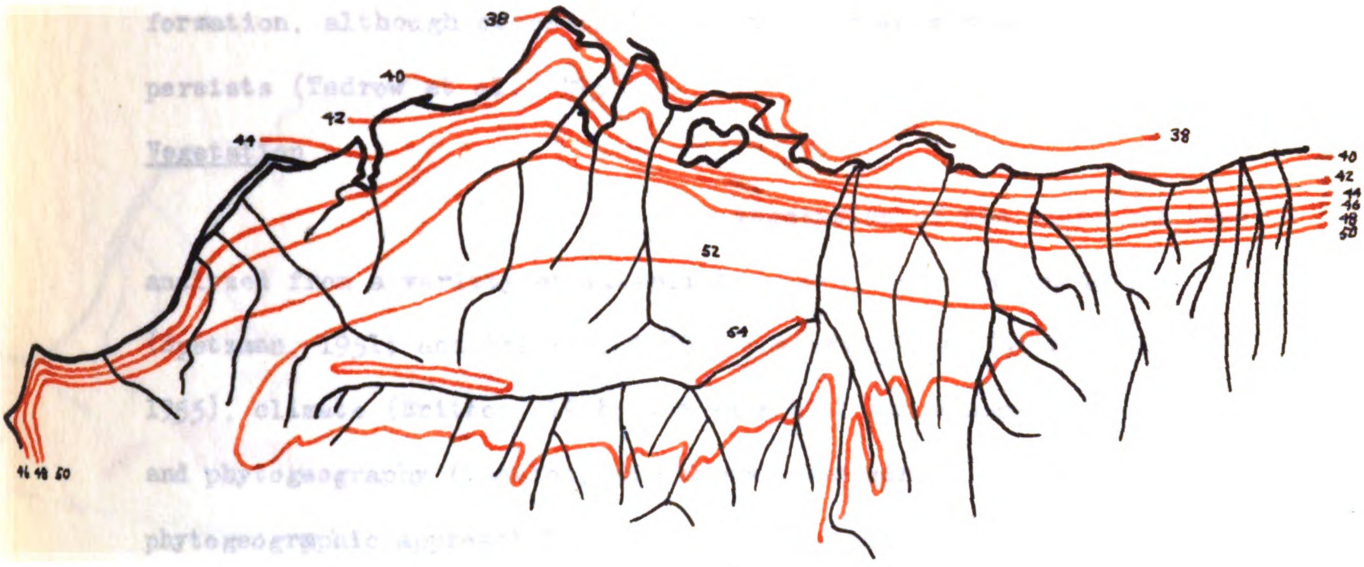
2. Precipitation. Precipitation is less than 8 inches per year, about 4 inches in both warm and cold seasons (Spetzman, 1951). (However, measured precipitation appears to be but 25-50 per cent of actual precipitation (Britton, 1957). Moreover, Evaporation is low and moisture accumulates on the soil directly by condensatinn (Tedrow et al., 1958). Winds are persistent and of moderately high velocity, and cloud cover and fog are common during the growing season, reaching maxima in September (Britton, 1957). Snowfall averages 10 inches on the coast, 16 inches in the foothills, and deeper further inland (Britton, 1957). Snow is ecologically important as protection from winter wind and ice blast, a moisture source in spring melt-off, and, in late-melt areas, a factor shortening the growing season (Britton, 1957). Areas of late snow-melt are often unique in species composition (Cantlon, unpublished manuscript).

Soils

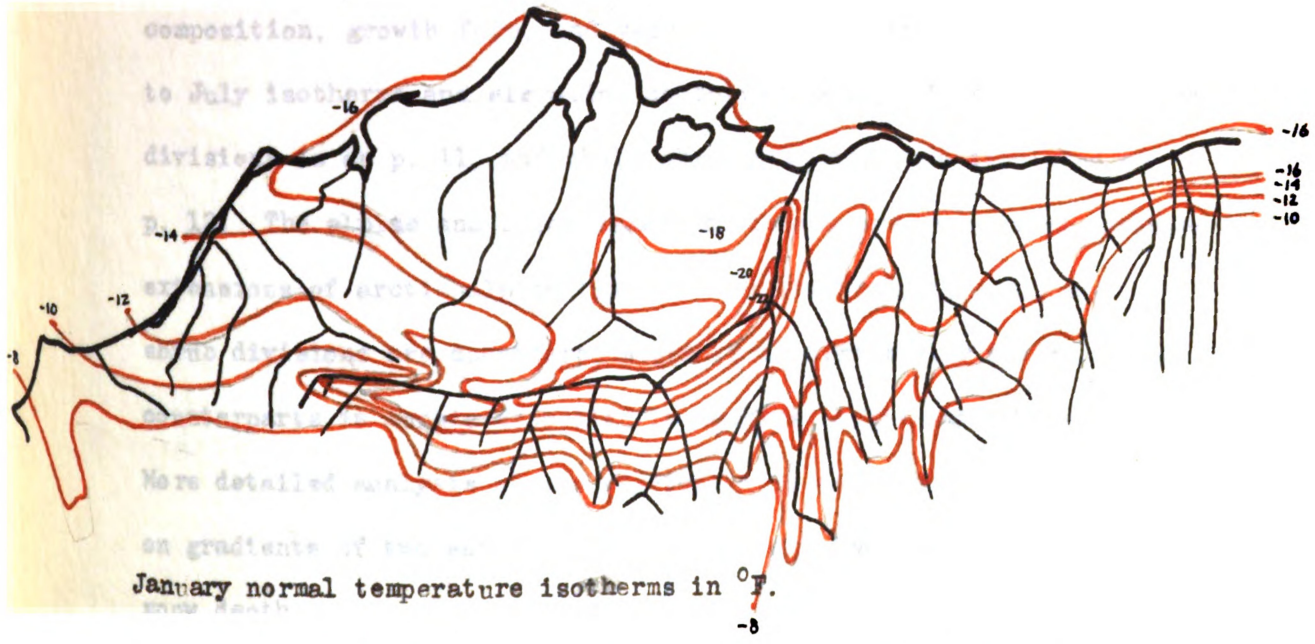
The Slope soils are classified bog, tundra, Arctic Brown, regosol, and lithosol (Tedrow et al., 1958). The tundra and bog soils are the most extensive, dominating the coastal flatlands and the broad river valleys of the foothills. Arctic Brown is the one zonal soil mapped, and covers a scant 1 per cent of the Slope, largely in the foothills (Tedrow et al., 1958).



July and January normal temperatures for the Slope.*



July normal temperature isotherms in °F.



January normal temperature isotherms in °F.

*redrawn from Conover, J. H., Macro- and Micro-climatology of the Arctic Slope of Alaska, Bulletin of the Ecological Society, vol. 36, no. 3, pp. 96,7. (abstract of a paper presented at the AIBS meetings, Michigan State University, East Lansing; map unpublished.)

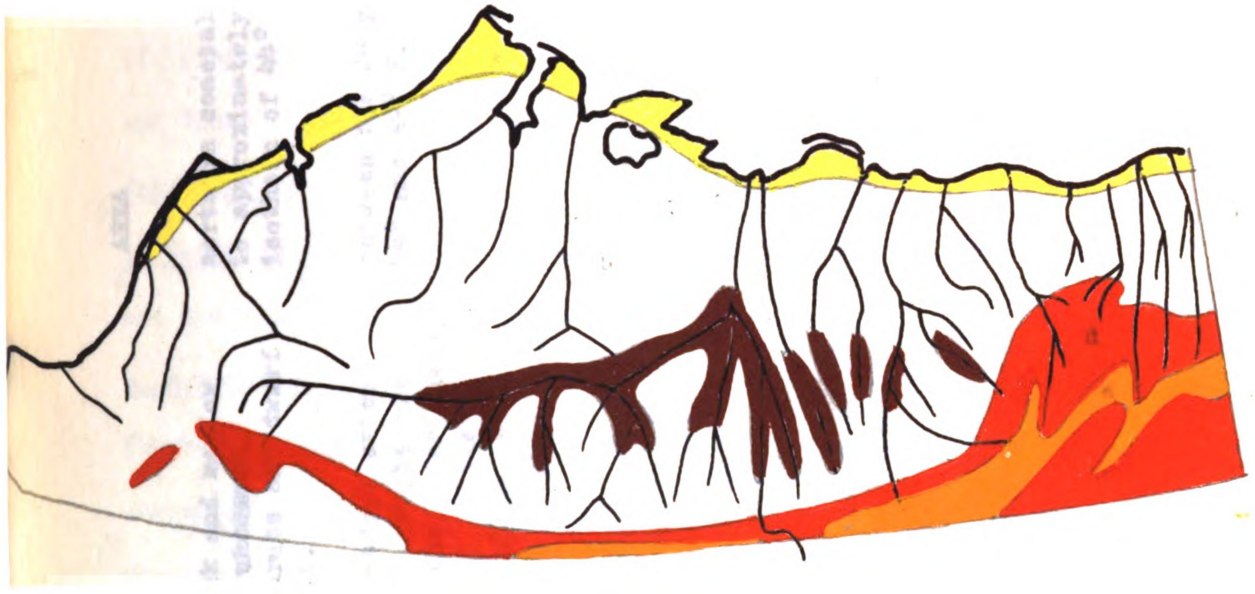
Regosols lack a well-defined profile, and occur on young alluvial, eolian, talus, and outwash deposits (Tedrow et al., 1958). In the mountains, lithosols occur where erosion exceeds soil formation, although occasionally a thin, brown surface horizon persists (Tedrow et al., 1958).

Vegetation

The vegetation of the Slope has been analyzed from a variety of viewpoints ———— physiography (Spetzman, 1951; and Britton, 1958), phytosociology (Churchill, 1955), climate (Britton, 1958; and Churchill and Hanson, 1958), and phytogeography (Cantlon, unpublished manuscript). The phytogeographic approach has received the least attention.

Cantlon (unpublished manuscript) classifies Slope vegetation in 5 'sub-zones' defined by species composition, growth form, and vegetation types roughly related to July isotherms and elevation contours. A map of the 5 vegetation divisions is on p. 11, and their characteristics are tabulated on p. 12. The alpine and polar desert divisions are considered northern extensions of arctic-alpine tundra. The littoral, typical, and shrub divisions are considered segments of circumpolar tundra, with counterparts in Russia described by Sochava (1933) and others. More detailed analysis of the vegetation in each division is based on gradients of two environmental variables, drainage and winter snow depth.

Major climatic vegetational divisions (Cantlon, unpublished)



littoral

typical

central valley (shrub)

arctic alpine

alpine desert

UNIT	CHARACTERISTIC VEGETATION	AREA
littoral	no Sphagnum accumulation, poor tussock and meadow development, dwarf shrubs and mosses uncommon, low shrubs scarce, berry-producing shrubs and dwarf shrubs rare, Dupontia fisheri abundant.	northern coastal region and inland to approximately the July normal isothern of 44° F.
typical	cottongrass tussock and dwarf shrub meadows extensive, berry-producing shrubs and dwarf shrubs common, low and medium shrubs absent on the interfluves, extensive stands of tall (over 10 feet) feltleaf willow absent, alder, Spiraea, Chamaedaphne, and Ribes from warmer regions rare or absent, Dupontia fisheri rare or absent.	between the July normal isotherms of 44° and 52° F.
central valley	medium shrub vegetation not restricted to steep slopes and extending onto the interfluves locally, tall (over 10 feet) feltleaf willow stands extensive. Local groves of poplar or alder common, Spiraea, Ribes, and Chamaedaphne occasional on warm slopes.	areas of July normal temperature above 52° F., and in the vicinity of major river valleys between 300 and 1800 feet elevation.
arctic alpine	shrub vegetation very poorly developed, dwarf birch and berry-producing shrubs unimportant or absent, tussocky wet meadow unimportant.	between 4000 and 6000 feet elevation.
alpine desert	vascular flora restricted to fewer than a dozen species, no woody plants, vegetation lichen-dominated.	above 6000 feet elevation.

METHODS AND SOURCES

This paper is an annotated species list of the Carices occurring on the Arctic Slope of Alaska. A total of 36 species are described and illustrated and their North American and Slope distributions mapped.

Descriptions

1. Organization Morphology, habitat, and abundance are described for each species.

a. Morphology description. Each species is described in detail. However, if species A differs from species B in a few, distinct characters, only species A is fully described, and the description for species B reads 'Similar to species A, but (for instance) leaves involute and the lowest bract reflected.'

The characters most useful for identification are underlined in the description.

The descriptions discuss at least the 27 morphological characters tabulated below.

habit
culm——length, and length in relation to the leaves.
leaves——width.
lowest bract of the inflorescence——shape, sheath, and length in relation to the inflorescence.
spikes——number, position, sex, shape, and size.
pistillate scale——shape, length in relation to perigynium, apex, margin, color, and midvein.
perigynium——shape, size, margin, nevration, lustre, color, beak, beak orifice, and stigmas.

Units of measurement are in the metric system. The dimensions are averages for conservative morphological characters and ranges for variable characters.

b. Habitat description. The habitat information includes vegetation type (barrens, upland meadow, shrub, wet meadow, marsh, and aquatic), physiography (river terrace, moraine, alluvial fan, talus slope), and elevation in feet (sea level to 5300 feet). More detailed information is summarized alphabetically by species on pp. 24-30.

c. Abundance estimation. Abundance is generalized by the terms rare, scarce, occasional, common, and abundant. Such designations are vague, and refer only to relative abundance. (The individuals of an 'abundant' Carex species total many more than those of any 'abundant' dicot.)

2. Sources The list of species is compiled from collection* determinations, Porsild (1957), Polunin (1959), and Spetzman (1951). Porsild treats the Canadian Arctic Archipelago, and therefore includes strictly eastern species and excludes strictly western species. Spetzman's area includes both the Slope proper and the Noatak River drainage of the DeLong and Baird Mountains, and therefore includes several typically southern Alaska species.

*collections by Cantlon et al. 1953, Cantlon and Gillis 1957, Cantlon and Malcolm 1958, and Malcolm 1958.

The discussions of morphology, habitat, and abundance are culled from the examination of specimens, from field experience, collection records, transect studies, and literature. For 6 species* not collected, the descriptions were compiled from Porsild (1957), Mackenzie (1940), Fernald (1950), and Hulten (1941-1948).

Illustrations

1. Organization The illustrations are ink line drawings, and include for each species at least habit, pistillate scale, and perigynium. However, if two species differ by only a few, distinct characters, only one species is fully illustrated. The drawings are intended as aids for rapid identification and therefore include characteristic features of morphology. Labels for the drawings are the first letters of the alphabet. Magnification of each figure is noted beside its explanation——for instance, b pistillate scale (10/1).

2. Sources. Most the drawings are based on specimens collected by Cantlon et al. in the years 1953, 1957, and 1958. Six species* are drawn from descriptions and illustrations in Porsild (1957), Mackenzie (1940), and Robinson and Fernald (1908), and are individually credited in footnotes on the drawings.

*C. bicolor, C. glareosa var. amphigena, C. gynocrates, C. lachenalii, C. microglochin, and C. ursina.

Distributions

1. Organization The colledtion locations are given by rivers, lakes, and towns, and the latitude and longitude noted. A map of principal rivers of the Slope is on p. 6. All the collection sites are listed on pp. 18 and 19. None of the Porsild and Spetsman determinations are verified, and therefore to the citations are added '(according to Porsild)' and '(according to Spetzman)'. The approximate North American range of each species is mapped in red below the species description.

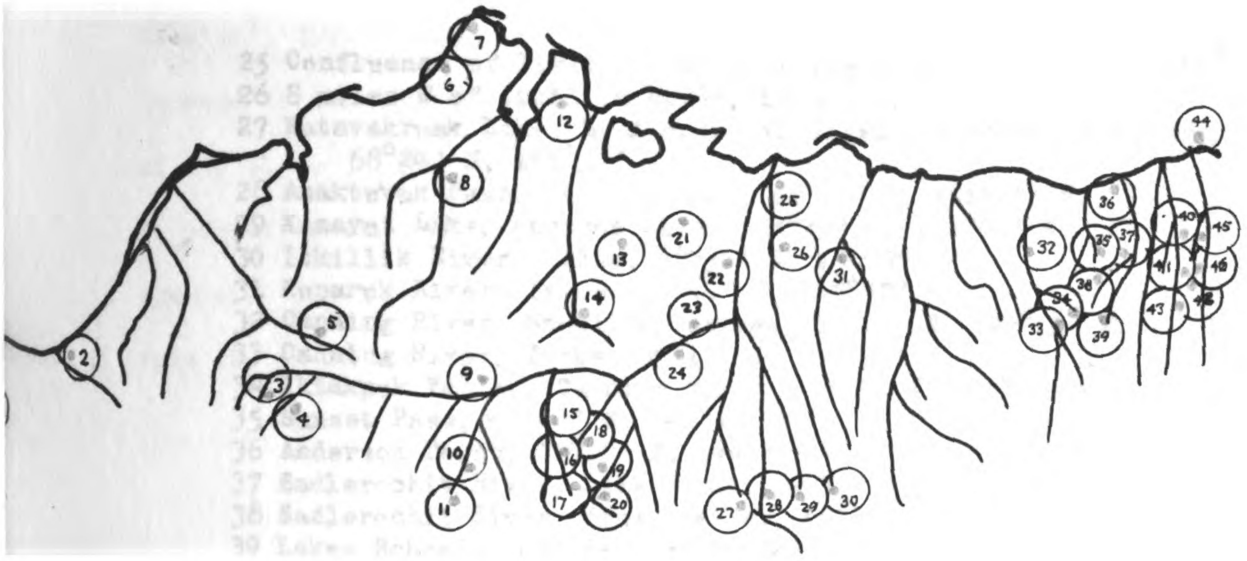
2. Sources

a. Collection locations and range data. The Slope distributions are compiled from Porsild (1957) (no collection numbers), collections cited by Spetsman (1951), and from collection records of Cantlon, Rebuck, and Bormann (Cantlon et al. 1953), Cantlon and Gillis (Cantlon-Gillis 1957), Cantlon and Malcolm (Cantlon-Malcolm 1958), and Malcolm (1958). The North American range data are compiled from Robinson and Fernald (1908), Porsild (1957), Polunin (1959), Hulten (1941-1948), and Mackenzie (1940).

b. Maps. The map of the Slope is based on the Brooks Range (63) and Point Hope (64) World Aeronautical Chart maps, compiled and printed in Washington, D.C., by the U. S. Coast and Geodetic Survey (December 1951 revision, U. S. Air Force Edition). Projection is the Lambert Conformal Conic at a scale of

1:1,000,000. The reduction for the Slope distributions is about 6:37. The map for North American range is taken from Rand McNally's Polar Map of the World, printed on p. 3 of the Rand McNally-Standard World Atlas, 1951, Rand McNally, New York. Projection is Polar Axiumuthal Equidistant at a scale of 1 inch = 1872 statute miles along the meridians.

Collection sites for specimen citations, numbered roughtly W to E.



1 Point Hope, 68°22' N, 166°40' W.
2 Pitmegea River, 68°54' N, 164°35' W.
3 Lake Noluk, upper Colville River, 68°47' N, 160°00' W.
4 Nuka River, 68°45' N, 159°30' W.
5 Carbon Creek, 69°15' N, 158°30' W.
6 Coast, SW of Barrow 40 miles (approx.).
7 Barrow, 71°20' N, 156°40' W.
8 Atkasuk Village, Meade River, 70°29' N, 157°25' W.
9 Colville River, 68°54' N, 156°20' W.
10 E of Nigu River, 68°30' N, 156°27' W.
11 Howard Pass, Etivluk River, 68°15' N 156°50' W.
12 Alaktak, Chipp River, 60°48' N, 155°00' W.
13 Price River, 69°52' N, 153°50' W.
14 Lake near Maybe Creek, 69°20' N, 154°20' W.
15 Kurupa River, forks, 68°40' N, 155°10' W.
16 3 miles E of Kurupa River,
17 Kurupa Lake, 68°22' N, 154°40' W.
18 Oolamnagavik River, 68°30' N, 154°33' W.
19 Killik River, 68°30' N, 154°20' W.
20 Killik River, 68°10' N, 154°10' W.
21 Headwaters of Fish Creek, 69°55' N, 152°50' W.
22 Confluence of Kogosukruk and Colville River, 69°46' N, 151°50' W.
23 Umiat, 69°22' N, 152°10' W.
24 10 miles SSW of Umiat, 69°14' N, 152°27' W.

Collection sites for specimen citation (cont'd.)

25 Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W.
26 8 miles W of Itkillik River, 69°50' N, 150°33' W.
27 Natavakruak Lake, headwaters of Siksikpuk River tributary, 68°24' N, 151°38' W.
28 Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W.
29 Kanayut Lake, Kanayut River, 68°23' N, 151°00' W.
30 Itkillik River, lakes, 68°30' N, 150°00' W.
31 Kuparuk River, forks, 69°43' N, 149°30' W.
32 Canning River, Shublick Springs, 69°28' N, 146°12' W.
33 Canning River, forks, 69°13' N, 145°54' W.
34 Ikiakpuk Valley, Canning River, 69°25' N, 145°30' W.
35 Sunset Pass, 69°40' N, 144°45' W.
36 Anderson Point, 70°00' N, 144°30' W.
37 Sadlerochit River, Lake Forks, 69°35' N, 144°45' W.
38 Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W.
39 Lakes Schrader and Peters, 69°22' N, 145°00' W.
40 12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W.
41 Okpilak Lake, Okpilak River, 69°23' N, 144°04' W.
42 5 miles SW of Okpilak Lake, Okpilak River, 69°22' N, 144°01' W.
43 Dark Creek, 6 miles S of Okpilak Lake, Okpilak River, 69°18' N, 144°00' W.
44 Barter Island, 70°10' N, 143°40' W.
45 10 miles N of Jago Lake, Jago River, 69°45' N, 143°42' W.
46 Jago Lake, Jago River, 69°45' N, 143°42' W.

Detailed sampling

In the field season of 1958, Cantlon[1], Brown[2], and Malcolm studied vegetation on 9 transects located in the foothills of the Brooks Range at the eastern end of the Slope[3]. Quadrat data include description of the soil to permafrost and per cent frequency and per cent cover for each species. The level of sampling is 1/16 of 1% with random quadrats of 100 cm^2 and 625 cm^2.

[1]Cantlon, John E., Professor, Department of Botany and Plant Pathology, Michigan State University, East Lansing, MICHIGAN.

[2]Brown, Jerry, Graduate Assistant, Department of Soil Science, Rutgers University, New Brunswick, NEW JERSEY.

[3]Seven of the transects were in the Okpilak River valley within 12 miles of Okpilak Lake, 69°23' N, 144°04' W, and two were in the Jago River valley in the vicinity of Jago Lake, 69°26' N, 143°47' W..

RESULTS AND DISCUSSION

Species ranges over the soil moisture and drainage gradient

Distribution of a species is always the result of the interaction of the diversity of the species and the diversity of the environment (Thompson, 1959). The environmental factors controlling distribution of a species through time are past and present climate, soil, geography, and biota (Good, 1953). The species factors controlling distribution are place and time of origin, potentiality of dispersal, and diversity of the species (Good, 1953). The control of plant distribution in the Arctic is characterized by a few, dominant environmental variables——temperature, precipitation, and soil. However, on a local level the principle physical and biotic environmental factors limiting distribution are 1. soil drainage and moisture, 2. winter snow depth, 3. thickness of the organic layer, 4. exposure to winter wind and snow blast, and 5. slope direction. Perhaps the first, soil drainage and moisture, is the most important.

