A TAXONOMIC REVIEW OF THE *ERIOPHORUM RUSSEOLUM—E. SCHEUCHZERI* COMPLEX (CYPERACEAE) IN NORTH AMERICA

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ABSTRACT

The taxonomy of *Eriophorum russeolum—E. scheuchzeri* complex in North America is reviewed, including the northwestern North American related species *E. chamissonis*. A key to the taxa including new characters of the medial fertile scales and achenes is presented. The new nothosubspecies ***Eriophorum* ×*medium*** subsp. ***album*** J. Cayouette is described; it represents the hybrid between *E. russeolum* subsp. *leiocarpum* and *E. scheuchzeri* subsp. *scheuchzeri* from northeastern Canada (northern Quebec and Nunavut), based on intermediate characters observed in herbarium specimens. The typical hybrid subspecies, *E.* ×*medium* subsp. *medium* (*E. russeolum* subsp. *russeolum* × *E. scheuchzeri* subsp. *scheuchzeri*) is also characterized and added to the flora of North America (Quebec and Labrador). The two hybrid subspecies are compared to their parental subspecies. Another related taxon, *E. scheuchzeri* subsp. *arcticum*, poorly known in North America, is compared to the typical subspecies and its range is established in northeastern North America. Lectotypes of *E. russeolum* Fries and *E. russeolum* var. *majus* Sommier are here designated.

RÉSUMÉ

Une révision taxonomique du groupe des *Eriophorum russeolum—E. scheuchzeri* en Amérique du Nord est proposée, incluant l'espèce voisine *E. chamissonis* du nord-ouest de l'Amérique. Une clef des taxons basée sur des caractères inédits des écailles fertiles médianes et des akènes est présentée. Une nouvelle notho-sous-espèce, l'***Eriophorum* ×*medium*** subsp. ***album*** J. Cayouette, est décrite, représentant l'hybride entre l'*Eriophorum russeolum* subsp. *leiocarpum* et l'*E. scheuchzeri* subsp. *scheuchzeri*, et localisée dans le nord-est du Canada (nord du Québec et Nunavut), à partir d'observations de caractères intermédiaires sur des spécimens d'herbier. La sous-espèce typique de l'hybride, l'*E.* ×*medium* subsp. *medium* (*E. russeolum* subsp. *russeolum* × *E. scheuchzeri* subsp. *scheuchzeri*), est également caractérisée et rapportée comme nouvelle pour l'Amérique du Nord (Québec et Labrador). Les deux sous-espèces de l'hybride sont comparées à leurs sous-espèces parentales respectives. Un autre taxon voisin, l'*E. scheuchzeri* subsp. *arcticum*, peu connu en Amérique du Nord, est comparé à la sous-espèce typique, et son aire de répartition est précisée dans le nord-est de l'Amérique. Les lectotypes de l'*E. russeolum* Fries et de l'*E. russeolum* var. *majus* Sommier sont désignés.

KEY WORDS: *Eriophorum*, Cyperaceae, hybrid, Canada, Quebec, Labrador, Nunavut, arctic

In the course of the preparation of the collaborative project "la Flore du Québec-Labrador nordique," spearheaded by "le Centre d'Études nordiques" and "l'Herbier Louis-Marie" (QFA), both of Laval University, Quebec City, Canada,

the genus *Eriophorum* (Cyperaceae) was found to be very difficult taxonomically, especially within the *E. russeolum* Fries in Hartman and *E. scheuchzeri* Hoppe groups of rhizomatous species with solitary spikelets, in subgenus *Eriophorum*. Approximately 700 specimens from the region of the projected flora were examined, covering the Quebec-Labrador peninsula north of 54° N, including adjacent islands in Hudson Bay and Ungava Bay that belong administratively to Canada's Nunavut Territory. Specimens from outside the region were also studied. Material was examined from the following herbaria: CAN, DAO, FI, GH, MICH, MINN, MT, MTMG, QFA, QFBE, QUE, SFS, TRTE, UPS, and WIS (abbreviations according to Holmgren et al. 1990).

Marcel Raymond (1954) was one of the first to circumscribe the taxa related to *Eriophorum chamissonis* C.A. Meyer and *E. russeolum*. He recognized five different species complexes worldwide based on the color and the shape of the spikelets, the pubescence of the achenes, the color pattern of the medial fertile scales, and in using some distributional characteristics. He also proposed three varieties of *E. russeolum* based on the color of the bristles and the pubescence of the achenes, two colored-bristle forms for *E. chamissonis*, and three colored-bristle forms for *E.* ×*medium* Andersson which he presumed to represent the hybrid between *E. russeolum* and *E. scheuchzeri*. His key to these taxa was very brief and does not work well. He believed that both *E. chamissonis* and *E. russeolum* occurred in eastern and western North America. In northeastern North America, he separated *E. russeolum* into two varieties based on achene pubescence. Specimens determined by Raymond as *E. chamissonis* in northeastern North America did not match the characters he gave in his publication for that species (first proximal scale length, stem width). It is almost impossible to clearly separate *E. chamissonis* from *E. russeolum* in northeastern North America based on his work.