In general, soil moisture increases from upland to lowland along a gradient of change. The gradient is arbitrarily divided into 5 segments from dry to wet ———1. barrens and rubble slopes, well-drained, 2. upland meadow, imperfectly drained, 3. wet meadow, poorly drained, 4. marsh, very poorly drained, and 5. aquatic, standing water over 6 inches deep (modified from Tedrow and Cantlon, 1959).

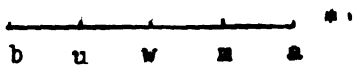
Individuals of a species vary in their ecological tolerances as well as in their morphology. And, a variety of habitats occur in a given locality. This diversity of the local environment and diversity of individuals causes differential microdistribution[1] of a species.

On pp. 24-30 are plotted the soil moisture microdistributions of the known Slope Cariees. The plottings simply indicate the segment of the moisture gradient occupied by each species. The 5 segments of the gradient are noted on the ordinate, and relative abundance[2] on the abscissa (which is not drawn).

Of the total 36 species studied, 28 per cent occur in only 1 segment of the moisture gradient, 19 per cent in 2 segments, 8 per cent in 3, 8 per cent in 4, and 0 per cent in all 5. Three times as many species occur in the wetter half as in the drier half. And, three times as many species are restricted to marsh as to barrens. The number of species in each segment increases by about 50 per cent from the dry to the wet end, until in marsh there are 2.5 times as many species as in barrens.

[1] Microdistribution——— distribution on a strictly local level, usually in terms of one or a few dominant environmental variables.

[2] Abundance here is the relative abundance of one species along the moisture gradient———no attempt is made to graph the actual abundance of any species. Therefore, the graphs of all the species have the same height.

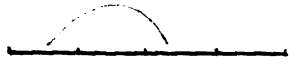


C. albo-nigra

shrubby or grassy S-facing meadows.

moraine slopes and alluvial fans 1900-4000.

scarce.



C. amblyorhyncha

wet meadows and marshes with or without standing water.

river terraces, lower moraine slopes, and flat ridges, 70-2700.

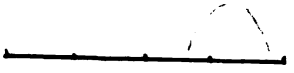
occasional.

C. aquatilis var. stans

marshes and wet river sands.

moraine flats, river floodplains, stream sides, and lake margins, sea level to 3500.

abundant.



the dominant species of much of the marshland of the Slope, and restricted to marsh, dropping out quickly in both wet meadow and aquatic vegetation——— a species of narrow ecological range but great abundance.

C. atrofusca

wet meadows and tussocky marshes.

river terraces, alluvial fans, and lower moraine slopes, 70-2000.

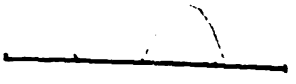
common.

C. bicolor

wet sand or silt.

lake margins, stream sides, and marshes.

scarce.



*b-barrens, u-upland meadow, w-wet meadow, m-marsh, a-aquatic.

C. capillaris s.l.

barrens to wet meadow and the drier microsites of marshes.

flats and slopes of mountains, moraines, and river valleys, 350-3500.

common.

a successful colonizer of disturbed peat and mineral surfaces of solifluxion lobes, frost boils or scars, and young river terrace soils.

C. capitata

upland to wet meadows on organic or mineral soils.

river terraces 1500-2500.

scarce.

C. chordorrhiza

pond margins and marshes, often in shallow stagnant water.

river terraces, sea level to 3000.

common.

C. glacialis

frost boils, barrens, and sparsely vegetated upland meadows.

moraine crests and ridge tops, 350-3100.

scarce.

C. glareosa var. amphigena

wet sand and clay, often near the nesting grounds of sea birds, (Porsild, 1957).

sea coast.

common on the coast.

C. gynocrates

wet meadows.

moraine slopes, alluvial fans, and river terraces.

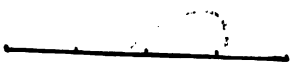
scarce.

C. holostoma

wet meadows to marshes.

river terraces and pond margins, 350-1800.

occasional.



C. krausei

upland meadows on organic or mineral soils.

moraine slopes and dry river terraces, 1800-2000.

scarce.

C. lachenalii

wet sand or organic soil.

marshes, pond margins, and stream sides, sea level to 3000.

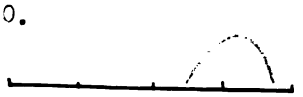
common.

C. laxa

sedge marshes.

gentle moraine slopes of river valleys, 1500.

very rare.

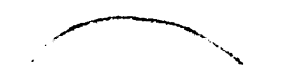


C. lugens

upland heath meadows to wet meadows and cottongrass tussocks, moss tufts, and peat hummocks of marshes.

mountain flats, moraine slopes and ridges, alluvial fans, and river terraces, 70-4800.

abundant.

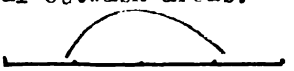


C. macloviana

grassy, S-facing slopes, wet meadows, and drier sites in marshes.

mountain flats, lake shores, and flat glacial outwash areas.

scarce.



C. maritima

dune and shore vegetation on sandy and gravelly soils.

seacoast, lake shores, and bluffs along stream sides, sea level to 3000.

scarce inland, common on the coast.

C. membranacea

wet meadows to marshes in bog soil, or sand and silt of river floodplains.

river terrace flats, lake margins and stream sides, and alluvial fans, sea level to 3500.

common.

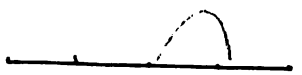
often a successful colonizer of older frost boils on lake margins.

C. microglochin

wet meadows.

moraine slopes and sloping river valleys.

scarce.



C. misandra

upland meadows to marshes on organic and mineral soils.

talus slopes of limestone, quartzite, and sandstone, and river terraces, sea level to 4000.

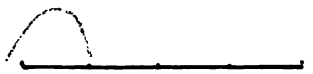
common.

C. nardina

barrens to upland meadows in soil or calcareous sand or gravel.

steep talus, till, or blowout slopes of mountains, moraines, and river banks, sea level to 4000.

scarce.

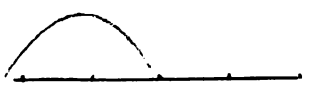


C. obtusata

barrens to wet meadows in usually calcareous soil, sand, or gravel.

steep talus and moraine slopes, 350-3500.

scarce.



C. petricosa

grassy, upland meadows on calcareous soils.

steep talus slopes, 2000.

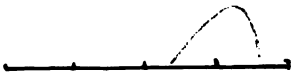
scarce.

C. physocarpa

in marshes and along streams, often in sand.

river terraces and moraine flats, 70-3500.

common.

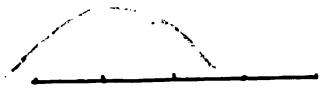


C. podocarpa

upland meadows to marshes.

river terraces, moraine crests and slopes, and alluvial fans, sea level to 5300.

common.



C. pariflora

wet meadows and marshes, occasionally in stagnant water.

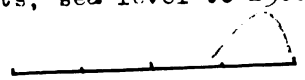
river terraces and floodplains, sea level to 3500.

C. rotundata

marshes, often in stagnant water, often on raw mineral soil.

river terraces and alluvial or moraine flats, sea level to 2500.

occasional.

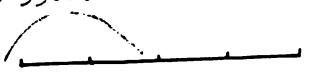


C. rupestris

barrens and upland meadows in calcareous sandy, gravelly, or rocky soils.

crests of ridges, knolls, and moraines, 50-3500.

common.



C. scirpoidea

barrens to marshes on organic and mineral, often calcareous, soils.

slopes and flats, sea level to 5000.

abundant.

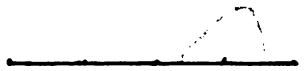
a species of wide tolerances to exposure, moisture, and soil conditions.

C. subspathacea

wet sands and clays.

saline tidal flats, sea level.

scarce.



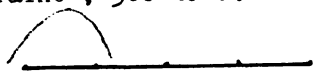
a strictly littoral species.

C. supina ssp. spaniocarpa

barrens and upland meadows, on sandy, gravelly and rocky soils.

exposed crests and slopes of knolls and moraines, 500-2000.

rare.

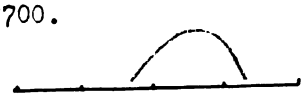


C. tenuiflora

wet meadows and marshes, on moist or flooded organic or mineral soils.

flats of river terraces and moraines, 500-2700.

rare.

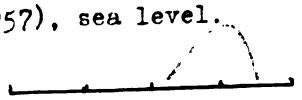


C. ursina

wet, tide-washed sands.

sheltered sea and lagoon shores (Porsild, 1957), sea level.

scarce.

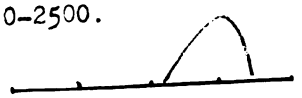


C. vaginata

wet meadows to marshes, often on hummocks and tussocks.

flats of river terraces and low moraines, 100-2500.

occasional.



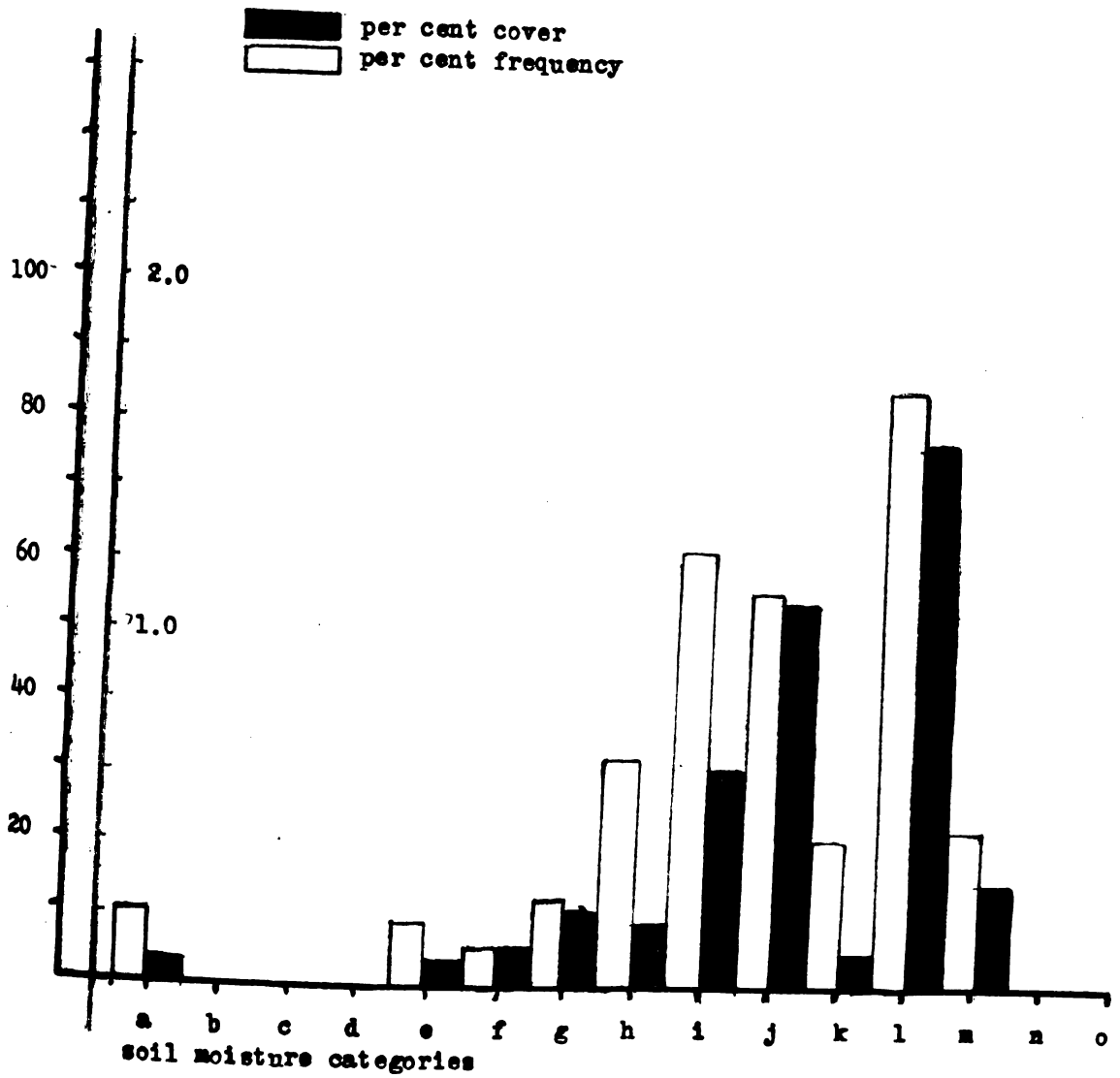
C. williamsii

tussock meadows and drier microsites of marshes, often on moss tufts, cottongrass tussocks, and peat hummocks.

river terraces and alluvial fans, 100-3000.

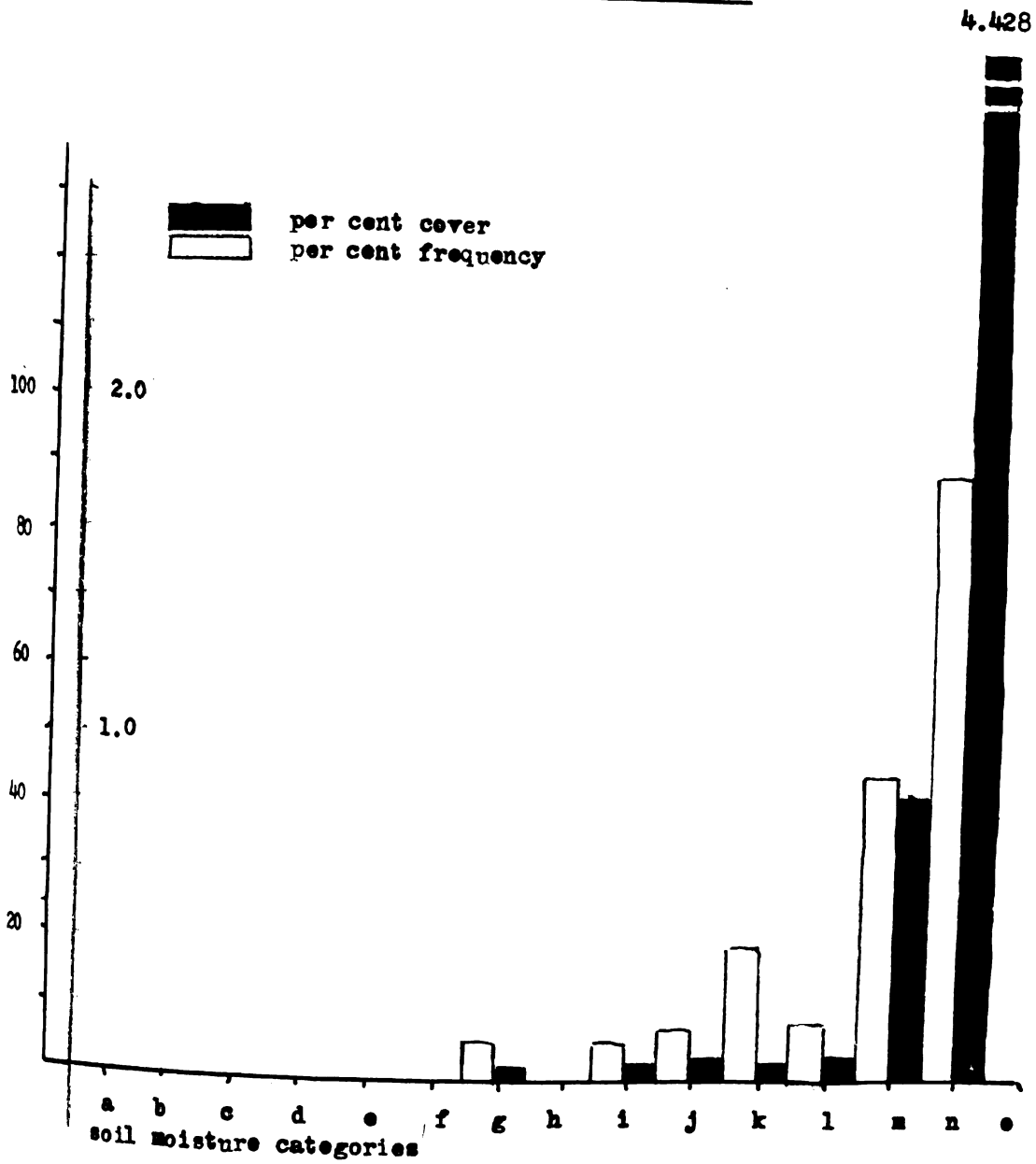
occasional.

graph of abundance against soil moisture



Carex lugens Holm (68 quadrats of 625 cm^2)

graph of abundance against soil moisture



Carex aquatilis Wahlenb. var stans (Drej.) Ostenf.. (31 quadrats of 625 cm^2)

Environmental measurements obtained in the transect studies for the common species *C. aquatilis* var. *stans*[1], *C. lugens*, and *C. podocarpa*[2] are tabulated on pp. 36 and 37.

[1] *C. aquatilis* or *C. stans* of some authors.

[2] *C. montanensis* or *C. microchaeta* of some authors.

CATEGORY	DATA (average of quadrats)
C. pododarpa R.Br. (cont'd.)	
per cent bryophyte cover	11
per cent shrub cover (over 12 inches)	0.05
per cent vascular cover	36
macrorelief	till and fan slopes
mesorelief	polygons present 71 per cent
	solifluction present 17 per cent
microrelief	moss tufts present 34 per cent
	boulders present 25 per cent
	erosion evident 22 per cent

CATEGORY	DATA (average of quadrats)
C. aquatilis Wahlenb. var. *stans* (Drej.) Ostenf. (31 quadrats of 625 cm^2)	
depth to frost	15 inches
slope angle	close to 0
snow depth (estimated)	moderate to deep
snow melt-off (estimated)	average
presence of carbonates	none
per cent organic matter cover	22
per cent bare rock and soil cover	0 05
per cent lichen cover	0.5
per cent bryophyte cover	19
per cent shrub cover (over 12 inches)	2
per cent vascular cover	34
macrorelief	terrace and old lake bottom
mesorelief	polygons present 20 per cent strangmoors present 13 per cent
microrelief	tussocks present 42 per cent moss tufts present 42 per cent
C. lugens Holm (68 quadrats of 625 cm^2)	
depth to frost	19 inches
slope angle	very slight to slight
snow depth (estimated)	deep
snow melt-off (estimated)	average
presence of carbonates	none
per cent organic matter cover	15
per cent bare rock and soil cover	0.05
per cent lichen cover	6
per cent bryophyte cover	84
per cent shrub cover (over 12 inches)	0.05
per cent vascular cover	48
macrorelief	terrace, fan, and low till
mesorelief	polygons present 41 per cent solifluction present 12 per cent
microrelief	moss tufts present 56 per cent tussocks present 28 per cent
C. podocarpa R.Br. (65 quadrats of 625 cm^2)	
depth to frost	over 40 inches
slope angle	slight
snow depth (estimated)	moderate to light
snow melt-off (estimated)	average to early
presence of carbonates	present 10 per cent
per cent organic matter cover	15
per cent bare rock and soil cover	2
per cent lichen cover	27

CATEGORY	DATA (average of quadrats)
C. pododarpa R.Br. (cont'd.)	
per cent bryophyte cover	11
per cent shrub cover (over 12 inches)	0.05
per cent vascular cover	36
macrorelief	till and fan slopes
mesorelief	polygons present 71 per cent
	solifluction present 17 per cent
microrelief	moss tufts present 34 per cent
	boulders present 25 per cent
	erosion evident 22 per cent

Key to the Carex species of the Arctic Slope of Alaska.

1.	spike single, terminal.	2
1.	spikes 2 or more.	9
2.	spike unisexual or usually so.	3
2.	spike bisexual.	4
3.	stigmas 2, perigynium hairy.	C. scirpoidea
3.	stigmas 3, perigynium not hairy.	C. gynocrates
4.	spike gynaecandrous, species littoral.	C. ursina
4.	spike androgynous, species not littoral.	5
5.	stigmas 3.	6
5.	stigmas 2.	8
6.	leaves filiform, perigynium 5-6 mm long, subulate and reflected.	C. microglochin
6.	leaves not filiform, perigynium 3 mm long, lanceolate and not reflected.	7
7.	leaf sheaths brown, perigynium dull brown at maturity, leaves curled.	C. rupestris
7.	leaf sheaths dark purple, perigynium shiny dark brown at maturity, leaves not curled.	C. obtusata
8.	leaves longer than the culm, perigynium stipitate.	C. nardina
8.	leaves shorter than the culm, perigynium not stipitate.	C. capitata
9.	spikes sessile.	10
9.	spikes pedunculate.	16

10.	spikes gynaecandrous.	11
10.	spikes androgynous.	15
11.	perigynium brown-orange, spikes 3-7, the lowermost perigynia in each spike erect.	C. macloviana
11.	perigyhium green or gold, spikes 2-5, the lowermost perigynia in each spike reflected.	12
12.	spikes clustered at apex of the culm.	13
12.	spikes approximate but separated on the culm.	14
13.	perigynium elliptic and green, pistillate scale silvery and transparent.	C. tenuiflora
13.	perigynium lanceolate and golden brown, pistillate scale brown.	C. lachenalii
14.	species littoral.	C. glareosa var. amphigena
14.	species not littoral.	C. amblyorhyncha
15.	spikes crowded into dense, ovoid, lowermost perigynia reflected, perigynium distinctly stipitate.	C. maritima
15.	spikes approximate on culm, lowermost perigynia erect, perigynium not stipitate.	C. chordorrhiza
16.	stigmas 2.	17
16.	stigmas 3.	21
17.	terminal spike gynaecandrous.	C. bicolor
17.	terminal spike staminate.	18
18.	lower spikes drooping on capillary peduncles, perigynium distinctly beaked.	C. physocarpa
18.	lower spikes erect on stout peduncles, perigynium short-beaked or beakless.	19
19.	dwarf littoral sedge, culms hidden among the leaves, pistillate spikes few-flowered.	C. subspathacea
19.	coarse bog and meadow sedge, culms longer than the leaves, pistillate spikes many-flowered.	20

20. lowest bract longer than the inflorescence, pistillate spikes long-cylindrical. *C. aquatilis* var. *stans*

20. lowest bract shorter than the inflorescence, pistillate spikes oblong to cylindrical. *C. lugens*

21. terminal spike gynaedandrous, plant densely caespitose. 22

21. terminal spike androgynous, plant caespitose or stoloniferous. 23

22. pistillate spikes few-flowered with zig-zag rachilla. *C. krausei*

22. pistillate spikes many-flowered with spike axis hidden. *C. misandra*

23. lowest bract long-sheathing (over 10 mm). 24

23. lowest bract not sheathing or short-sheathing (less than 5 mm). 29

24. pistillate spikes 2-ranked and few-flowered with zig-zag rachilla. 25

24. pistillate spikes not 2-ranked and few- to many-flowered with rachilla hidden. 26

25. pistillate spikes drooping on capillary peduncles, leaves flat. *C. capillaris*

25. pistillate spikes erect on capillary peduncles, leaves filiform. *C. williamsii*

26. perigynium scabrous-margined and 4-5 cm long. *C. petricosa*

26. perigynium smooth-margined and less than 4 mm long. 27

27. pistillate spikes erect on stout peduncles, perigynium beak bidentate. *C. vaginata*

27. pistillate spikes drooping on capillary peduncles, perigynium beak truncate or bidentate. 28

28. perigynium distinctly stipitate, beak short and truncate, pistillate scale brown with green midvein. *C. laxa*

28. perigynium rounded at the base, beak long and bidentate, pistillate scale purple-black with obscure midvein. *C. atrofusca*

29. pistillate spikes erect or spreading on short peduncles (2 mm or less). 30

29. pistillate spikes erect or drooping on long peduncles. 33

30. terminal spike gynaecandrous. *C. albo-nigra*

30. terminal spike staminate or with a few pistillate flowers at the base. 31

31. terminal spike hidden between the two lateral pistillate spikes. *C. holostoma*

31. terminal spike conspicuous. 32

32. lowest bract short-sheathing, plant caespitose. *C. glacialis*

32. lowest bract not sheathing, plant stoloniferous. *C. supina* ssp. *spaniocarpa*

33. lower pistillate spikes drooping or nodding on slender peduncles. 34

33. lower pistillate spikes erect on stout peduncles. 35

34. lowest bract short-sheathing, perigynium nearly beakless, spikes 2 or 3. *C. rariflora*

34. lowest bract not sheathing, perigynium short-beaked, spikes 3-7. *C. podocarpa*

35. leaves flat, lowest bract erect. *C. membranacea*

35. leaves involute, lowest bract reflected. *C. rotundata*

Glossary of Terms

androgynous (Carex) said of a spike in which the staminate flowers are borne above (acropetal to) the pistillate flowers.

approximate close together but not touching.

auricle an ear-shaped appendage.

bidentate having two teeth.

bisexual having both stamen(s) and pistil(s).

bract a modified leaf subtending a flower or inflorescence.

caespitose growing in tufts or mats.

calcareous rich in lime.

capillary hair-like.

contiguous touching.

culm the stem of grasses or sedges.

cylindrical shaped like a cylinder.

foliaceous leafy.

filiform thread-like.

involute rolled longitudinally as in the leaves of Ammophila.

glabrous lacking pubescence, smooth.

gynaecandrous (Carex) said of a spike in which the staminate flowers are borne below (basipetal to) the pistillate flowers.

habit the general appearance of a plant.

habitat the local environment of a plant, such as marsh.

hyalin transparent or translucent.

Glossary of Terms (cont'd.)

midvein (midrib) median or central vein of a bract or leaf.

mucronate with a small, abruptly pointed tip.

lanceolate 

linear 

littoral (litoral) growing on seashores.

nerved marked with veins or slender ribs.

nerveless not nerved.

oblanceolate 

obovate 

obtuse blunt.

ovate 

pedunculate supported by a flower stalk.

perigynium (Carex) the inflated sac enclosing the achene.

rachilla small rachis, (Carex) the spike axis.

reflected (Carex) turned downward or back on itself.

runner a slender stolon.

scabrous rough, armed with minute bristles.

scale (Carex) a membranaceous bract lacking chlorophyll.

sessile lacking a stalk.

sheath a tubular envelope.

spike (Carex) an inflorescence of sessile florets along a common axis.

stigma the part of the pistil that receives pollen.

Glossary of terms (cont'd.)

stipitate with a short stalk.

stoloniferous producing runners or any basal branch which tends to root.

subulate 

truncate cut off transversely.

unisexual with stamens or pistils but not both.

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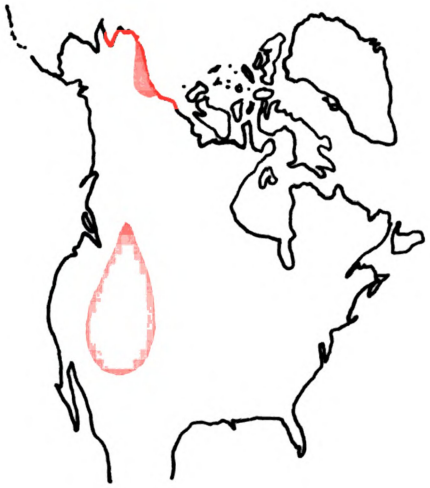
Carex albo-nigra Mack.

Loosely tufted with a short, stout rhizome and persistent purple basal sheaths. Culm 25-45 cm long, twice as long as the 2-3 mm wide leaves. Lowest bract foliaceous, short-sheathing (1-2 mm), shorter than the inflorescence. Spikes 3 or 4, contiguous, the terminal gynaecandrous, club-shaped, 15 x 5 mm, the lateral pistillate, elliptic, 7 x 3 mm, erect on stout peduncles. Pistillate scale slightly longer than the perigynium, dark brown with a distinct hyalin margin and narrow buff-colored midvein. Perigynium elliptic, smooth-margined, nerveless, dull dark brown at maturity, with a short (0.4 mm) shallowly bidentate beak. Stigmas 3.



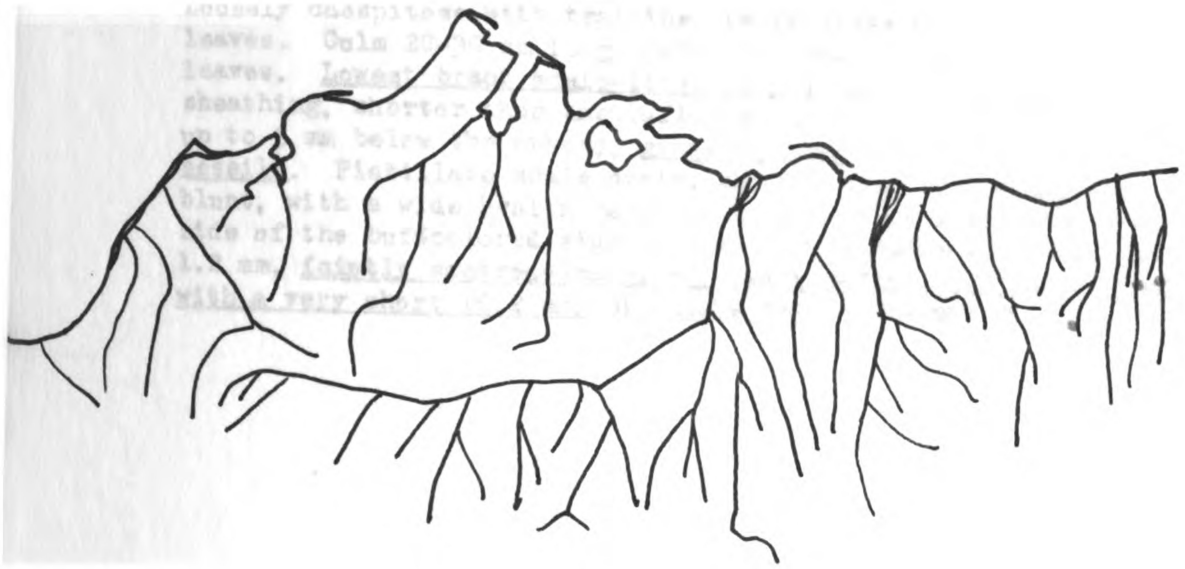
Carex albo-nigra Mack.

a

b c

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex albo-nigra Mack.

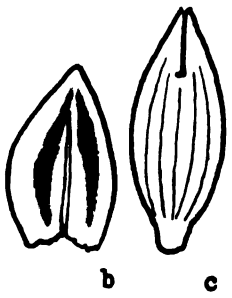


Lakes Schrader and Peters, 69°22' N, 145°00' W, Spetzman (acc. to Spetzman) 668, Scholander and Flagg (acc. to Spetzman) 186.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-1795, 57-1749, 57-2073, 57-2240, Cantlon-Malcolm 58-504, Malcolm 5.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-1748.

Carex amblyorhyncha Krecz.

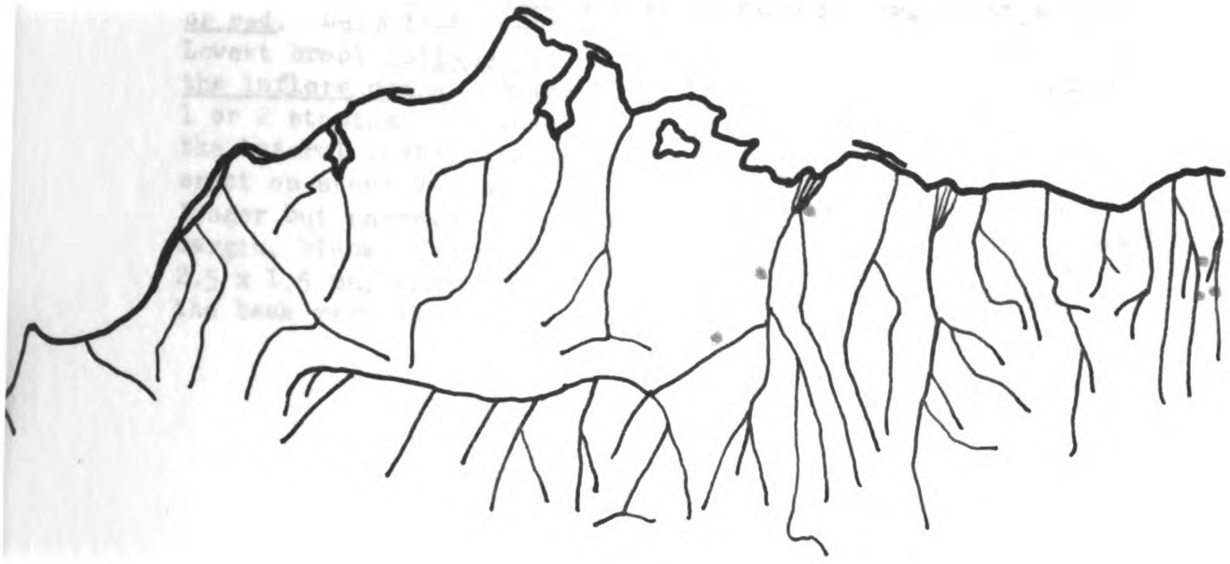
Loosely caespitose with trailing, leafy stems and persistent dead leaves. Culm 20-30 cm long, twice as long as the 0.7-1.5 mm wide leaves. Lowest bract scale-like, tipped with a scabrous awl, not sheathing, shorter than the inflorescence. Spikes 2-4, the lowest up to 5 mm below the others, gynaecandrous, obovate, 6 x 4 mm, sessile. Pistillate scale ovate, shorter than the perigynium, blunt, with a wide hyalin margin and 2 chestnut stripes on each side of the buff-colored midvein area. Perigynium elliptic, 2.7 x 1.2 mm, faintly scabrous-margined, many-nerved, dull gold-brown with a very short (0.2 mm) bidentate beak. Stigmas 2.

Carex amblyorhyncha Krecz.



a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex amblyorhyncha Krēcz.

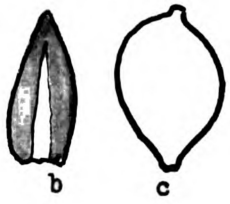


Umiat, 69°22' N, 152°10' W, Porsild (acc. to Porsild).
Kogosukruk River, 69°46' N, 151°50' W, Cantlon et al 53-368, 53-419, 53-515.
Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W, Cantlon et al 53-584.
12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-448, 58-247, 58-447.
Okpilak Lake, Okpilak River, 69°23' N, 143°47' W, Cantlon-Malcolm 58-155.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-931, 57-1002, 57-1142, 57-1458, 57-1581, 57-2438.

Carex aquatilis Wahlenb. var. stans (Drej.) Ostenf.

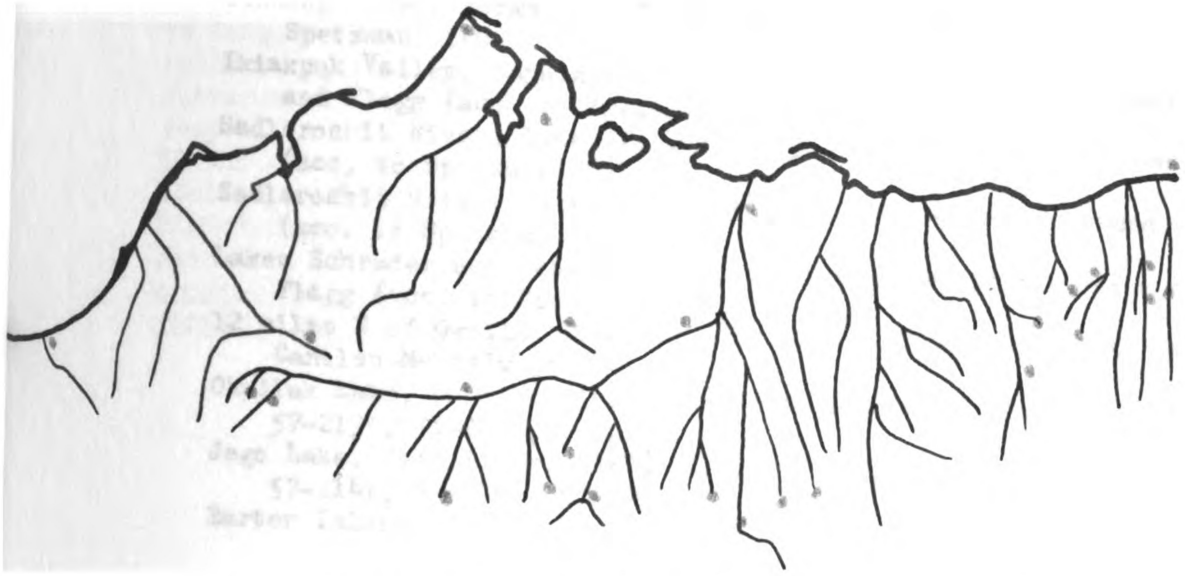
Coarse, stoloniferous, marsh species, the basal sheaths purple or red. Culm 15-40 cm long, 1.5 times the 2-5 mm wide leaves. Lowest bract foliaceous, not sheathing, equal to or longer than the inflorescence. Spikes 4 or 5, the lowest remote, the terminal 1 or 2 staminate, oblanceolate, 15 x 5 mm (the lower smaller), the lateral pistillate, linear to cylindrical, 15-30 x 3-5 mm, erect on stout 2-6 mm long peduncles. Pistillate scale lanceolate, longer but narrower than the perigynium, acute, lacking a hyalin margin, black, the midvein green. Perigynium obovate to circular, 2.5 x 1.5 mm, smooth-margined, nerveless, dull cream or green, the beak very short (0.2 mm) and truncate. Stigams 2.

Carex aquatilis Wahlenb. var. stans (Drej.) Ostenf.



a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex aquatilis Wahlenb. var. **stans** (Drej.) Ostenf.



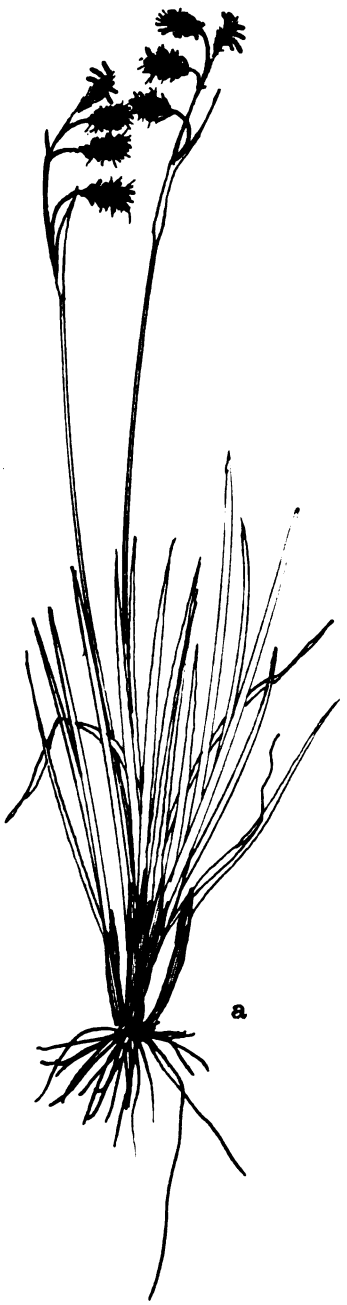
Pitmegea River, 68°54' N, 164°35' W, Cantlon-Gillis 57-297.
Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 3716, 3922, 2965, 4265.
Nuka River, 68°45' N, 159°50' W, Spetzman (acc. to Spetzman) 3966, 4073.
Carbon Creek, 69°15' N, 158°30' W, Spetzman (acc. to Spetzman) 2231.
Barrow, 71°20' N, 156°40' W, Scholander (acc. to Spetzman) 595.
Colville River, 68°45' N, 156°20' W, Spetzman (acc. to Spetzman) 2271.
Howard Pass, Etivluk River, 68°15' N, 156°50' W, Spetzman (acc. to Spetzman) 2305.
Alaktak, Chipp River, 69°48' N, 155°00' W, Scholander (acc. to Spetzman) 173, Spetzman (acc. to Spetzman) 2442.
Lake near Maybe Creek, 69°20' N, 154°20' W, Spetzman (acc. to Spetzman) 2549.
Kurupa Lake, 68°22' N, 154°40' W, Spetzman (acc. to Spetzman) 3760.
Oolamnagavik River, Mount Front, 68°30' N, 154°33' W, Olson (acc. to Spetzman) 22.
Killik River, 68°10' N, 154°10' W, Lachenbruch (acc. to Spetzman) 16.
Umiat, 69°22' N, 152°10' W, Cantlon et al 53-1, 53-110, 53-128, 53-140, 53-201, 53-692, 53-4065, 53-5067, Scholander (acc. to Spetzman) 172, Spetzman (acc. to Spetzman) 1259, 2700, 2731.
Natavakruak Lake, headwaters of tributary of Siksikpuk River, 68°24' N, 151°38' W, Cantlon et al 53-5154.
E of Colville River at delta, 70°13' N, 150°55' W, Cantlon et al 53-589.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1758.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1969.

Itkillik River, lakes, 68°30' N, 150°00' W, Gudin (acc. to Spetzman) 6.
Canning River, forks, 69°13' N, 145°54' W, Spetzman (acc. to Spetzman) 360.
Ikiakpuk Valley, Canning River, 69°25' N, 145°30' W, Scholander and Flagg (acc. to Spetzman) 174.
Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 871.
Sadlerochit River, Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1057.
Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 171.
12 miles N of Okpilak Lake, Okpilak River, 69°25' N, 143°56' W, Cantlon-Malcolm 58-260.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-2135, 57-2331, 57-2275.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-927, 57-1141, 57-1446, 57-1591, 57-1610.
Barter Island, 70°10' N, 143°40' W, Spetzman (acc. to Spetzman) 1233.

Carex atrofusca Schk.

Loosely caespitose, the older leaves disintegrating. Culm 25-40 cm long, 3 times longer than the 2-4 mm wide leaves. Lowest bract foliaceous, long-sheathing (15-25 mm), much shorter than the inflorescence. Spikes 3-5, remote, the terminal staminate, club-shaped, 15 x 5 mm, the lateral pistillate, ovate to elliptic, 10 x 6 mm, drooping on long (10-40 mm) capillary peduncles. Pistillate scale lanceolate, equal to the perigynium, acute, hyalin-tipped, black, with an obscure midvein. Perigynium ovate-lanceolate, 4 x 1.5 mm, scabrous-margined, nerveless, dull black with a cream-colored base, tapering to a 1 mm long, hyalin-tipped, strongly bidentate beak. Stigmas 3.

Carex atrofusca Schk.



a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

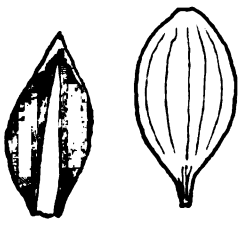
Carex atrofusca Schk.

Meade River, 70°40' N, 157°20' W (approx.), Porsild (acc. to Porsild).
Umiat, 69°22' N, 152°10' W, Cantlon et al 53-281, Spetzman (acc. to Spetzman) 2683.
Confluence of Kogosukruk and Colville Rivers, 69°46' N, 151°50' W, Cantlon et al 53-384.
8 miles W of Itkillik River, 69°50' N, 150°33' W, Cantlon et al 53-4748.
Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W, Cantlon et al 53-478, 53-657.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-2021, Cantlon-Malcolm 58-512, Malcolm 10.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-951, 57-590, 57-989, 57-1449, 57-1540, Cantlon-Malcolm 58-548.

Carex bicolor All.

Loosely caespitose, the old leaves persisting. Culm 5-20 cm long, nodding, 2-3 times the 1-3 mm wide leaves. Lowest bract foliaceous, black-auricled, equal to or longer than the inflorescence. Spikes 3, contiguous, the terminal gynaecandrous, oblanceolate to obovate, 7 x 3 mm, the lateral pistillate, obovate, 7 x 3 mm, erect on long (10 mm) peduncles. Pistillate scale obovate, shorter than the perigynium, acute to mucronate, hyalin-margined, dark brown with a lighter midvein area. Perigynium obovate, 2.5 x 1.5 mm, somewhat stipitate, smooth-margined, faintly many-nerved, dull light green with a very short (0.1 mm) truncate beak. Stigmas 2.

Carex bicolor All.



b c

a

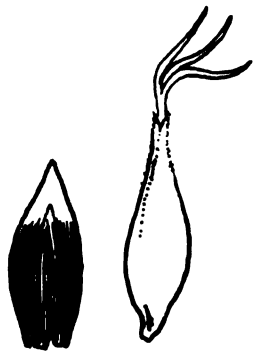
a habit (1/2)
b pistillate scale (10/1)*
c perigynium (10/1)*

* redrawn from Mackenzie, 1940, plate 269, a and h.

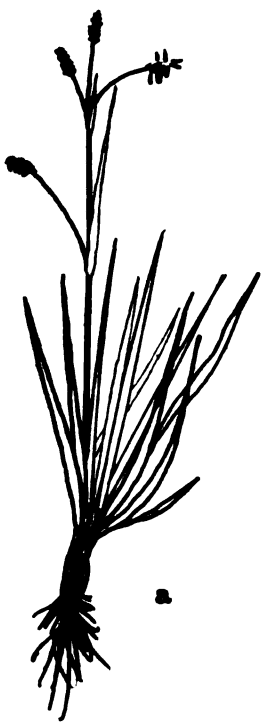
Carex capillaris L.

Densely caespitose, the dead leaves persisting. Culm 5-20 cm long, filiform, about 3 times the 1-2 mm wide leaves. Lowest bract foliaceous, long-sheathing (7-12 mm), shorter than the inflorescence. Spikes 3-5, remote, the terminal staminate, lanceolate, 5 x 1 mm, the lateral pistillate, cylindrical to oblanceolate, 7 x 2 mm, drooping on long (15-30 mm) capillary peduncles, lax-flowered with a zig-zag rachis. Pistillate scale ovate, shorter than the perigynium, acute to obtuse, with a broad hyalin margin, chestnut brown, the midvein obscure. Perigynium lanceolate, 3 x 1 mm, scabrous-margined, not nerved, shiny dark brown, tapering to a long (0.8 mm) hyalin-tipped, bidentate beak. Stigmas 3.

Carex capillaris L.



b c



a

d

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)
d terminal spike portion of inflorescence (10/1)

Carex capillaris L.

Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 3923.
E of Nigu River, 68°30' N, 156°27' W, Cantlon et al 53-4687.
Lake near Maybe Creek, 69°30' N, 154°20' W, Spetzman (acc. to Spetzman) 2551.
Killik River, 68°30' N, 154°20' W, Cantlon et al 53-4817.
Umiat, 69°22' N, 152°10' W, Cantlon et al 53-100, 53-124, 53-293, Scholander (acc. to Spetzman) 161, 163, Spetzman (acc. to Spetzman) 1261.
Confluence of Kogosukruk and Colville Rivers, 69°46' N, 151°25' W, Cantlon et al 53-404, 53-439, 53-537, 53-542.
Anaktuvuk Pass, Tuliguk Lake, 68°42' N, 151°25' W, Spetzman (acc. to Spetzman) 1626, 1649, 1886.
Itiakpuk Valley, Caning River, 69°25' N, 145°30' W, Scholander and Flagg (acc. to Spetzman) 164.
Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 1022.
Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 159.
Sadlerochit River, Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1062.
12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-258, 58-244.

Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-1900, Cantlon-Malcolm 58-22, 58-446.

10 miles N of Jago Lake, Jago River, 69°45' N, 143°42' W, Cantlon-Gillis 57-1668.