Later, Novoselova (1993) proposed an alternative circumscription of these taxa, and made other changes in the *E. scheuchzeri* group (Novoselova 1994a, 1994b). She believed that in subgenus *Eriophorum* two rhizomatous species with orange-brown spikelets occur in North America, *E. chamissonis* and *E. russeolum* subsp. *russeolum*. She restricted the range of *E. chamissonis* to North America (both western and eastern North America), considering the Russian material to be referable to other species of the group. She also considered *E. russeolum* subsp. *russeolum* to be an amphi-Atlantic taxon. Ball and Wujek (2002) included *E. russeolum* within *E. chamissonis*, and considered *E. scheuchzeri* to be monotypic.

This investigation supports the circumscriptional concepts of Novoselova (1993, 1994a, 1994b), with the addition of a new taxon to the *E. russeolum*—*E. scheuchzeri* group. Moreover, based on examination of North American rhizomatous taxa of subgenus *Eriophorum* with orange-brown spikelets, it appears that *E. chamissonis* is present only in Alaska and British Columbia, while

Eriophorum russeolum subsp. *russeolum* occurs only in the northeastern North America.

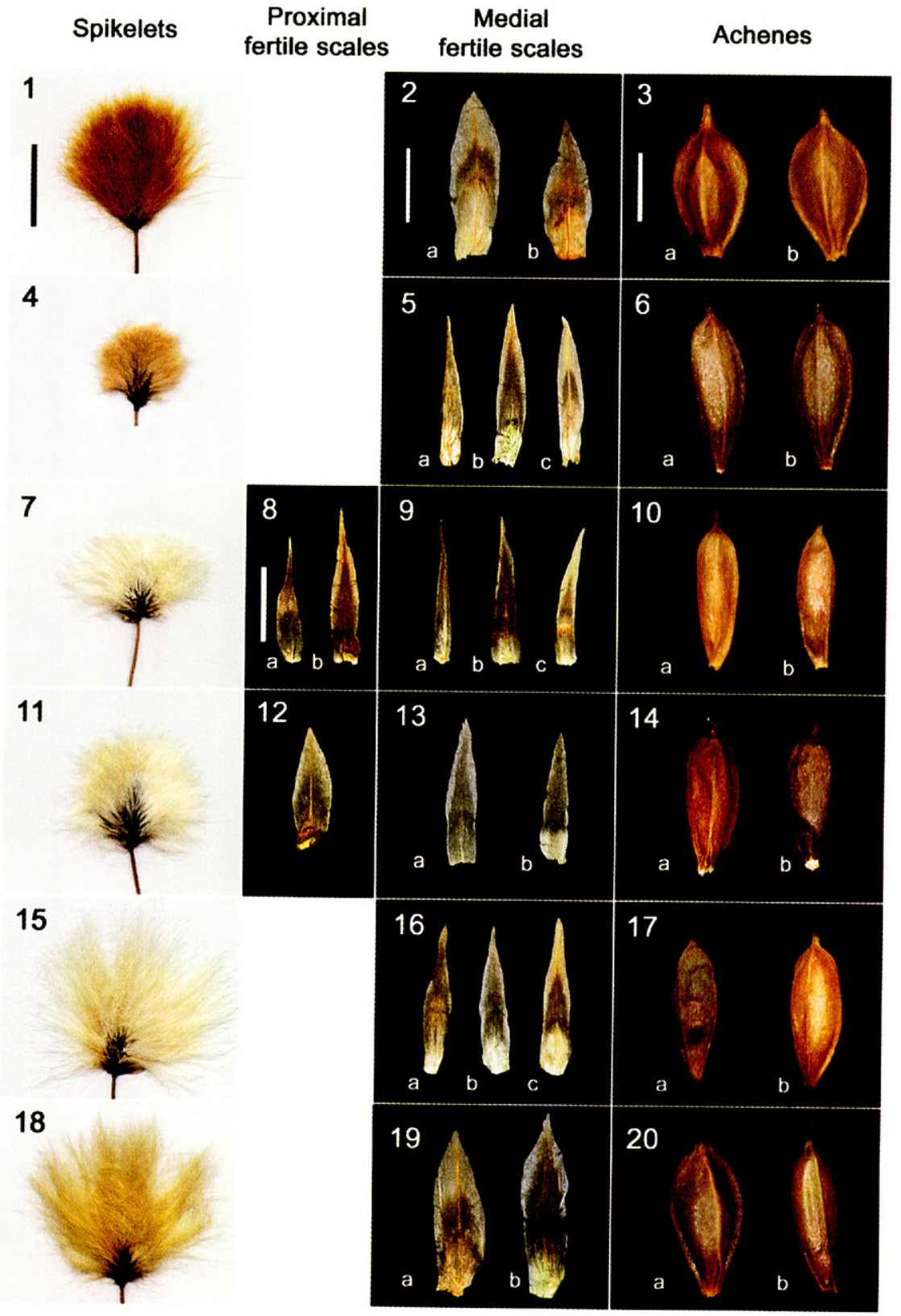
Examination of material from northeastern North America, revealed that rhizomatous specimens with orange-brown spikelets are highly variable. The variation includes typical and atypical *E. russeolum* subsp. *russeolum*, and what is known in western Russia and northwestern Europe as *E.* ×*medium*, the hybrid between *E. russeolum* subsp. *russeolum* and *E. scheuchzeri* subsp. *scheuchzeri* (Novoselova 1993, 1994a), a taxon not previously reported in North America. A few specimens seem to be atypical *E. russeolum* subsp. *russeolum*, or perhaps backcrosses of *E.* ×*medium* with *E. russeolum* subsp. *russeolum*.