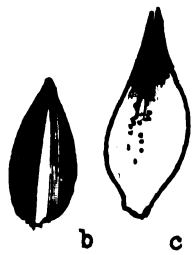
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-552, 57-608, 57-749, 57-972, 57-1057, 57-1442, 57-1452.

Carex capitata L.

Loosely caespitose, with dark brown basal sheaths and persisting old leaves. Culm 15-25 cm long, 1.5 to 2 times the filiform, 0.8 mm wide, trigonous leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spike single, terminal, androgynous, ovate, 6 x 6 mm. Pistillate scale ovate, shorter than the perigynium, acute, with a hyalin margin, chestnut brown, the midvein obscure. Perigynium lanceolate-ovate, 3.5 x 1.2 mm, smooth-margined, nerveless, shiny brown above, tapering to a long (0.7 mm) bidentate beak. Stigmas 2.

Carex capitata L.

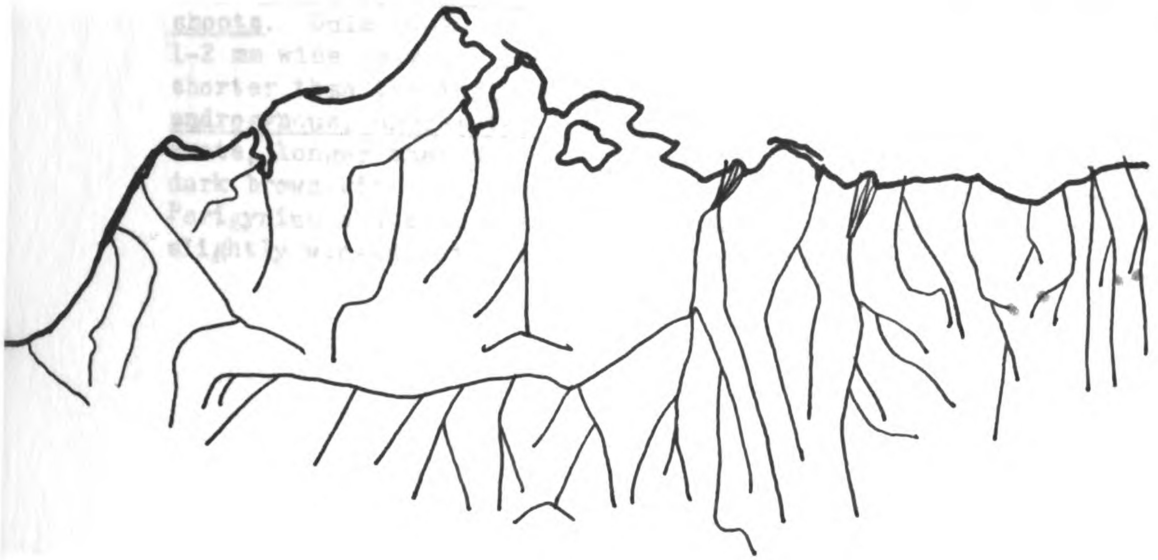
a



b c

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex capitata L.



Ikiakpuk Valley, Canning River, 69°25' N, 145°30' W, Scholander and Flagg (acc. to Spetzman) 150, Spetzman (acc. to Spetzman) 1254.

Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 857.

Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Malcolm 58-270.

Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-1613.

Carex chordorrhiza Ehrh.

Stoloniferous, with long, few-scaled runners and leafy ascending shoots. Culm 10-20 cm long, equal to or slightly longer than the 1-2 mm wide leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spikes 3-8, contiguous, sessile, androgynous, aggregated into a head 10 x 15 mm. Pistillate scale ovate, longer than the perigynium, acute, hyalin at the margins, dark brown with a green or buff midvein area. Midvein obscure. Perigynium ovate, 2 x 1 mm, smooth-margined, nerved, dull brown, slightly winged, with a 0.3 mm, bidentate beak. Stigmas 2.

Carex chordorrhiza Ehrh.

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex chordorrhiza Ehrh.

Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 4269, 4302, 4366.
Alaktak, Chipp River, 60°48' N, 155°00' W, Spetzman (acc. to Spetzman) 2446.
Umiat, 69°22' N, 152°10' W, Cantlon et al 53-117, 53-119, 53-138, 53-279, 53-4567, 53-5068, 53-5245, Scholander (acc. to Spetzman) 148, Spetzman (acc. to Spetzman) 1256, 2216, 2682.
Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W, Cantlon et al 53-5333, 53-477.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzan (acc. to Spetzman) 1780.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1977.
Ikiakpuk Valley, Canning River, 69°25' N, 145°30' W, Scholander and Flagg (acc. to Spetzman) 151.
12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-248.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-955, 57-612a, 57-1134.

Carex glacialis Mack.

Densely caespitose, with purple basal sheaths. Culm 3-9 cm long, 1.5 times the 0.3-0.8 mm wide leaves. Lowest bract foliaceous and short-sheathing (1.5 mm). Spikes 3 or 4, somewhat distant, the terminal staminate, lanceolate, 4 x 15 mm, the lateral pistillate, lax-flowered, 5 x 3 mm, erect on short (1.5 mm) peduncles. Pistillate scale ovate, shorter than the perigynium, obtuse, narrowly hyalin-margined, chestnut brown with a lighter green or tan midvein area. Perigynium ovate, 2 x 1 mm, smooth-margined, nerveless, dull brown above with a long (0.7 mm) bidentate beak. Stigmas 3.

Carex glacialis Mack.

a habit (1/2)
b inflorescence (10/1)

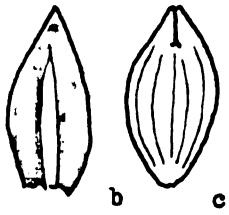
Carex glacialis Mack.

Umiat, 69°22' N, 152°10' W, Spetzman (acc. to Spetzman).
10 miles SSW of Umiat, 69°14' N, 152°27' W, Cantlon et al 53-4846, 53-4546.
8 miles S of Okpilak Lake, Okpilak River, 69°18' N, 144°00' W, (approx.), Cantlon-Malcolm 58-144.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-600, Cantlon-Malcolm 58-428, 58-600.

Carex glareosa Wahlenb. var amphigena Fern.

Loosely caespitose littoral species. Culm 10-25 cm long, twice the 1-2.5 mm wide leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spikes 2-4, more or less contiguous, the terminal gynaecandrous, obovate, 5 x 3 mm, the lateral ovate, 5 x 3 mm, sessile. Pistillate scale obovate, shorter than the perigynium, obtuse, widely hyalin-margined, dark brown, the midvein area tan. Perigynium ovate, 3.5 x 1 mm, smooth-margined, many-nerved, dull tan, somewhat stipitate, with a short (0.3 mm) truncate beak. Stigmas 2.

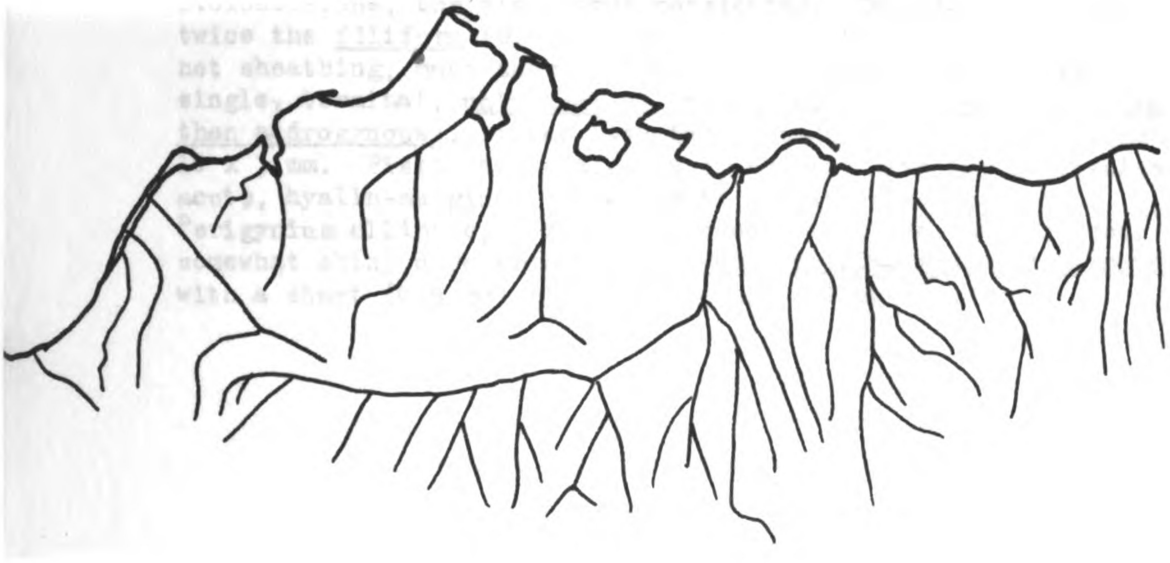
Carex glareosa Wahlenb. var. amphigena Fern.



a habit (1/2)*
b pistillate scale (10/1)
c perigynium (10/1)*

Porsild, 1957, p. 53, fig. 19e, and p. 48, fig. 16_{12}.

Carex glareosa Wahlenb. var. amphigena Fern.

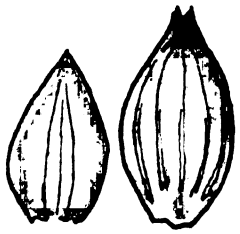


Coast SW of Barrow 40 miles (approx.) Porsild (acc. to Porsild).

Carex gynocrates Wormskj.

Stoloniferous, the old leaves persisting. Culm 5–20 cm long, twice the filiform (0.5 mm) leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spike single, terminal, unisexual or occasionally bisexual (the spike then androgynous), linear (staminate) to cylindrical (pistillate), 10 x 3 mm. Pistillate scale ovate, shorter than the perigynium, acute, hyalin-margined, brown, with a lighter midvein area. Perigynium elliptic, 3 x 1.5 mm, smooth-margined, many-nerved, somewhat shiny dark brown, the lower perigynia reflexed at maturity, with a short (0.5 mm) bidentate beak. Stigmas 2.

Carex gynocrates Wormskj.



b c

a

a habit (1/2)*
b pistillate scale (10/1)
c perigynium (10/1)*

* redrawn from Porsild, 1957, p. 50, fig. 17d and p. 48, fig. 16_3.

Carex glacialis Mack.

a habit (1/2)
b inflorescence (10/1)

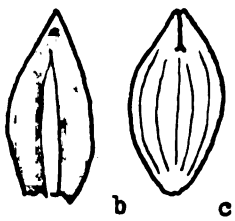
Carex glacialis Mack.

Umiat, 69°22' N, 152°10' W, Spetzman (acc. to Spetzman).
10 miles SSW of Umiat, 69°14' N, 152°27' W, Cantlon et al 53-4846, 53-4546.
8 miles S of Okpilak Lake, Okpilak River, 69°18' N, 144°00' W, (approx.), Cantlon-Malcolm 58-144.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-600, Cantlon-Malcolm 58-428, 58-600.

Carex glareosa Wahlenb. var amphigena Fern.

Loosely caespitose littoral species. Culm 10-25 cm long, twice the 1-2.5 mm wide leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spikes 2-4, more or less contiguous, the terminal gynaecandrous, obovate, 5 x 3 mm, the lateral ovate, 5 x 3 mm, sessile. Pistillate scale obovate, shorter than the perigynium, obtuse, widely hyalin-margined, dark brown, the midvein area tan. Perigynium ovate, 3.5 x 1 mm, smooth-margined, many-nerved, dull tan, somewhat stipitate, with a short (0.3 mm) truncate beak. Stigmas 2.

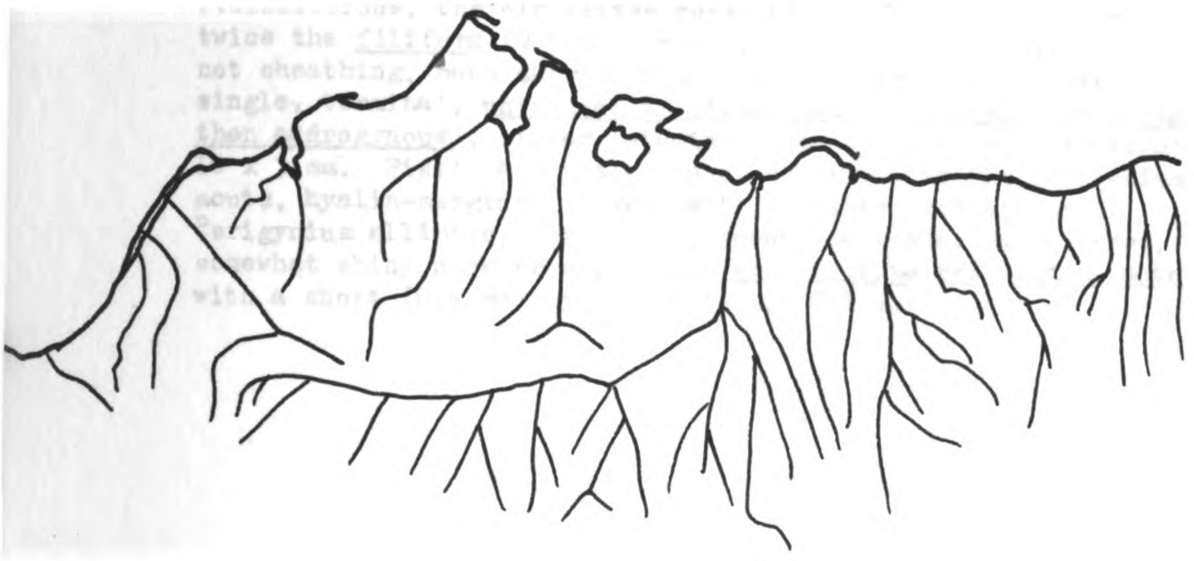
Carex glareosa Wahlenb. var. amphigena Fern.



a habit (1/2)*
b pistillate scale (10/1)
c perigynium (10/1)*

*redrawn from Porsild, 1957, p. 53, fig. 19e, and p. 48, fig. 16_{12}.

Carex glareosa Wahlenb. var. amphigena Fern.

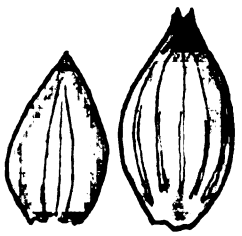


Coast SW of Barrow 40 miles (approx.) Porsild (acc. to Porsild).

Carex gynocrates Wormskj.

Stoloniferous, the old leaves persisting. Culm 5–20 cm long, twice the filiform (0.5 mm) leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spike single, terminal, unisexual or occasionally bisexual (the spike then androgynous), linear (staminate) to cylindrical (pistillate), 10 x 3 mm. Pistillate scale ovate, shorter than the perigynium, acute, hyalin-margined, brown, with a lighter midvein area. Perigynium elliptic, 3 x 1.5 mm, smooth-margined, many-nerved, somewhat shiny dark brown, the lower perigynia reflexed at maturity, with a short (0.5 mm) bidentate beak. Stigmas 2.

Carex gynocrates Wormskj.



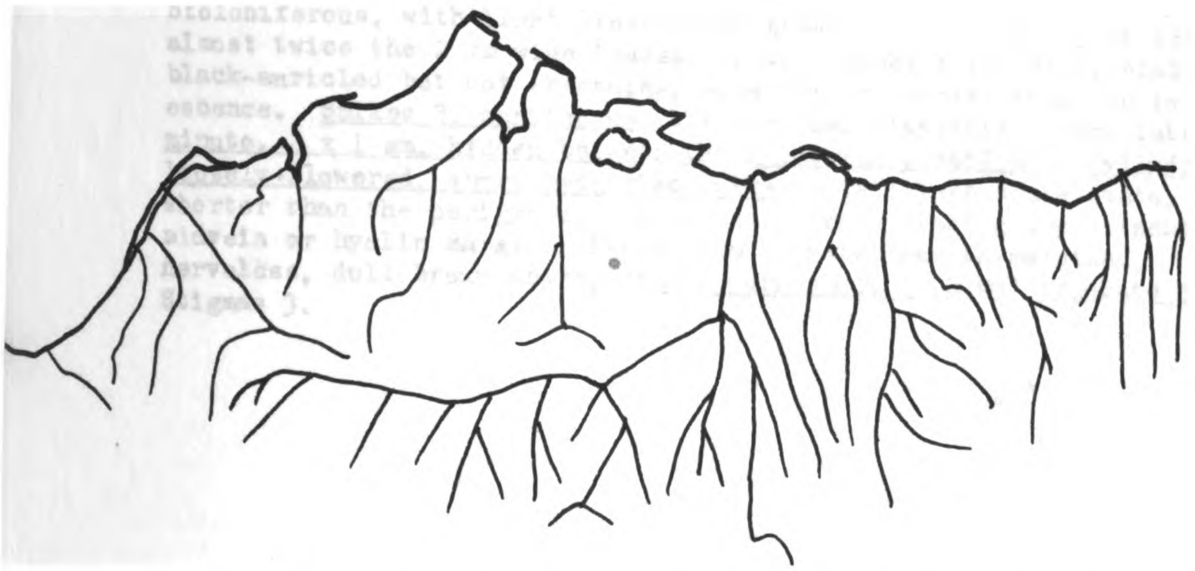
b c

a

a habit (1/2)*
b pistillate scale (10/1)
c perigynium (10/1)*

* redrawn from Porsild, 1957, p. 50, fig. 17d and p. 48, fig. 16_3.

Carex gynocrates Wormskj.



Price River, 69°52' N, 151°50' W, Spetzman (acc. to Spetzman).

Carex holostoma Drej.

Stoloniferous, with light brown basal sheaths. Culm 15-25 cm long, almost twice the 2 mm wide leaves. Lowest bract foliaceous, scabrous, black-auricled but not sheathing, equal to or shorter than the inflorescence. Spikes 3, contiguous, the terminal staminate, lanceolate, minute, 2 x 1 mm, hidden between the 2 lateral pistillate, cylindrical, loosely-flowered, short-peduncled spikes. Pistillate scale ovate, shorter than the perigynium, blunt, dark brown, lacing a prominent midvein or hyalin margin. Perigynium obovate, smooth-margined, nerveless, dull brown above, with a very short (0.2 mm) truncate beak. Stigmas 3.

Carex holostoma Drej.

a habit (1/2)
b lower portion of inflorescence (10/1)

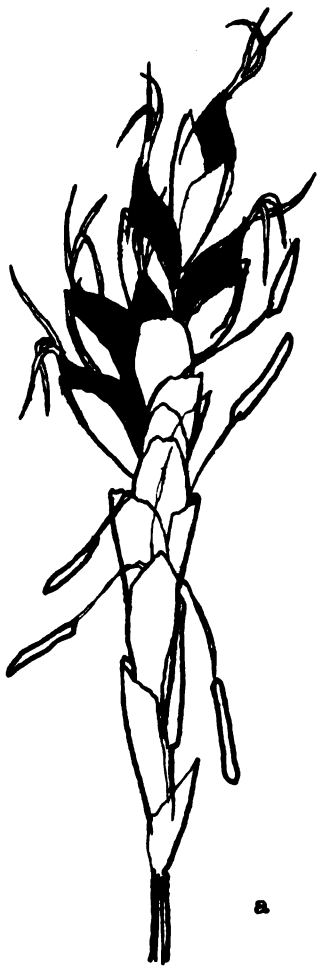
Carex holostoma Drej.

Umiat, 69°22' N, 152°10' W, Cantlon et al 53-282.
12 miles N or Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-253.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-984, Cantlon-Malcolm 58-555.

Carex krausei Boeck.

Similar to C. capillaris, but the terminal spike gynaecandrous.

Carex krausei Boeck.



a terminal spike (gynaecandrous) (10/1)

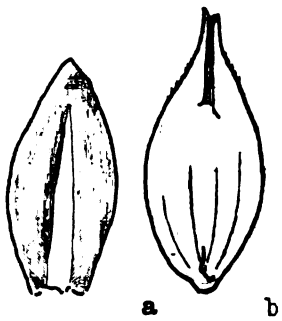
Carex krausei Boeck.

Umiat, 69°22' N, 152°10' W, Spetzman (acc. to Spetzman) 2198, 2663.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1763.
Itkillik River, lakes, 68°30' N, 150°00' W, Gudin (acc. to Spetzman) 8.
Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 940.
Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 160.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-1580, 57-2270.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Malcolm 58-109.

Carex lachenalii Schk.

Similar to C. amblyorhyncha, but the perigynium lanceolate, nerveless, and distinctly beaked (0.5 mm).

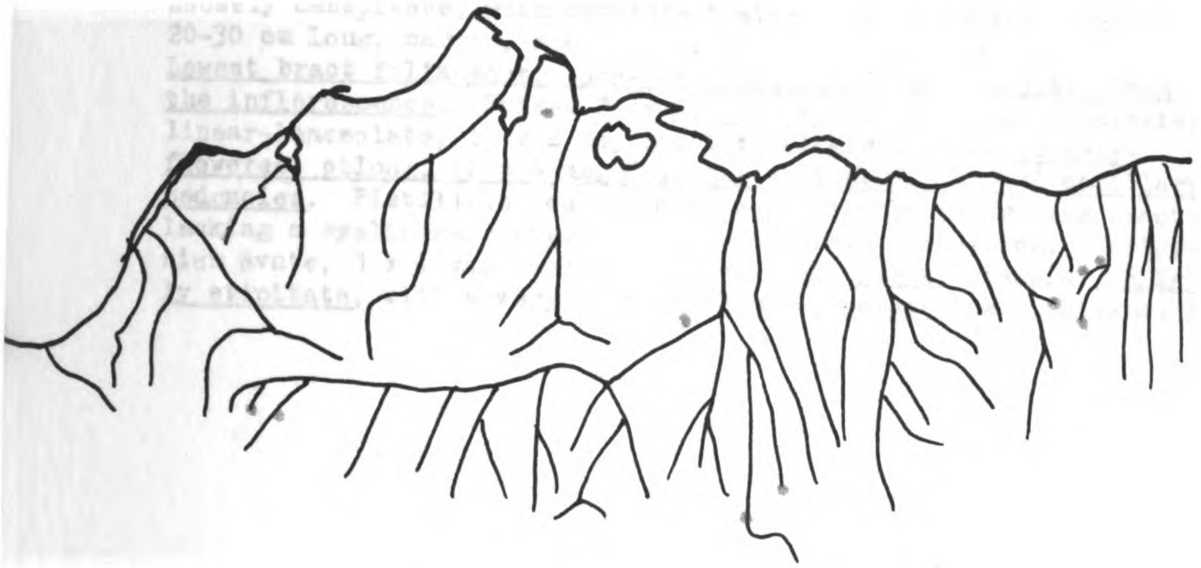
Carex lachenalii Schk.



a pistillate scale (10/1)
b perigynium (10/1)*

* redrawn from Porsild, 1957, p. 48, fig. 16_{10}.

Carex lachenalii Schk.

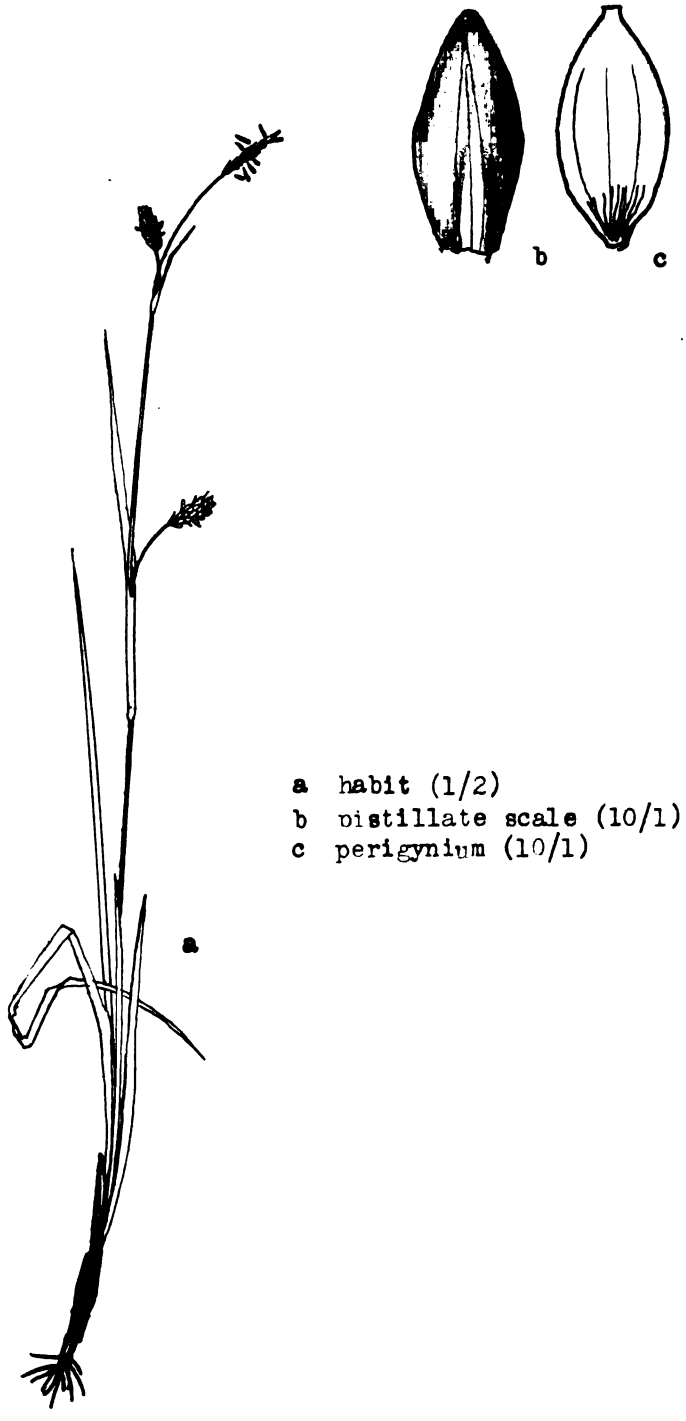


Point Hope, 68°22' N, 166°40' W, Porsild (acc. to Porsild).
Alaktak, Chipp River, 60°48' N, 155°00' W, Spetzman (acc. to Spetzman) 2445.
Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 4006.
Nuka River, 68°47' W, 159°50' W, Spetzman (acc. to Spetzman) 4408.
Umiat, 69°22' N, 152°10' W Scholander (acc. to Spetzman) 143, Spetzman (acc. to Spetzman) 4485.
Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 946.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 4409.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W Spetzman (acc. to Spetzman 4410.
Ikiakpuk Valley, Canning River, 69°25' N, 145°30' W, Scholander and Flagg (acc. to Spetzman) 198.
Sadlerochit River, Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1067.
Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 156, Spetzman (acc. to Spetzman) 550.

Carex laxa Wahlenb.

Loosely caespitose, with persistent older, outer leaves. Culm 20-30 cm long, narrow, about twice the 0.5-1 mm wide leaves. Lowest bract foliaceous, long-sheathing (15-30 mm), shorter than the inflorescence. Spikes 2 or 3, remote, the terminal staminate, linear-lanceolate, 15 x 2 mm, the lateral pistillate, loosely-flowered, oblong, 12 x 4 mm, drooping on long (15-40 mm) capillary peduncles. Pistillate scale ovate, equal to the perigynium, acute, lacking a hyalin margin and prominent midvein, red-brown. Perigynium ovate, 3 x 1 mm, smooth-margined, dull green, granular, slightly stipitate, with a very short (0.2 mm) truncate beak. Stigmas 3.

Carex laxa Wahlenb.



a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

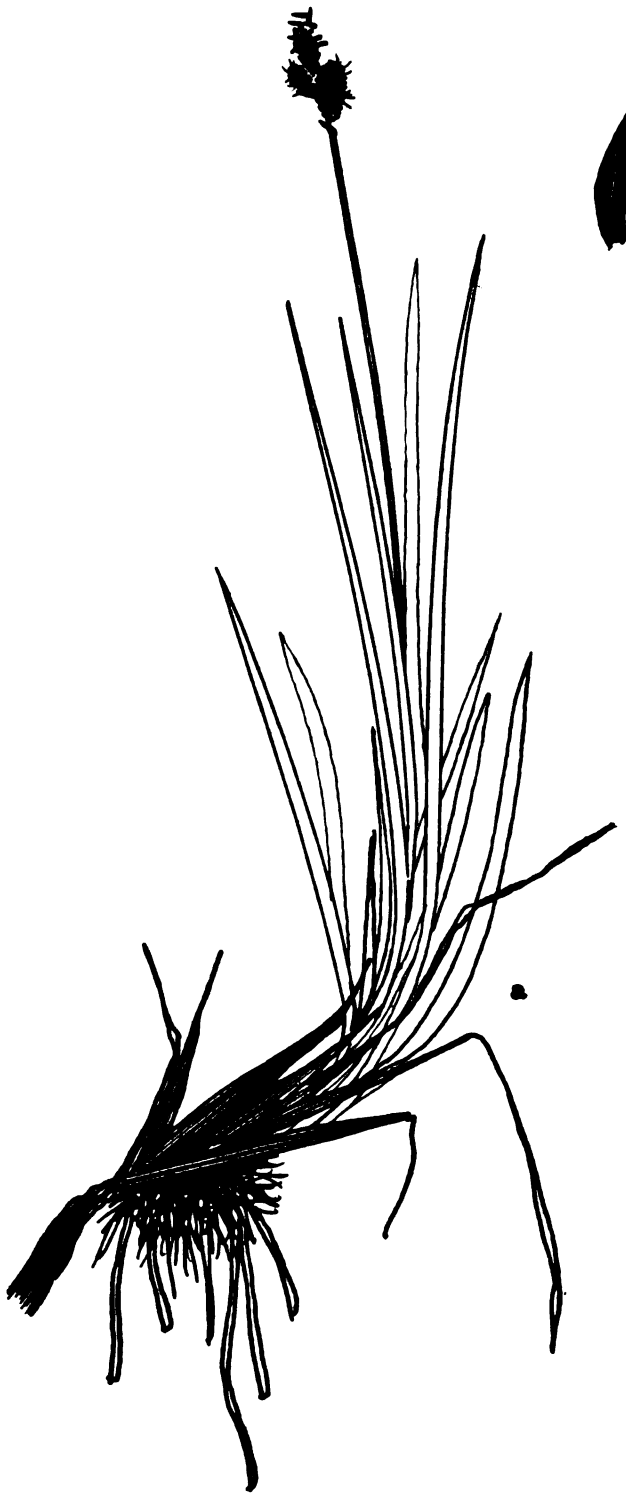
Carex laxa Wahlenb.

6 miles N of Okpilak Lake, Okpilak River, 69°29' N, 144°00' W,
Cantlon-Malcolm 58-262.

Carex lugens Holm

Caespitose, the outer, shiny, tan leaf bases persisting. Roots covered with fine white hairs. Culm 15-40 cm long, 1.5-3 times the 1-2 mm wide leaves. Lowest bract variable, scale-like to foliaceous, black-auricled but not sheathing, shorter than the inflorescence. Spikes 2-4, more or less contiguous, the terminal staminate, lanceolate to oblanceolate, 12 x 4 mm, the lateral pistillate, cylindrical to ovate, 10 x 4 mm, erect on stout, 1-10 mm long peduncles. Pistillate scale ovate, shorter than the perigynium, acute to obtuse, usually lacking a hyalin margin and prominent midvein, dull black or brown. Perigynium obovate, 2.5 x 1.5 mm, smooth-margined, nerveless, dull green below and mottled with brown above where exposed to the sun, with an abrupt, short (0.2 mm) truncate beak.

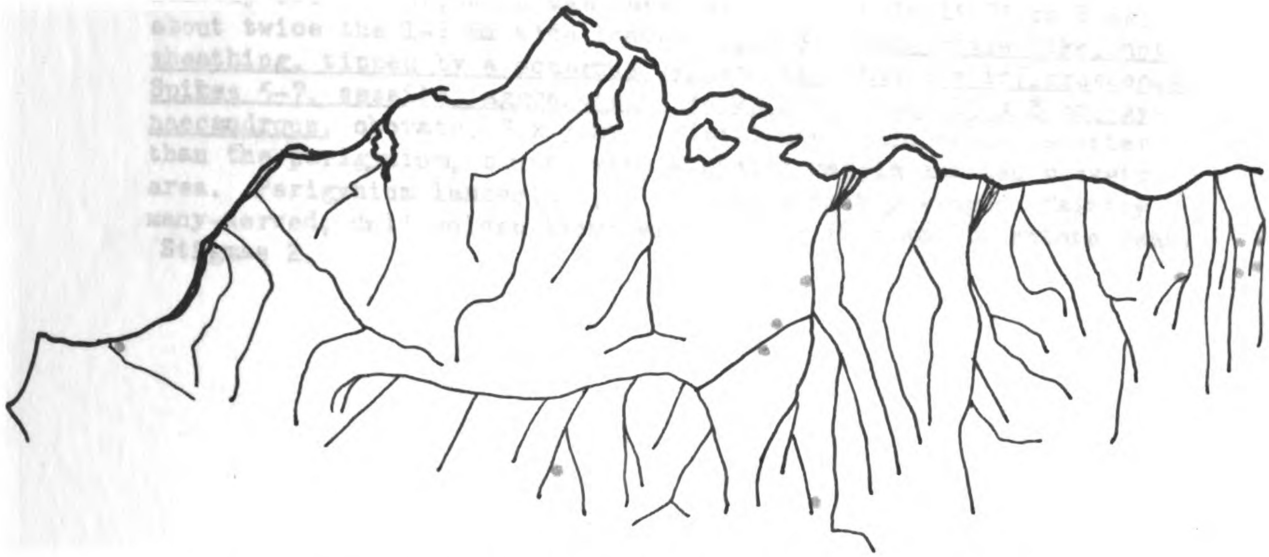
Carex lugens Holm



b c

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex lugens Holm

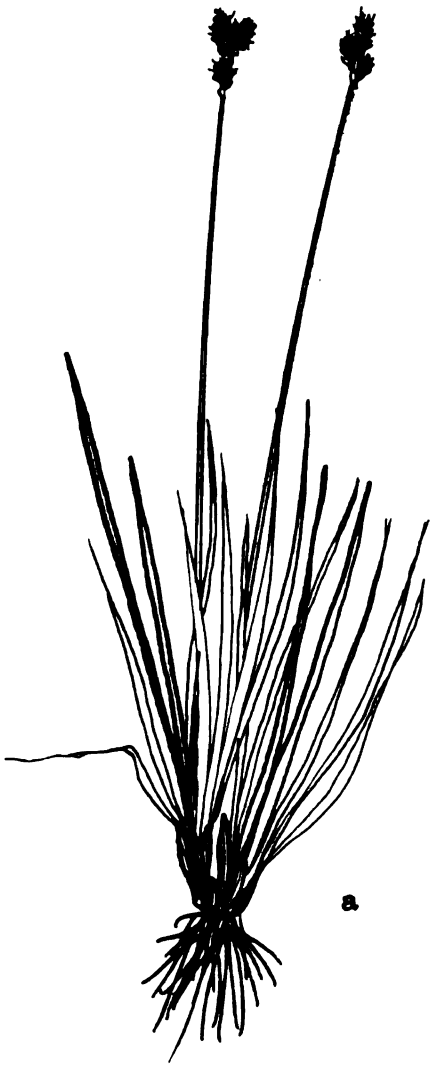


Pitmegea River, 68°54' N, 164°35' W, Cantlon-Gillis 57-177, 57-301.
E of Nigu River, 68°30' N, 156°27' W, Cantlon et al 53-4707.
10 miles SSW of Umiat, 69°14' N, 152°27' W, Cantlon et al 53-4523, 53-4865.
Umiat, 69°22' N, 152°10' W, Cantlon et al 53-13, 53-71, 53-114, 53-146, 53-204, 53-5028, 53-5090, Scholander (acc. to Spetzman) 189, Spetzman (acc. to Spetzman) 1361, 2214.
Confluence of Kogosukruk and Colville Rivers, 69°46' N, 151°50' W, Cantlon et al 53-446, 53-488, 53-491. 53-532, 53-543.
Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W, Cantlon et al 53-471, 53-646.
Natavakruak Lake, headwaters of Siksikpuk River tributary, 68°24' N, 151°38' W, Cantlon et al 53-5153.
Sadlerochit River, Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1000a, 1085.
12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-241.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-1821, 57-1822, 57-1825, 57-1911, 57-2019, 57-2031, 57-2138, 57-2139, 57-2140, 57-2197, Cantlon-Malcolm 58-299. 58-300, 58-301, 58-302, 58-303, 58-304, 58-305, 58-354, 58-369, 58-370, [illegible], 58-396, 58-397.
10 miles N of Jago Lake, Jago River, 69°45' N, 143°42' W, Cantlon-Gillis 57-1766, 57-1781.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-624, 57-980, 57-1025, 57-1139, 57-1144, 57-1298, 57-1443, 57-1444, 57-1447, 57-1605.

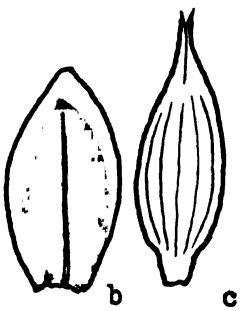
Carex macloviana d'Urv.

Densely caespitose, with tan basal sheaths. Culm 15-25 cm long, about twice the 1-2 mm wide leaves. Lowest bract scale-like, not sheathing, tipped by a scabrous awl shorter than the inflorescence. Spikes 5-7, sessile, aggregated into an ovoid head 15 x 8 mm, gynaecandrous, obovate, 7 x 3 mm. Pistillate scale ovate, shorter than the perigynium, blunt, with a hyalin margin and tan midvein area. Perigynium lanceolate, 3 x 1 mm, slightly winged, faintly many-nerved, dull golden brown with a long (0.5 mm) bidentate beak. Stigmas 2.

Carex macloviana d'Urv.



a



b c

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

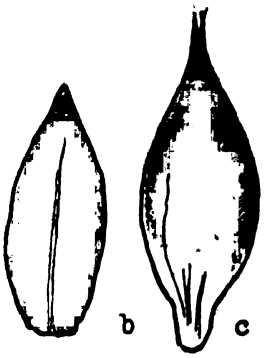
Carex macloviana d'Urv.

E of Nigu River, 68°30' N, 156°27' W, Cantlon et al 53-4705.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Malcolm 58-379.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-1734.

Carex maritima Gunn.

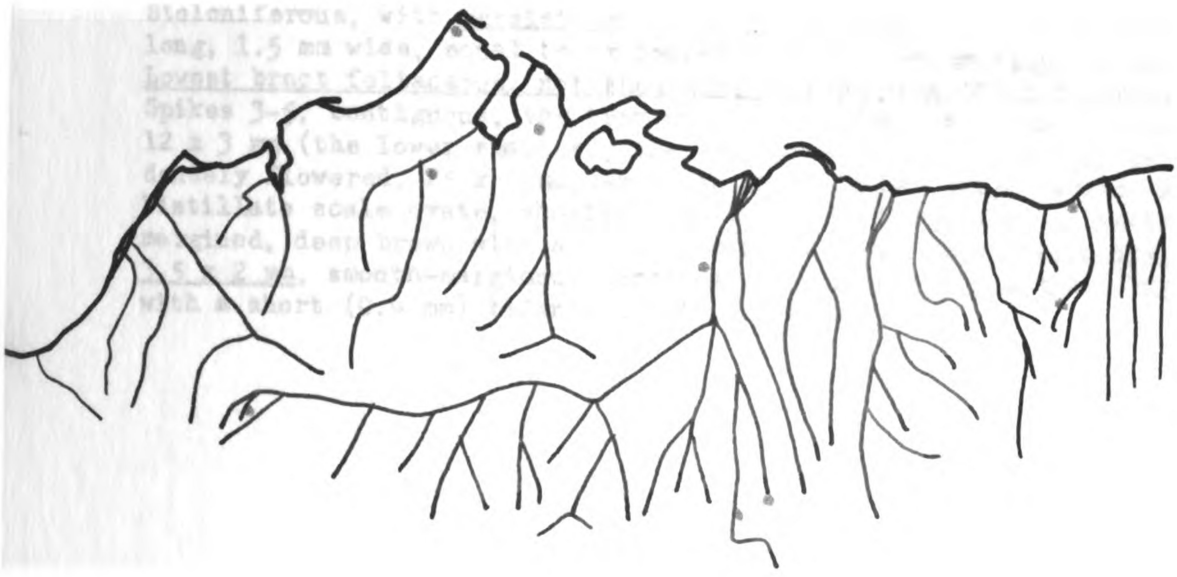
Dwarf, littoral species with creeping rootstock and erect culms. Culm 5-10 cm long, 1 mm wide, slightly longer than the 0.7 mm wide, spreading leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spikes 3-5, sessile, aggregated into a dense, ovoid, 20 x 15 mm head, androgynous, obovate, 5 x 4 mm, the lowest perigynia reflexed. Pistillate scale ovate, obtuse, with a pronounced hyalin margin, shiny brown without a prominent midvein. Perigynium ovate, 4 x 2 mm, smooth-margined, nerveless, dull brown above and cream below, distinctly stipitate, tapering to a long (0.5 mm) conical, bidentate beak. Stigmas 2.

Carex maritima Gunn.



a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex maritima Gunn.

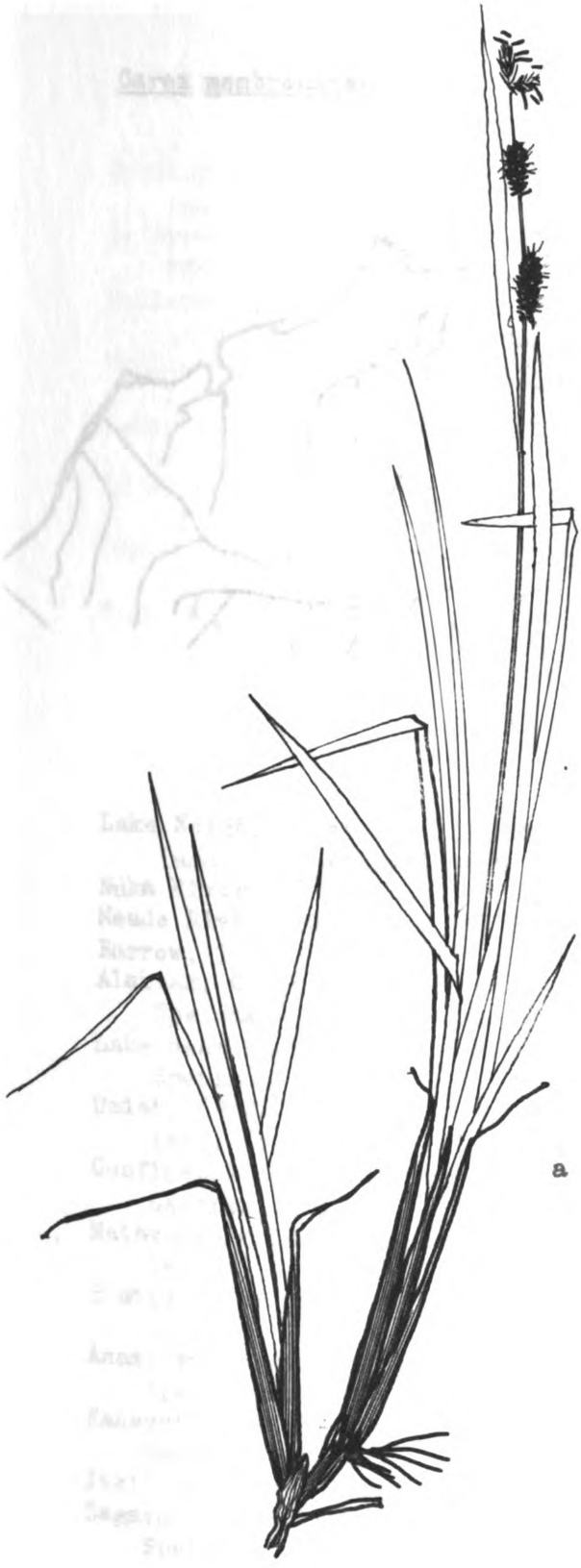


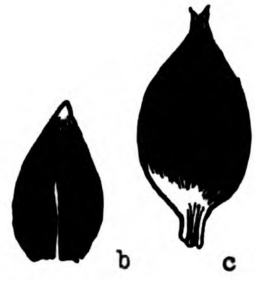
Point Hope, 68°22' N, 166°40' W, Porsild (acc. to Porsild).
Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 4247.
Atkasuk Village, Meade River, 70°29' N, 157°25' W, Cantlon et al 53-3043, 53-3059, 53-4768.
Barrow, 71°20' N, 156°40' W, Porsild (acc. to Porsild).
Alaktak, Chipp River, 60°48' N, 155°00' W, Spetzman (acc. to Spetzman) 2444.
Confluence of Kogosukruk and Colville Rivers, 69°46' N, 151°50' W, Cantlon et al 53-355.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1929.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1976.
Anderson Point, 70°00' N, 144°30' W, Spetzman (acc. to Spetzman) 1241.
Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 1002.

Carex membranacea Hook.

Stoloniferous, with persisting purple basal sheaths. Culm 20-40 cm long, 1.5 mm wide, equal to or longer than the 3-4 mm wide leaves. Lowest bract foliaceous, not sheathing, longer than the inflorescence. Spikes 3-5, contiguous, the terminal 1 or 2 staminate, lanceolate, 12 x 3 mm (the lower smaller), the lateral pistillate, cylindrical, densely flowered, 25 x 5 mm, erect on short (8 mm) stout peduncles. Pistillate scale ovate, shorter than the perigynium, blunt, hyalin-margined, deep brown with a lighter midvein area. Perigynium ovate, 3.5 x 2 mm, smooth-margined, nerveless, shiny brown to almost black, with a short (0.4 mm) bidentate beak. Stigmas 3.

Carex membranacea Hook.





a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex membranacea Hook.

Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 4000, 4277.
Nuka River, 68°45' N, 159°20' W, Spetzman (acc. to Spetzman) 3929.
Meade River, 70°40' N, 157°20' W, Cantlon et al. 53-4769.
Barrow, 71°20' N, 156°40' W, (acc. to Porsild).
Alaktak, Chipp River, 60°48' N, 155°00' W, Scholander (acc. to Spetzman) 169, Spetzman (acc. to Spetzman) 2441.
Lake near Maybe Creek, 69°20' N, 154°20' W Spetzman (acc. to Spetzman) 2552.
Umiat, 69°22' N, 152°10' W, Cantlon et al. 53-202, Scholander (acc. to Spetzman) 167, Spetzman (acc. to Spetzman) 1262, 2377.
Confluence of Kogosukruk and Colville Rivers, 69°46' N, 151°50' W, Cantlon et al. 53-352, 53-396, 53-486, 53-437, 53-558.
Natavakruak Lake, headwaters of Siksikpuk River tributary, 68°24' N, 151°38' W, Cantlon etal. 53-5347.
8 miles E of Itkillik River, 69°50' N, 150°33' W, Cantlon et al. 53-5745.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1603, 1818, 2729.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1968.
Itkillik River, lakes, 68°30' N, 150°00' W, Gudin (acc. to Spetzman) 9.
Sagavanirktok River, forks, 69°30' N, 148°30' W Spetzman (acc. to Spetzman) 120.

Canning River, Shublick Springs, 69°28' N, 146°12' W, Spetzman (acc. to Spetzman) 457.

Ikiakpuk Valley, Canning River, 69°25' N, 145°30' W, Scholander and Flagg (acc. to Spetzman) 170.

Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 874, 1035.

Sadlerochit River Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1177.

Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 165, 166, Spetzman (acc. to Spetzman) 692.

12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-256.

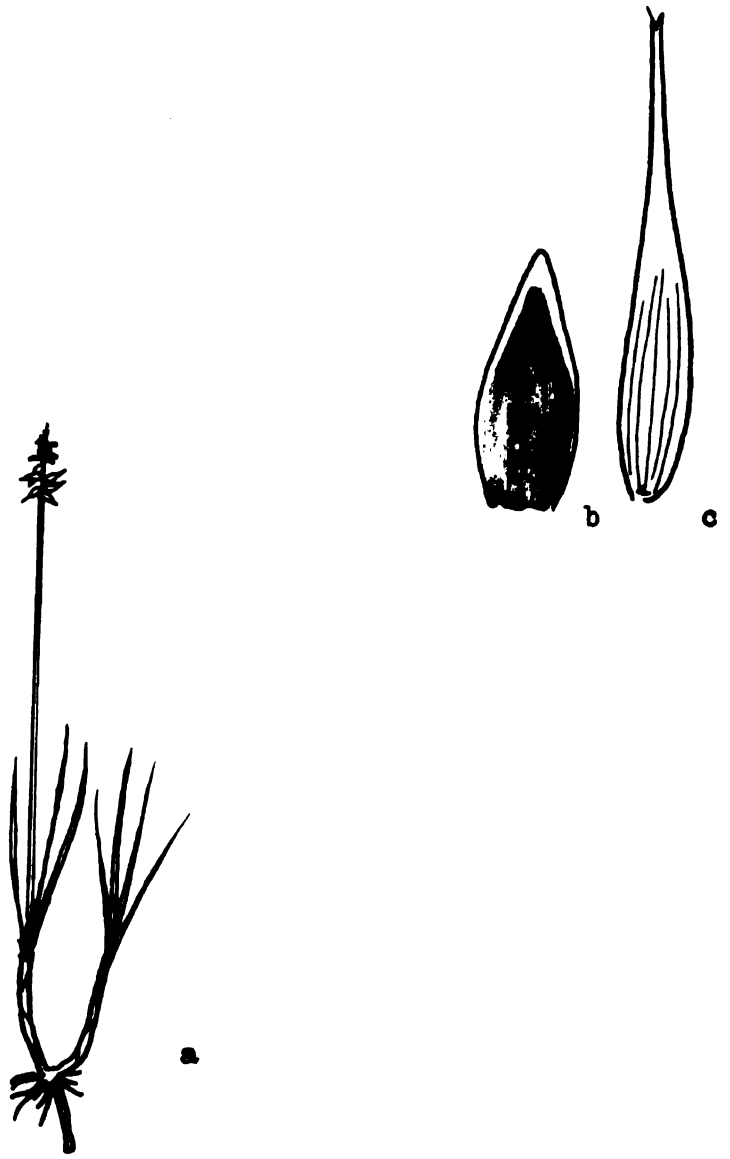
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-2175, 57-2274, Malcolm 17, 55.

Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-720, 57-930, 57-1578, 57-1727, 57-2448, Cantlon-Malcolm 58-544.

Carex microglochin Wahlenb.

Stoloniferous, the leaves sparsely tufted. Culm 5-15 cm long, twice the 0.5 mm wide, involute leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spike single, terminal, androgynous, lanceolate, 10 x 5 mm. Pistillate scale ovate, shorter than the perigynium, acute to obtuse, narrowly hyalin-margined, chestnut brown, the midvein lighter. Perigynium subulate-lanceolate, 5 x 1 mm, distinctly reflexed at maturity, smooth-margined, faintly many-nerved, dull straw color, tapering to a very long (2 mm) truncate beak. Stigmas 3.

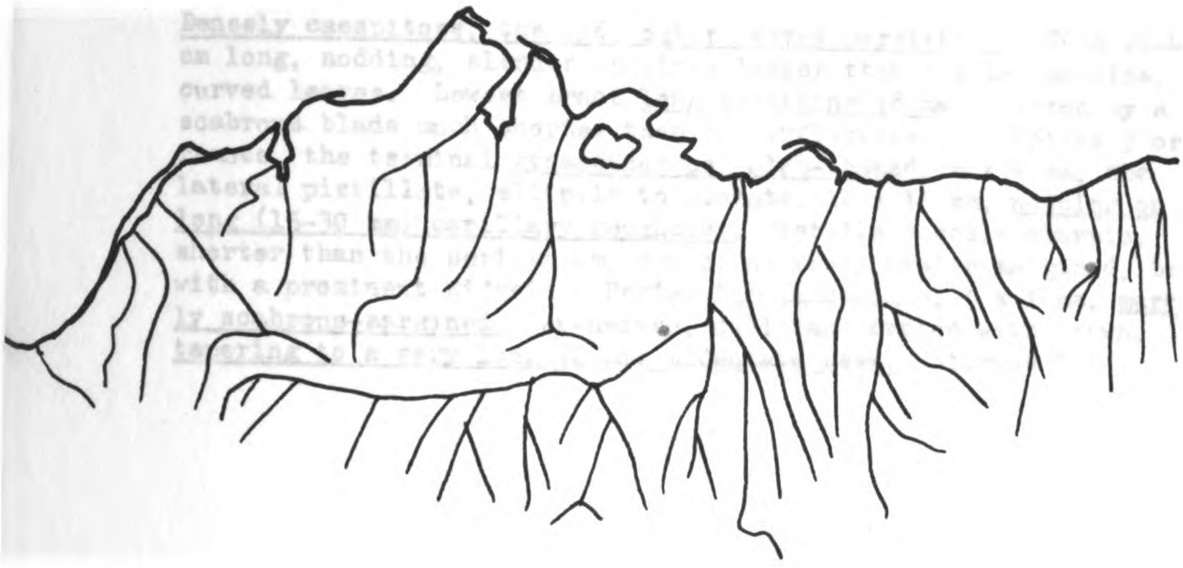
Carex microglochin Wahlenb.



a habit (1/2) *
b pistillate scale (10/1)
c perigynium (10/1) *

* redrawn from Porsild, 1957, p. 51, fig. 18a, and p. 48, fig. 16_6.

Carex microglochin Wahlenb.



Umiat, 69°22' N, 152°10' W, Porsild (acc. to Porsild), Spetzman (acc. to Spetzman) 2642.
Sadlerochit River, Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1063.

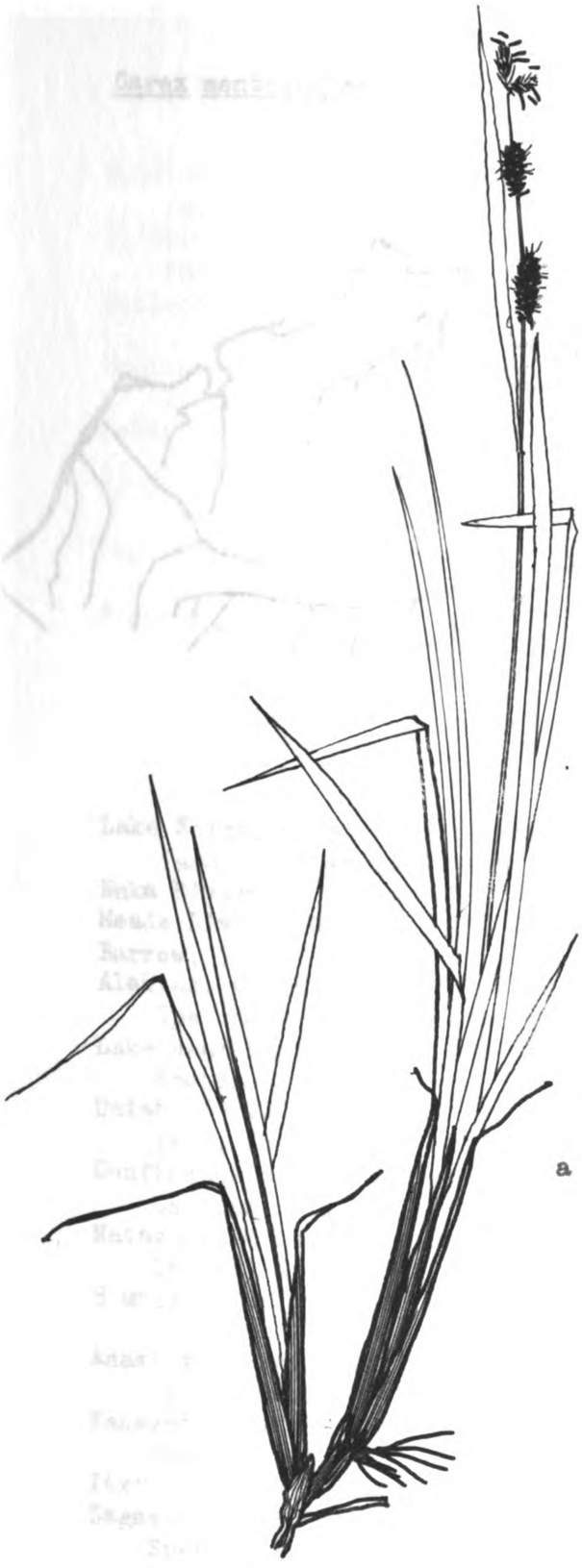
Carex misandra R.Br.

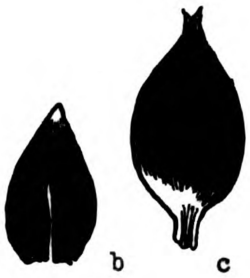
Densely caespitose, the old, outer leaves persisting. Culm 20-40 cm long, nodding, slender, 5 times longer than the 1-2 mm wide, curved leaves. Lowest bract long-sheathing (8 mm), tipped by a scabrous blade much shorter than the inflorescence. Spikes 3 or 4, remote, the terminal gynaecandrous, club-shaped, 6 x 4 mm, the lateral pistillate, elliptic to obovate, 12 x 15 mm, nodding on long (15-30 mm) capillary peduncles. Pistillate scale obovate, shorter than the perigynium, acute, narrowly hyalin-margined, brown with a prominent midvein. Perigynium lanceolate, 5 x 1 mm, markedly scabrous-margined, few-nerved, dull tan mottled with brown, tapering to a very long (2 mm) bidentate beak. Stigmas 3.

Carex membranacea Hook.

Stoloniferous, with persisting purple basal sheaths. Culm 20-40 cm long, 1.5 mm wide, equal to or longer than the 3-4 mm wide leaves. Lowest bract foliaceous, not sheathing, longer than the inflorescence. Spikes 3-5, contiguous, the terminal 1 or 2 staminate, lanceolate, 12 x 3 mm (the lower smaller), the lateral pistillate, cylindrical, densely flowered, 25 x 5 mm, erect on short (8 mm) stout peduncles. Pistillate scale ovate, shorter than the perigynium, blunt, hyalin-margined, deep brown with a lighter midvein area. Perigynium ovate, 3.5 x 2 mm, smooth-margined, nerveless, shiny brown to almost black, with a short (0.4 mm) bidentate beak. Stigmas 3.

Carex membranacea Hook.





a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex membranacea Hook.

Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 4000, 4277.
Nuka River, 68°45' N, 159°20' W, Spetzman (acc. to Spetzman) 3929.
Meade River, 70°40' N, 157°20' W, Cantlon et al. 53-4769.
Barrow, 71°20' N, 156°40' W, (acc. to Porsild).
Alaktak, Chipp River, 60°48' N, 155°00' W, Scholander (acc. to Spetzman) 169, Spetzman (acc. to Spetzman) 2441.
Lake near Maybe Creek, 69°20' N, 154°20' W Spetzman (acc. to Spetzman) 2552.
Umiat, 69°22' N, 152°10' W, Cantlon et al. 53-202, Scholander (acc. to Spetzman) 167, Spetzman (acc. to Spetzman) 1262, 2377.
Confluence of Kogosukruk and Colville Rivers, 69°46' N, 151°50' W, Cantlon et al. 53-352, 53-396, 53-486, 53-437, 53-558.
Natavakruak Lake, headwaters of Siksikpuk River tributary, 68°24' N, 151°38' W, Cantlon etal. 53-5347.
8 miles E of Itkillik River, 69°50' N, 150°33' W, Cantlon et al. 53-5745.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1603, 1818, 2729.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1968.
Itkillik River, lakes, 68°30' N, 150°00' W, Gudin (acc. to Spetzman) 9.
Sagavanirktok River, forks, 69°30' N, 148°30' W Spetzman (acc. to Spetzman) 120.

Canning River, Shublick Springs, 69°28' N, 146°12' W, Spetzman (acc. to Spetzman) 457.

Ikiakpuk Valley, Canning River, 69°25' N, 145°30' W, Scholander and Flagg (acc. to Spetzman) 170.

Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 874, 1035.

Sadlerochit River Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1177.

Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 165, 166, Spetzman (acc. to Spetzman) 692.

12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-256.

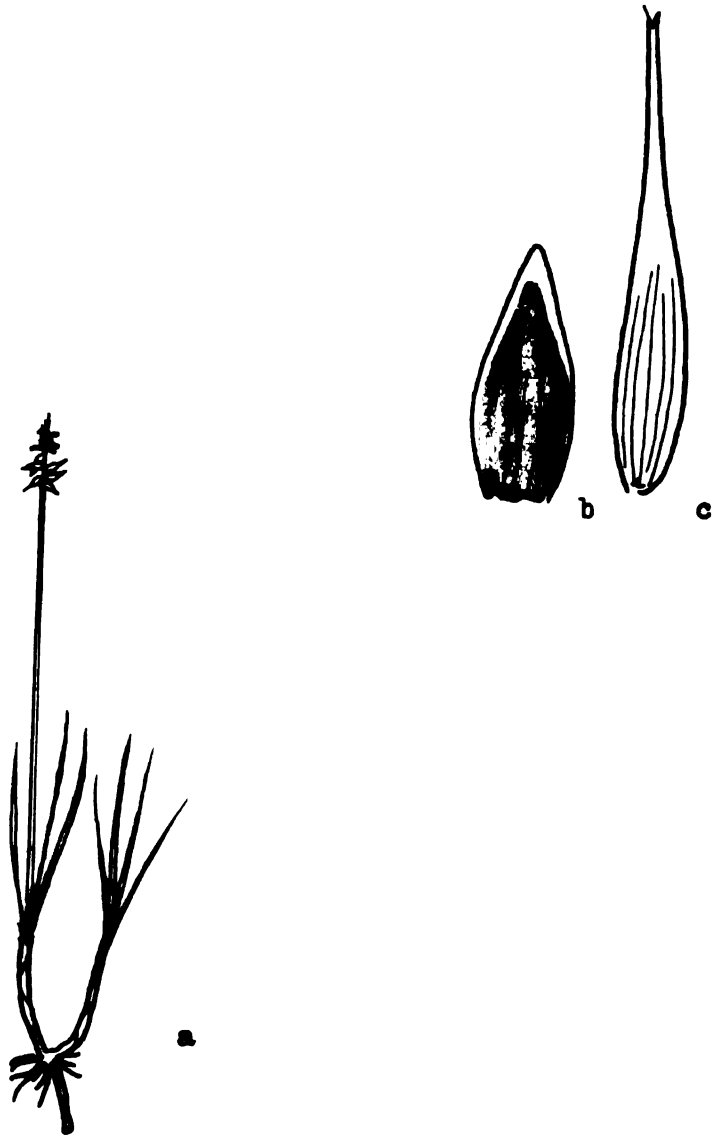
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W. Cantlon-Gillis 57-2175, 57-2274, Malcolm 17, 55.

Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-720, 57-930, 57-1578, 57-1727, 57-2448, Cantlon-Malcolm 58-544.

Carex microglochin Wahlenb.

Stoloniferous, the leaves sparsely tufted. Culm 5-15 cm long, twice the 0.5 mm wide, involute leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spike single, terminal, androgynous, lanceolate, 10 x 5 mm. Pistillate scale ovate, shorter than the perigynium, acute to obtuse, narrowly hyalin-margined, chestnut brown, the midvein lighter. Perigynium subulate-lanceolate, 5 x 1 mm, distinctly reflexed at maturity, smooth-margined, faintly many-nerved, dull straw color, tapering to a very long (2 mm) truncate beak. Stigmas 3.

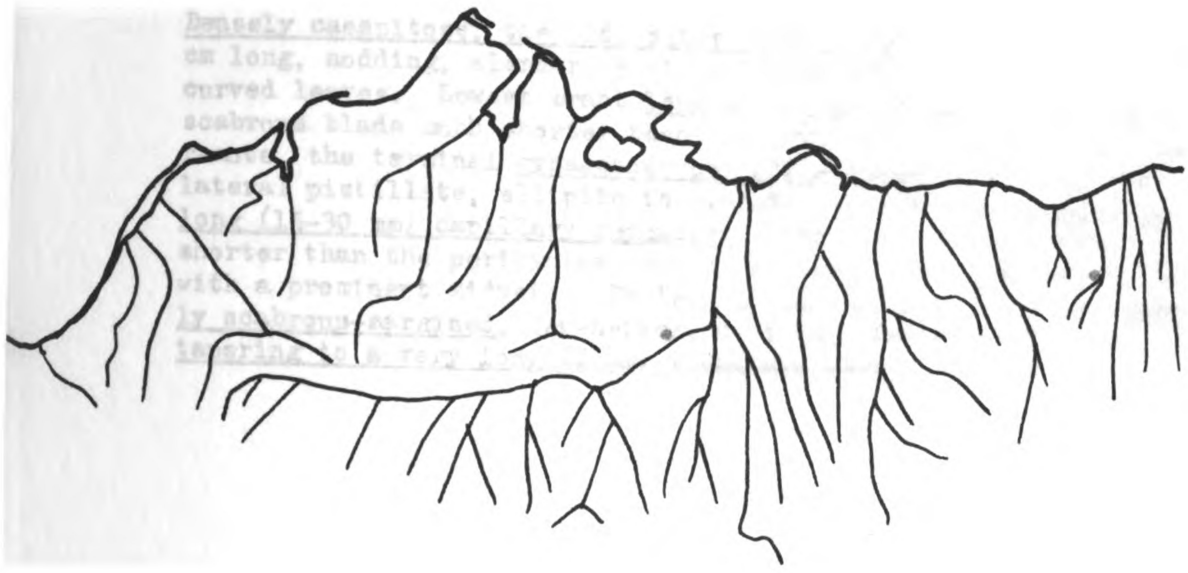
Carex microglochin Wahlenb.



a habit (1/2) *
b pistillate scale (10/1)
c perigynium (10/1) *

* redrawn from Porsild, 1957, p. 51, fig. 18a, and p. 48, fig. 16_6.

Carex microglochin Wahlenb.

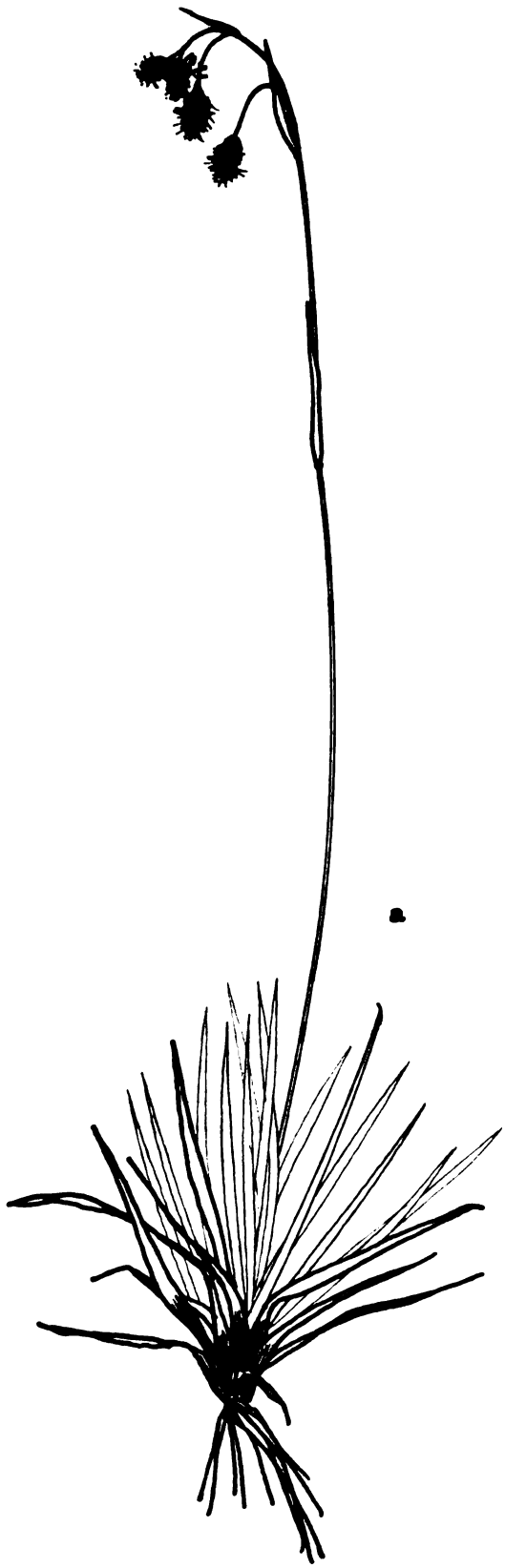


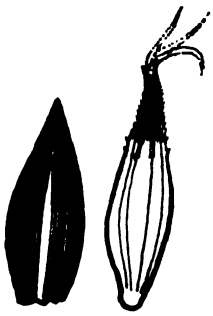
Umiat, 69°22' N, 152°10' W, Porsild (acc. to Porsild), Spetzman (acc. to Spetzman) 2642.
Sadlerochit River, Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1063.

Carex misandra R.Br.

Densely caespitose, the old, outer leaves persisting. Culm 20-40 cm long, nodding, slender, 5 times longer than the 1-2 mm wide, curved leaves. Lowest bract long-sheathing (8 mm), tipped by a scabrous blade much shorter than the inflorescence. Spikes 3 or 4, remote, the terminal gynaecandrous, club-shaped, 6 x 4 mm, the lateral pistillate, elliptic to obovate, 12 x 15 mm, nodding on long (15-30 mm) capillary peduncles. Pistillate scale obovate, shorter than the perigynium, acute, narrowly hyalin-margined, brown with a prominent midvein. Perigynium lanceolate, 5 x 1 mm, markedly scabrous-margined, few-nerved, dull tan mottled with brown, tapering to a very long (2 mm) bidentate beak. Stigmas 3.

Carex misandra R.Br.





b c

a

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

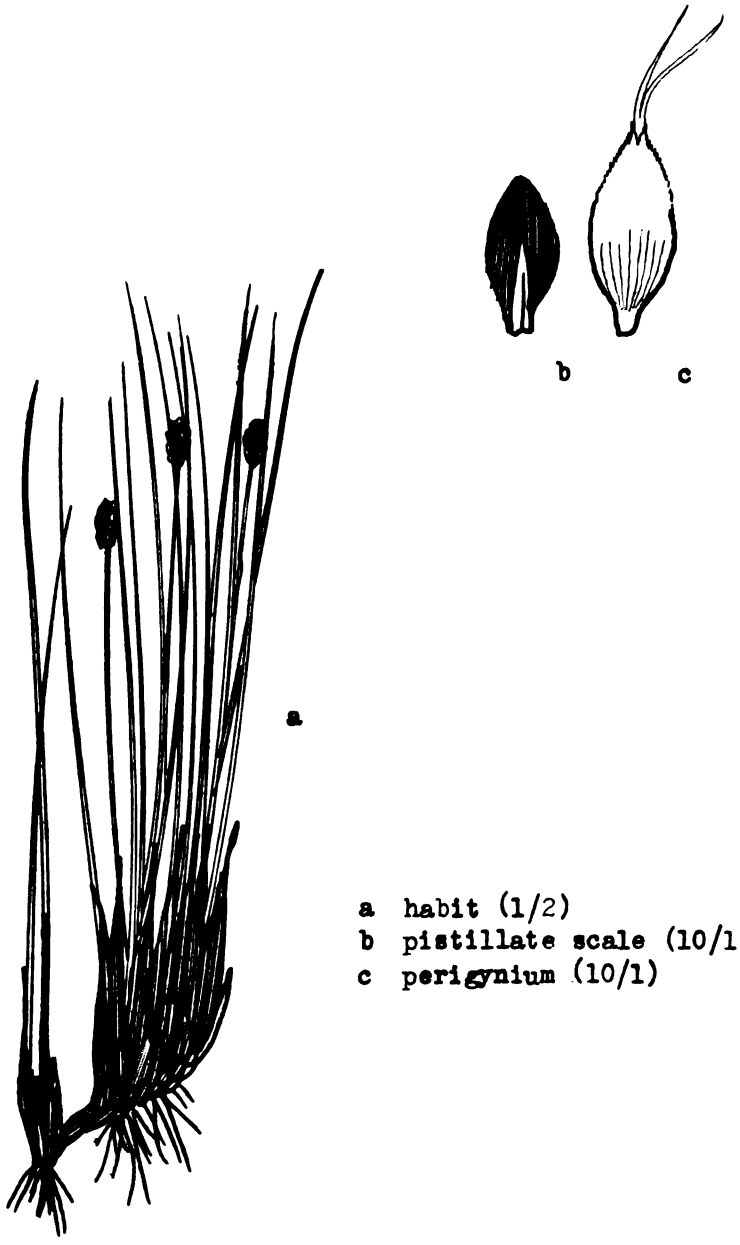
Carex misandra R.Br.

Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 3228, 4004.
Barrow, 71°20' N, 156°40' W, Scholander (acc. to Spetzman) 596.
Alaktak, Chipp River, 60°48' N, 155°00' W, Spetzman (acc. to Spetzman) 2443.
Umiat, 69°22' N, 152°10' W, Scholander (acc. to Spetzman) 182, Spetzman (acc. to Spetzman) 4411.
Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W, Cantlon et al 53-628, 53-676.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1799, 1819, 1892.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1972.
Canning River, forks, 69°13' N, 145°54' W, McGregor (acc. to Spetzman) 15.
Sunset Pass, 69°40' N, 144°45' W, Spetzman (acc. to Spetzman) 1153.
Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 958, 973.
Sadlerochit River, Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1058.
Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 176.
12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-245, 58-257.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Malcolm 9.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-801, 57-920, 57-952, 57-1135, 57-1454, 57-1523, Cantlon-Malcolm 58-545.
Barter Island, 70°10 N, 143°40' W, Spetzman (acc. to Spetzman) 1223.

Carex nardina Fr.

Densely caespitose, the persistent, shiny tan leaf bases forming dense tufts. Culm 10-20 cm long, about equal to the filiform leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spike single, terminal, androgynous, ovate, 9 x 5 mm. Pistillate scale ovate, one-half the length of the perigynium, blunt, narrowly hyalin-margined, dark brown with a broad pale midvein area. Perigynium elliptic, 4 x 1.5 mm, distinctly scabrous-margined, many-nerved, dull tan with a very short (0.1 mm) bidentate beak. Stigmas 2.

Carex nardina Fr.



a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

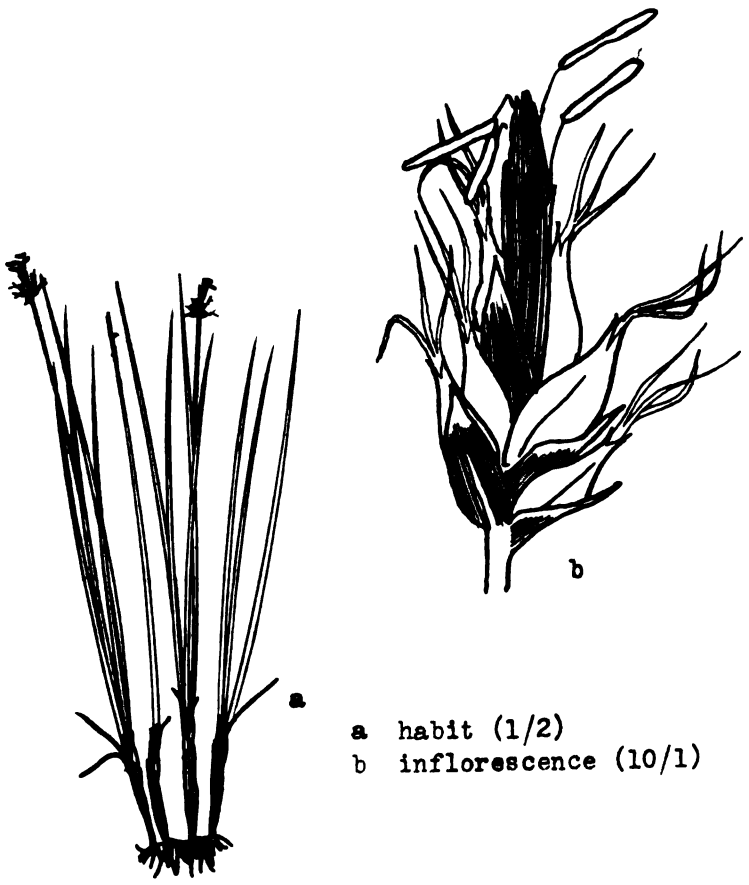
Carex nardina Fr.

Alakta, Chipp River, 60°48' N, 155°00' W, Spetzman (acc. to Spetzman) 4413.
Headwaters of Fish Creek, 69°55' N, 152°50' W, Cantlon et al 53-4732.
10 miles SSW of Umiat, 69°14' N, 152°27' W, Cantlon et al 53-4548.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1872b.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman(acc. to Spetzman) 4414.
Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 957.
Lakes Schrader and Peters, 69°22' N, 145°00' W, Spetzman (acc. to Spetzman) 620.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-1890, Cantlon-Malcolm 58-60.
Dark Creek, Opkilak River 6 miles S of Okpilak Lake, 69°18' N, 144°00' W, Cantlon-Malcolm 58-140, 58-142.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-802, 57-723.

Carex obtusata Liljebl.

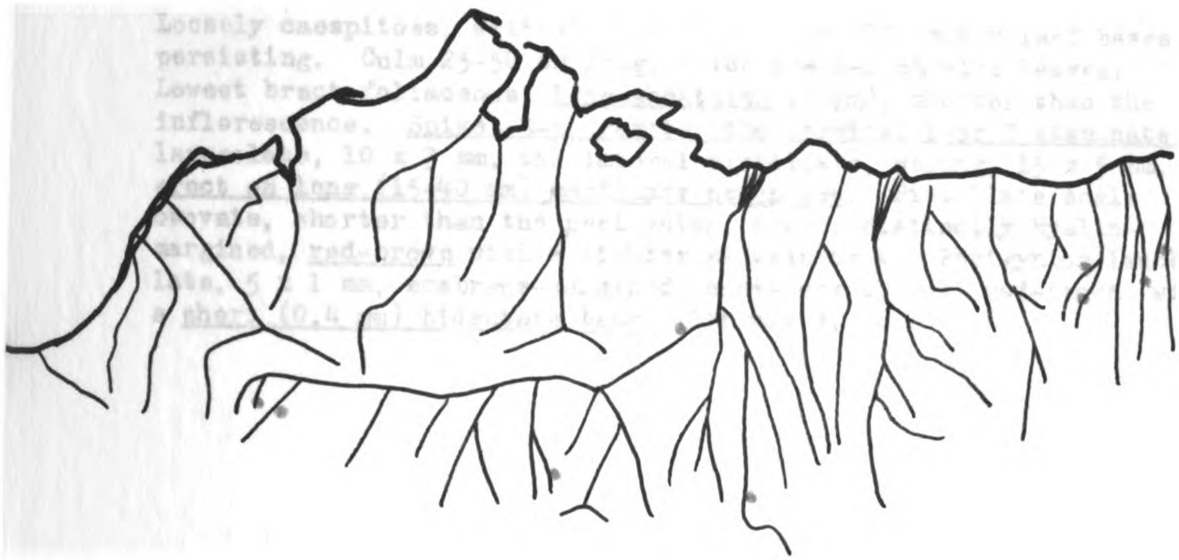
Similar to C. rupestris, but stoloniferous, the lower portion of the culm narrow and with purple sheaths, the leaves 0.5-1 mm wide, and the perigynium a dark, shiny brown.

Carex obtusata Liljebl.



a habit (1/2)
b inflorescence (10/1)

Carex obtusata Liljebl.



Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 3669.
Nuka River, 68°45' N, 159°50' W, Spetzman (acc. to Spetzman) 3643, 4058.
3 miles E of Kurupa River, 68°28' N, 154°50' W, Cantlon et al 53-4634.
Umiat, 69°22' N, 152°10' W, Cantlon et al 53-85, Scholander (acc. to Spetzman) 154, Spetzman (acc. to Spetzman) 1358, 2185, 2344, 2644.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1680.
Sadlerochit River, Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1047.
Lakes Schrader and Peters, 69°22' N, 145°00' W, Spetzman (acc. to Spetzman) 1252.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Malcolm 58-118, 58-174, 58-353, Malcolm 2, 4, 32, 34, 37, 51.
10 miles N of Jago Lake, Jago River, 69°45' N, 143°42' W, Cantlon-Gillis 57-1750.

Carex petricosa Dewey

Loosely caespitose, with stout stolons, the old, outer leaf bases persisting. Culm 25-50 cm long, twice the 1-2 mm wide leaves. Lowest bract foliaceous, long-sheathing (8 mm), shorter than the inflorescence. Spikes 3-5, remote, the terminal 1 or 2 staminate, lanceolate, 10 x 3 mm, the lateral pistillate, oblong, 15 x 5 mm, erect on long (15-40 mm) capillary peduncles. Pistillate scale obovate, shorter than the perigynium, acute, distinctly hyalin-margined, red-brown with a lighter midvein area. Perigynium lanceolate, 5 x 1 mm, scabrous-margined, many-nerved, dull red-brown, with a short (0.4 mm) bidentate beak. Stigmas 3.

Carex petricosa Dew.

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)
d lowest bract of inflorescence (10/1)

Carex petricosa Dew.

Okpilak Lake, Okpilak River, 69°23' N, 144°04' W. Cantlon-Malcolm 58-502, 58-503.

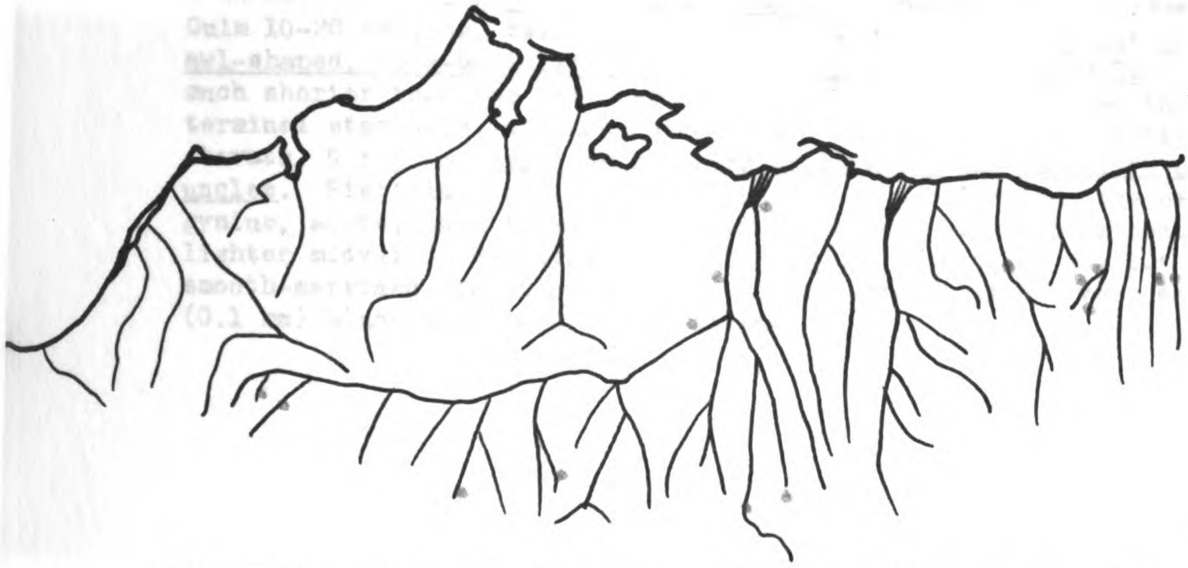
Carex physocarpa Presl.

Coarse, with a stout rootstock. Culm 20-60 cm long, about equal to the 3-5 mm wide leaves. Spikes 3 or 4, remote, the terminal 1 or 2 staminate, linear, 20 x 4 mm, the lateral pistillate, cylindrical, 20 x 7 mm, the upper erect and the lower drooping on long (10-30 mm) capillary peduncles. Pistillate scale lanceolate, much narrower and shorter than the perigynium, acute, hyalin-tipped, somewhat shiny, dark brown, with a conspicuous narrow mid-vein. Perigynium lanceolate, 5 x 2 mm, smooth-margined, faintly many-nerved, shiny brown above and cream below, with a short (0.5 mm) bidentate beak. Stigmas 2.

Carex physocarpa Presl.

a habit (1/2)
b pistillate scales and perigynia (10/1)

Carex physocarpa Presl.

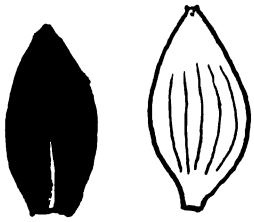


Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 3921.
Nuka River, 68°45' N, 159°50' W, Spetzman (acc. to Spetzman) 4059.
Howard Pass, Etivluk River, 68°15' N, 156°50' W, Spetzman (acc. to Spetzman) 2311.
3 miles E of Kurupa River, 68°40' N, 155°10' W, Cantlon et al 53-4641, 53-4642.
Umiat, 69°22' N, 152°10' W, Cantlon et al 53-132, 53-5194, 53-5255.
Confluence of Kogosukruk and Colville Rivers, 69°46' N, 151°50' W, Cantlon et al 53-348, 53-376, 53-377.
Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W, Cantlon et al 53-475, 53-587, 57-591.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1919.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1973.
Canning River, Shublick Springs, 69°28' N, 146°12' W Spetzman (acc. to Spetzman) 455.
Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 876.
Sadlerochit River, Lake Forks, 69°35' N, 144°45' W, Spetzman (acc. to Spetzman) 1038.
Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 178.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-1954, Cantlon-Malcolm 58-166, 58-398, 58-513, 58-526, 53-588, Malcolm 8.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-1609, 57-1729.

Carex rariflora (Wahlenb.) Smith

Stoloniferous, with purple basal sheaths and persisting old leaves. Culm 10-20 cm long, twice the 0.8-1.5 mm wide leaves. Lowest bract awl-shaped, long-auricled (5 mm) appearing to sheath the culm, much shorter than the inflorescence. Spikes 2 or 3, remote, the terminal staminate, oblanceolate, 10 x 3 mm, the lateral pistillate, obovate, 9 x 5 mm, erect or drooping on long (10 mm) capillary peduncles. Pistillate scale ovate, equal to or shorter than the perigynium, acute, dark brown, not hyalin-margined, with a prominent, lighter midvein. Perigynium ovate, somewhat stipitate, 4 x 1.5 mm, smooth-margined, faintly many-nerved, dull green, with a very short (0.1 mm) black bidentate beak. Stigmas 3.

Carex rariflora (Wahlenb.) Smith

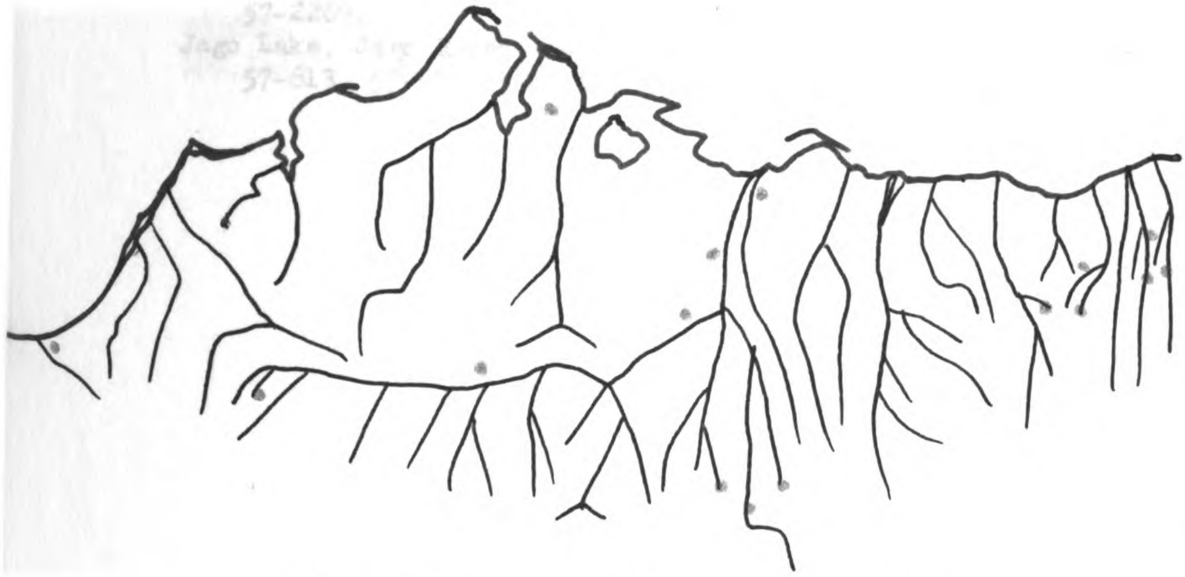


b c

a

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex rariflora (Wahlenb.) Smith



Pitmegea River, 68°54' N, 164°35' W, Cantlon-Gillis 57-166.
Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 4366a, 4305.
Colville River, 68°54' N, 155°00' W, Spetzman (acc. to Spetzman) 2207.
Alaktak, Chipp River, 60°48' N, 155°00' W, Spetzman (acc. to Spetzman) 4416.
Umiat, 69°22' N, 152°10' W, Cantlon et al 53-130, 53-234, Scholander (acc. to Spetzman) 140, 142, 144, Spetzman (acc. to Spetzman) 1357, 2215.
Confluence of Kogosukruk and Colville Rivers, 69°46' N, 151°50' W, Cantlon et al 53-370, 53-420.
Natvakruak Lake, headwaters of tributary of Siksikpuk River, 68°24' N, 151°38' W, Cantlon et al 53-5155.
Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W, Cantlon et al 53-581.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1923.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1974a.
Ikiakpuk Valley, Canning River, 69°25' N, 145°30' W, Scholander and Flagg (acc. to Spetzman) 139.
Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 1042.
Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 145, Spetzman (acc. to Spetzman) 800.

12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-254.

Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-2269.

Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-612b, 57-613, 57-981, 57-1145, 57-1403, 57-1404, 57-1451.

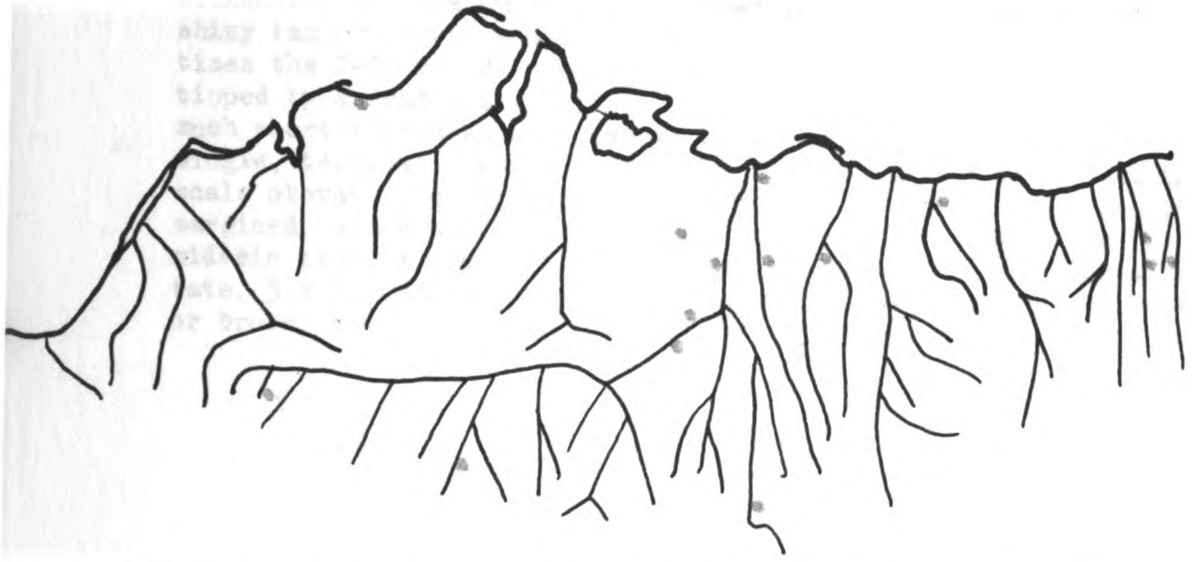
Carex rotundata Wahlenb.

Similar to C. membranacea, but the lowest bract reflected, and the leaves canaliculate.

Carex rotundata Wahlenb.

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex rotundata Wahlenb.

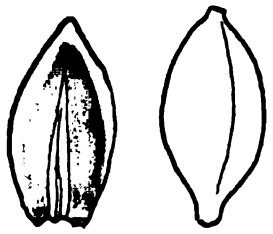


Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 4274.
Peard Bay, 70°48' N, 158°30' W, Irving (acc. to Spetzman) 192.
E of Nigu River, 68°30' N, 156°27' W, Cantlon et al. 53-4672.
Headwaters of Fish Creek, 69°55' N, 152°50' W, Cantlon et al. 53-4716.
Umiat, 69°22' N, 152°10' W, Cantlon et al. 53-134, Scholander (acc. to Spetzman) 141, 168, Spetzman (acc. to Spetzman) 1306, 2217, 2658.
10 miles SSW of Umiat, 69°14' N, 152°27' W Cantlon et al. 53-4565.
Confluence of Kogosukruk and Colville River, 69°46' N, 151°50' W, Cantlon et al. 53-359, 53-487, 53-528.
Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W, Cantlon et al. 53-586, 53-628.
8 miles W of Itkillik River, 69°50' N, 150°33' W, Cantlon et al. 53-4748.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetaman (acc. to Spetzman) 4417.
Kuparuk River, forks, 69°43' N, 149°30' W, Cantlon et al. 53-4813.
Shaviovik River, White Hills, 69°43' N, 147°10' W, Spetzman (acc. to Spetzman) 198.
12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-439.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Malcolm 58-510, Malcolm 11.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-962, 57-1138, 57-1440.

Carex rupestris All.

Stoloniferous, the culms often curved and clothed basally with shiny tan or brown persisting leaves. Culm 8-15 cm long, 1.5 times the 1-2 mm wide, curved leaves. Lowest bract scale-like, tipped by a scabrous awl (up to 10 mm long), not sheathing, much shorter than to about equal to the inflorescence. Spike single, terminal, androgynous, oblanceolate, 12 x 3 mm. Pistillate scale obovate, longer than the perigynium, obtuse, broadly hyalin-margined, somewhat shiny brown, the midvein area lighter and the midvein usually distinct. Perigynium oblanceolate, slightly stipitate, 3 x 1.5 mm, faintly scabrous-margined, many-nerved, dull tan or brown, the beak short (0.3 mm) and truncate. Stigmas 3.

Carex rupestris All.



a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex rupestris All.

Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 4325.
Atkasuk Village, Meade River, 70°29' N, 157°25' W, Cantlon et al 53-4815.
Kurupa River, 68°40' N, 155°10' W, Cantlon et al 53-4617.
10 miles SSW of Umiat, 69°14' N, 152°27' W, Cantlon et al 53-4505.
Umiat, 69°22' N, 152°10' W, Spetzman (acc. to Spetzman) 1253, 2643.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1681, 1782.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1975.
Sunset Pass, 69°40' N, 144°45' W, Spetzman (acc. to Spetzman) 1144.
Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 974, 1045.
Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 153, Spetzman (acc. to Spetzman) 621, 735.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-2425.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-628, 57-1270.

Carex scirpoidea Michx.

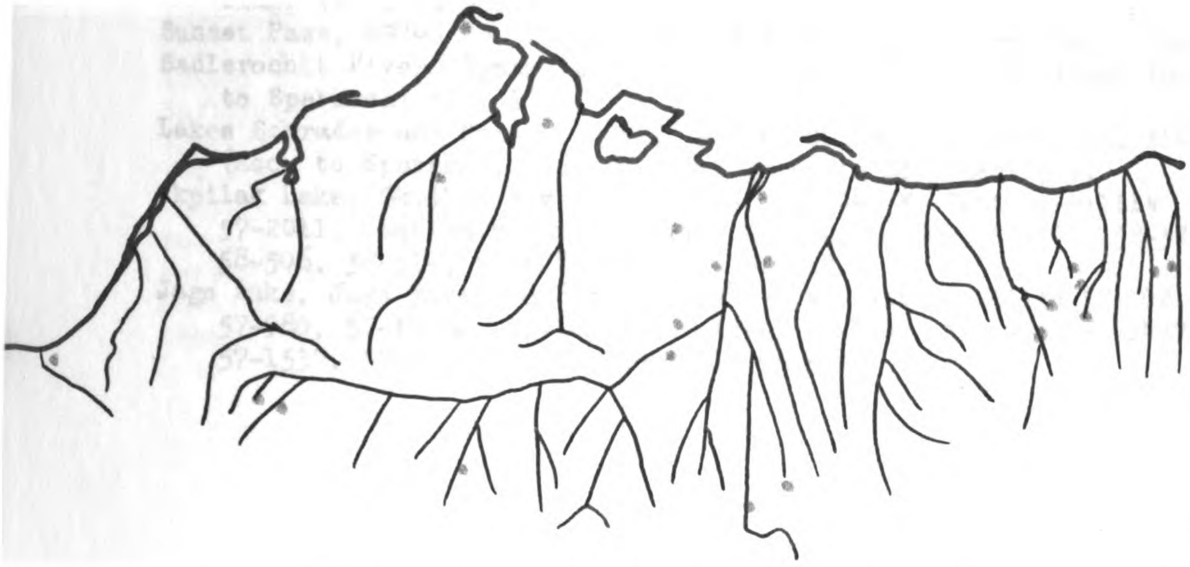
Loosely tufted, the rootstock horizontal, stout, and purple-scaled. Culm 5-30 cm long, 1-3 times the 1-3 mm wide leaves. Lowest bract absent or scale-like, tipped by a scabrous awl, not sheathing, much shorter than the inflorescence. Spike single, terminal, unisexual (plant dioecious), the staminate oblanceolate, 12 x 4 mm, the pistillate linear to cylindrical, 15-25 x 2-4 mm. Pistillate scale lanceolate, shorter than the perigynium, acute, hairy, black or dark brown, the midvein indistinct and slightly lighter. Perigynium ovate, 2.5 x 1.5 mm, densely covered with white hairs, nerveless, dull brown, the beak long (0.7 mm), glabrous, and truncate. Stigmas 3.

Carex scirpoidea Michx.

b c

a habit (staminate) (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex scirpoidea Michx.



Pitmegea River, 68°54' N, 164°35' W, Cantlon-Gillis 57-504, 57-275.
Lake Noluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 3701, 3902, 3985, 4321.
Nuka River, 68°45' N, 159°50' W, Spetzman (acc. to Spetzman) 3627.
Atkasuk Village, Meade River, 70°29' N, 157°25' W, Cantlon et al 53-4759.
Barrow, 71°20' N, 156°40' W, Porsild (acc. to Porsild).
E of Nigu River, 68°30' N, 156°27' W, Cantlon et al 53-4690.
Alaktak, Chipp River, 60°48' N, 155°00' W, Scholander (acc. to Spetzman) 155, Spetzman (acc. to Spetzman) 2439.
Headwaters of Fish Creek, 69°55' N, 152°50' W, Cantlon et al 53-4729.
10 miles SSW of Umiat, 69°14' N, 152°27' W, Cantlon et al 53-4513, 53-4553.
Umiat, 69°22' N, 152°10' W, Cantlon et al 53-180, 53-118, 53-178, Scholander (acc. to Spetzman) 147, Spetzman (acc. to Spetzman) 1255, 2328.
Confluence of Kogosukruk and Colville Rivers, 69°46' N, 151°50' W, Cantlon et al 53-351, 53-403, 53-539, 53-398, 53-441.
Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W, Cantlon et al 53-470, 53-630, 53-649, 53-670.
8 miles W of Itkillik River, 69°50' N, 150°33' W, Cantlon et al 53-4747.
Anaktuvuk Pass, Tuliguk Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 1602, 1647.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1966.
Canning River, forks, 69°13' N, 145°54' W, McGregor (acc. to Spetzman) 17, Spetzman (acc. to Spetzman) 346.

Ikiakpuk Valley, Canning River, 69°25' N, 145°30' W, Scholander and Flagg (acc. to Spetzman) 149.

Sunset Pass, 69°40' N, 144°45' W, Spetzman (acc. to Spetzman) 1154.

Sadlerochit River, Ignek Valley, 69°30' N, 145°00' W, Spetzman (acc. to Spetzman) 828, 1009.

Lakes Schrader and Peters, 69°22' N, 145°00' W, Scholander and Flagg (acc. to Spetzman) 146, Spetzman (acc. to Spetzman) 529.

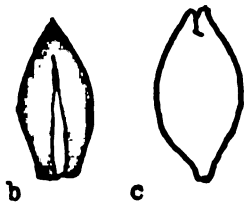
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Gillis 57-2011, Cantlon-Malcolm 58-117, 58-120, 58-500, 58-501, 58-505, 58-506, 58-514, 58-528b, 58-518, 58-519.

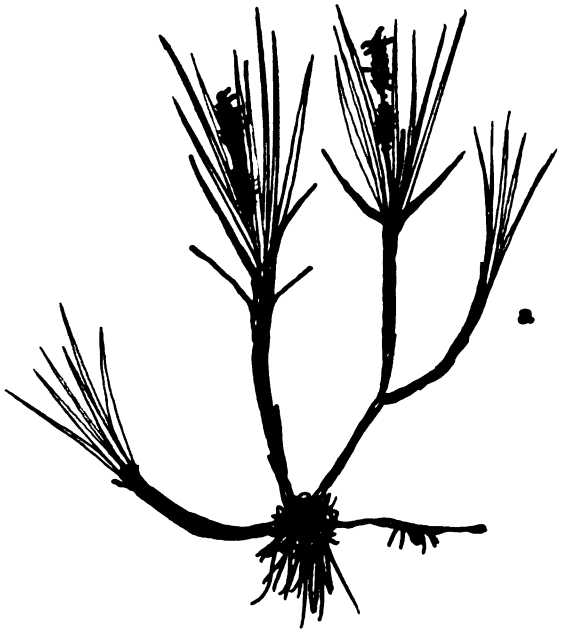
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-802, 57-980, 57-1036a, 57-1036b, 57-1295, 57-1402, 57-1406, 57-1407, 57-1537, 57-1728, Cantlon-Malcolm 58-554.

Carex subspathacea Wormskj.

Trailing, stoloniferous, dwarf, littoral species. Culm 7 cm long, 0.75 times the length of the spreading, reddish 0.7 mm wide leaves. Lowest bract foliaceous, not sheathing, slightly shorter than the inflorescence. Spikes 2 or 3, remote, the terminal staminate, oblanceolate, 10 x 3 mm, the lateral pistillate, cylindrical, 5 x 2 mm, few-flowered, erect on short (3 mm) peduncles. Pistillate scale obovate, longer than the perigynium, acute, lacking a hyalin margin, black or brown, the midvein area green, the midvein distinct. Perigynium oblanceolate, 2 x 0.8 mm, smooth-margined, nerveless, dull brown or olive, the beak short (0.3 mm) and distinctly bidentate. Stigmas 2.

Carex subspathacea Wormskj.





a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

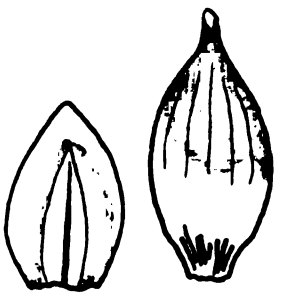
Carex subspathacea Wormskj.

Pitmegea River, 68°54' N, 164°35' W, Cantlon-Gillis 57-156.
Barrow, 71°20' N, 156°40' W, Scholander (acc. to Spetzman) 598,
Spetzman (acc. to Spetzman) 2412b.
Barter Island, 70°10' N, 143°40' W, Porsild (acc. to Porsild).

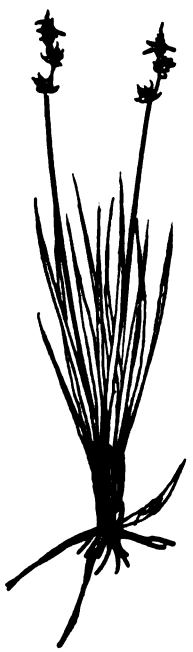
Carex supina Wahlenb. ssp. spaniocarpa (Steud.) Hult.

Tufted, with slender, shiny brown stolons. Culm 5-12 cm long, 1.5 times the filiform, 0.5 mm wide leaves. Lowest bract scale-like, tipped by a scabrous awl, not sheathing, shorter than the inflorescence. Spikes 2 or 3, somewhat remote, the terminal staminate, lanceolate, 5 x 1.5 mm, the lateral pistillate, globose, 4 x 4 mm, few-flowered and the perigynia crowded, nearly sessile. Pistillate scale ovate, equal to the perigynium, acute, the margin broadly hyalin, chestnut brown, the midvein lighter and prominent. Perigynium lanceolate, 3 x 1 mm, smooth-margined, nerveless, shiny brown or olive, the beak long (0.7 mm) and bidentate. Stigmas 3.

Carex supina Wahlenb. ssp. spaniocarpa (Steud.) Hult.



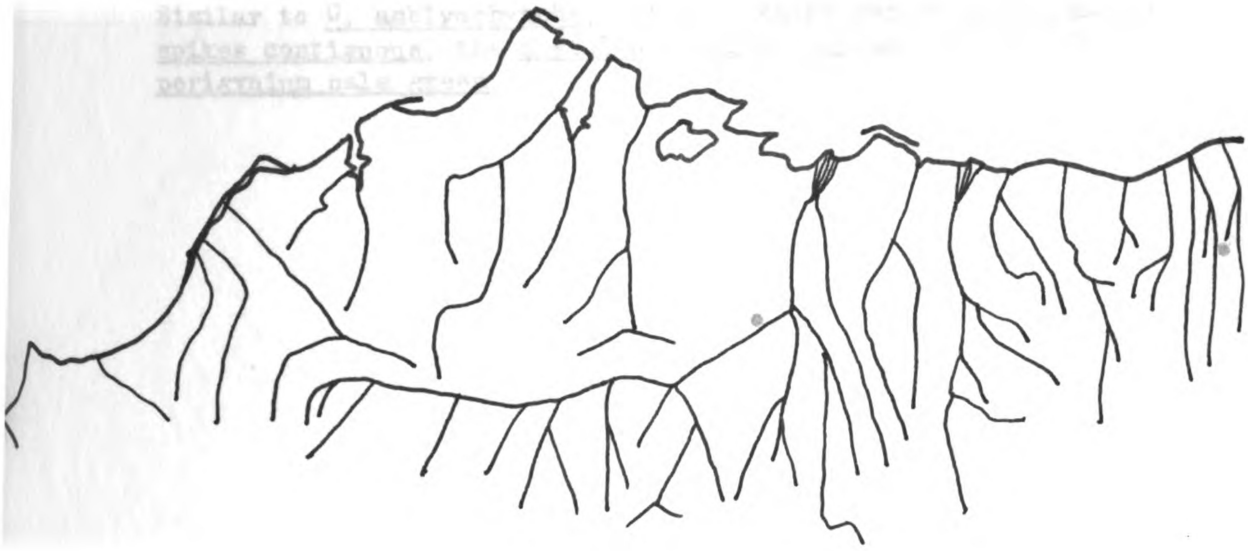
b c



a

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex supina Wahlenb. ssp. spaniocarpa (Steud.) Hult.

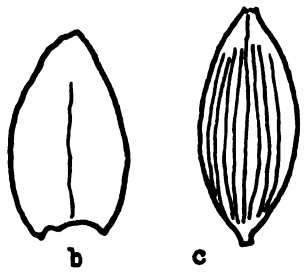


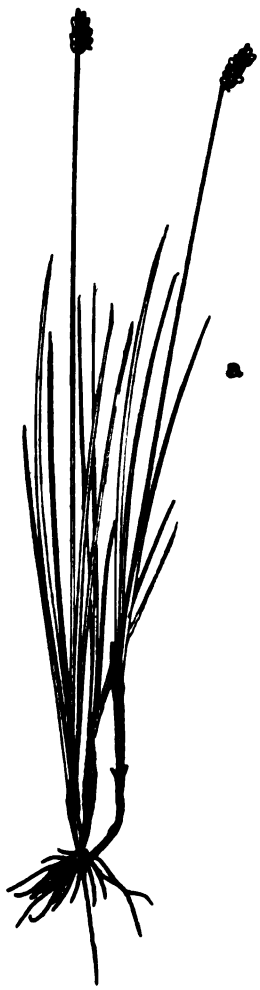
Umiat, 69°22' N, 152°10' W, Spetzman (acc. to Spetzman) 2345.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Malcolm 3.

Carex tenuiflora Wahlenb.

Similar to C. amblyorhyncha, but the leaves narrow (0.5-1 mm), the spikes contiguous, the pistillate scale transparent, and the perigynium pale green.

Carex tenuiflora Wahlenb.





a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

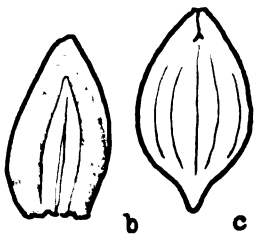
Carex tenuiflora Wahlenb.

Umiat, 69°22' N, 152°10' W, Spetzman (acc. to Spetzman), Cantlon et al 53-5344.
12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-249.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Malcolm 58-449, Malcolm 12.

Carex ursina Dew.

A dwarf, littoral species, densely caespitose. Culm 3-6 cm long, often curved, about equal to the 1 mm wide leaves. Lowest bract scale-like, not sheathing, much shorter than the inflorescence. Spike single, terminal, gynaecandrous, globose, 6 x 4 mm. Pistillate scale obovate, shorter than the perigynium, obtuse, hyalin-margined, dark brown, the midvein area lighter. Perigynium ovate, 2 x 1 mm, smooth-margined, faintly many-nerved, dull tan, with a very short (0.2 mm) truncate beak. Stigmas 2.

Carex ursina Dewey



a habit (1/2)*
b pistillate scale (10/1)
c perigynium (10/1)*

* redrawn from Porsild, 1957, p. 51, fig. 18e, and p. 48, fig. 16$_7$.

Carex ursina Dewey

Barrow, 71°20' N, 156°40' W, Porsild (acc. to Porsild), Scholander (acc. to Scholander) 599.

Carex vaginata Tausch

Stoloniferous, the brown, older leaves persisting. Culm 15-25 cm long, 2-4 times the 2-3 mm wide leaves. Lowest bract foliaceous, long-sheathing (8-12 mm), shorter than the inflorescence. Spikes 2 or 3, remote, the terminal staminate, lanceolate, 10 x 4 mm, the lateral pistillate, ovate to cylindrical, 8 x 4 mm, erect on long (20 mm) stout peduncles. Pistillate scale ovate, equal to the perigynium, acute, the midvein area tan. Perigynium ovate, 2 x 1 mm, smooth-margined, several-nerved, dull tan, the beak short (0.3 mm) and distinctly bidentate. Stigmas 3.

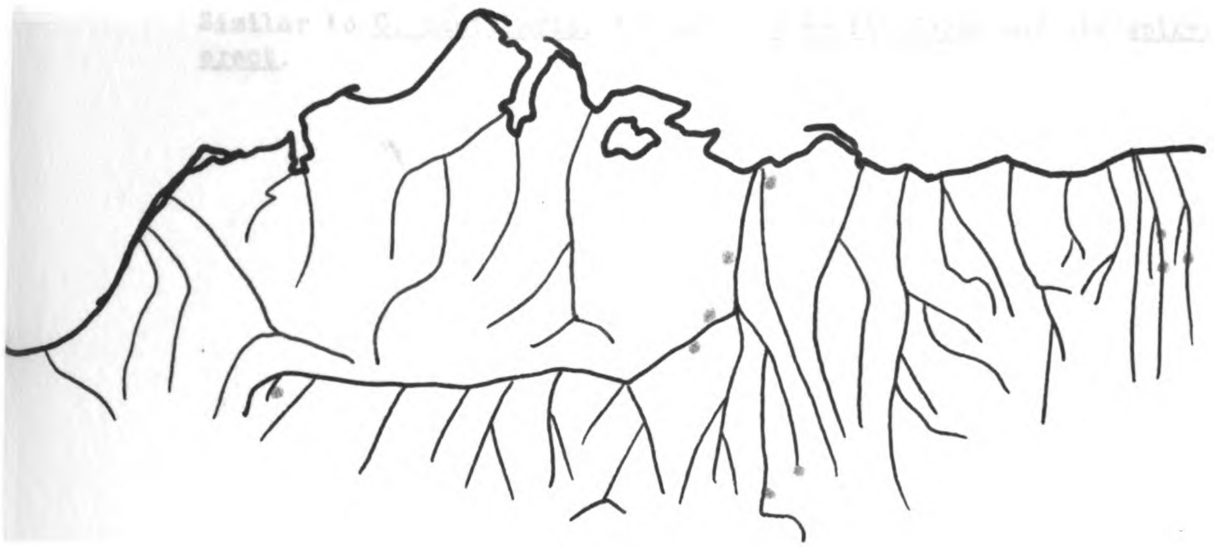
Carex vaginata Tausch

b c

a

a habit (1/2)
b pistillate scale (10/1)
c perigynium (10/1)

Carex vaginata Tausch



Lake Ncluk, upper Colville River, 68°47' N, 160°00' W, Spetzman (acc. to Spetzman) 4029b, 4344.
10 miles SSW of Umiat, 69°14' N, 152°27' W, Cantlon et al 53-4532.
Umiat, 69°22' N, 152°10' W, Cantlon et al 53-120, 53-236, 53-283, Scholander (acc. to Spetzman) 188, Spetzman (acc. to Spetzman) 2641.
Confluence of Kogosukruk and Volville Rivers, 69°46' N, 151°50' W, Cantlon et al 53-540.
Confluence of Itkillik and Colville Rivers, 70°13' N, 150°55' W, Cantlon et al 53-674.
Anaktuvuk Pass, Tuligak Lake, 68°24' N, 151°25' W, Spetzman (acc. to Spetzman) 4418.
Kanayut Lake, Kanayut River, 68°23' N, 151°00' W, Spetzman (acc. to Spetzman) 1974b.
12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-250.
Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Malcolm 58-124.
Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-985, 57-1137, 57-1143, 57-1401, 57-1405, 57-1408, 57-1409, 57-1439, 57-1521.

Carex williamsii Britt.

Similar to C. capillaris, but the leaves filiform, and the spikes erect.

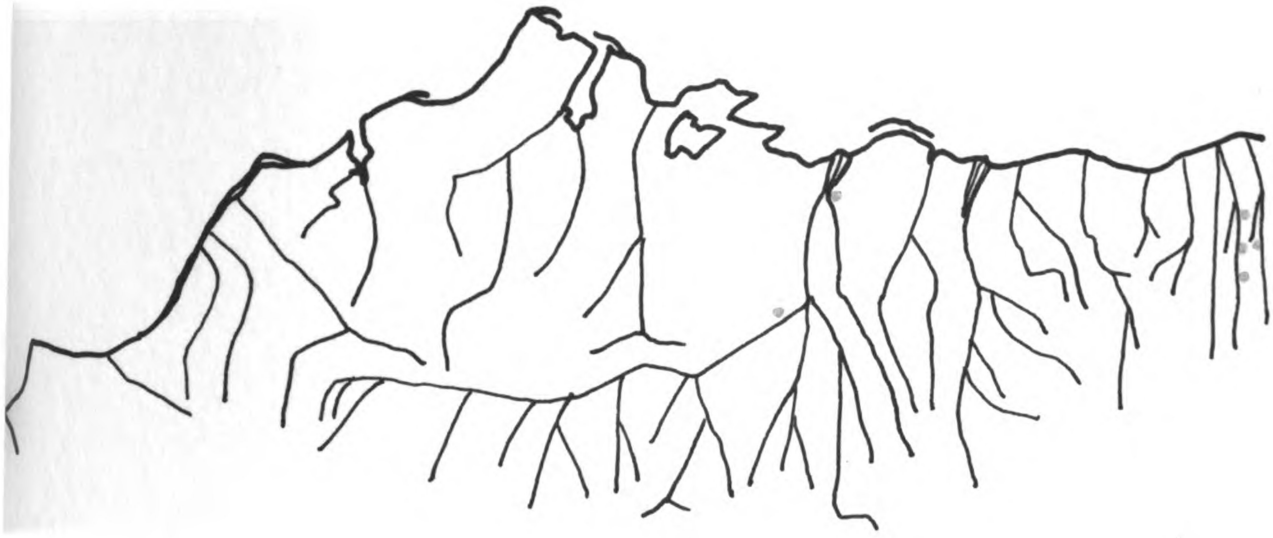
Carex williamsii Britt.

b

a

a habit (1/2)
b pistillate scale and perigynium (10/1)

Carex williamsii Britt.



Umiat, 69°22' N, 152°10' W, Cantlon et al 53-284, 53-2693, 53-5316, Scholander (acc. to Spetzman) 162, Spetzman (acc. to Spetzman) 2632.

15 miles S of the Colville River delta, 70°13' N, 150°55' W, Cantlon et al 53-579.

12 miles N of Okpilak Lake, Okpilak River, 69°36' N, 143°56' W, Cantlon-Malcolm 58-242, 58-252, 58-434.

Okpilak Lake, Okpilak River, 69°23' N, 144°04' W, Cantlon-Malcolm 58-156, 58-205.

Jago Lake, Jago River, 69°26' N, 143°47' W, Cantlon-Gillis 57-1136, 57-1410, 57-2444.

Dark Creek, Okpilak River, 5 miles S of Okpilak Lake, 69°18' N, 144°00' W, Cantlon-Malcolm 58-134.

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