Variation is even greater among rhizomatous taxa with white spikelets in the *Eriophorum russeolum* and *E. scheuchzeri* groups. *Eriophorum russeolum* subsp. *leiocarpum* Novoselova can be considered the white phase of *E. russeolum*. Two subspecies can be discerned in the *E. scheuchzeri* group, the common boreal and arctic-alpine subsp. *scheuchzeri*, and the recently recognized high-Arctic subsp. *arcticum* Novoselova. Novoselova (1994b) reported the latter subspecies for Arctic North America, without adequately establishing its distribution in northeastern North America. It should be noted that despite the high variability of *E. russeolum* subsp. *leiocarpum* (Novoselova 1993), some specimens with white spikelets match neither the description of that subspecies nor that of any subspecies in the *E. scheuchzeri* group. Since these specimens have many intermediate characters between *E. russeolum* subsp. *leiocarpum* and *E. scheuchzeri* subsp. *scheuchzeri*, I conclude that they represent a hybrid of these two subspecies. To account for this hybrid, I propose and describe below a new nothosubspecies of *E.* ×*medium*.

With the naming and description of a new taxon, the discovery of a second as new to North America (*E.* ×*medium* subsp. *medium*), and the realization that a third (*E. scheuchzeri* subsp. *arcticum*), while recognized as present, is poorly known on the continent, it has been necessary to identify new characters that help to distinguish these taxa from the commoner *E. russeolum* subsp. *russeolum*, subsp. *leiocarpum* and *E. scheuchzeri* subsp. *scheuchzeri*. The characters are based on various features of the medial fertile scales (size, shape, apex, color pattern), on features of the achenes (size, shape, surface, beak shape and size), and on the lengths of hypogynous perianth bristles and stigmatic branches. Complete descriptions of all six taxa are provided below. The main differences among these taxa are illustrated in Figs. 1–20, summarized in Tables 1 and 2, and employed in the key to the taxa.

As the northwestern North American *E. chamissonis* has been previously reported in northeastern North America, and confused with *E. russeolum*, a complete description is also provided and some of its main differences are included in Table 1 and employed in the key.

General ranges are given for the widespread *E. russeolum* subsp. *russeolum*


Spikelets
Proximal fertile scales
Medial fertile scales
Achenes
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
a
b
c

and *E. scheuchzeri* subsp. *scheuchzeri*, while selected specimens or paratypes are cited for the other five taxa.

Eriophorum chamissonis

Eriophorum chamissonis C.A. Meyer in Ledeb. Fl. Alt. 1:70. 1829. TYPE: U.S.A. ALASKA: (LECTOTYPE: "Legit Eschsch. in Unalaska," by Novoselova (1993), p. 88).

Herbs perennial with short to elongate rhizomes. Vegetative shoots 1–3, 21–61 cm high, leaf margins glabrous. Stems erect, glabrous, terete in cross section, 27–95 cm high, 1.0–2.2(–2.5) mm in diameter below the inflorescence. Leaves basal and cauline 2–5. Proximal sheaths pale brown, pale reddish-brown to reddish-brown, with orange-brown spots on distal membranous parts, ligules obtuse or truncate. Highest distal sheath situated above or below the medial part of the stem, 2.3–4.2 mm wide, without blades or with reduced blades. Blades of proximal sheaths flat to slightly cymbiform, 25–430 × 1.4–1.5 mm, glabrous in distal parts, the apex rounded. Blades of distal sheaths 0 or 0.9–3.5 × 0.4–1.0 mm. Spikelets solitary, typically spherical at maturity, sometimes widely obovoid, 2–6 × 2–7 cm, with 100–200 florets. Proximal scales 3–7, without florets. First proximal scale olive to pale gray-olive, becoming pale beige with reddish-brown dots in marginal and distal parts, triangular-lanceolate to elliptic, 12–23(–30) × 2.6–6.5 mm, with 4–10 pale orange, pale brown to blackish nerves converging below the apex, acute, acuminate or rarely short-awned. Medial fertile scales with a non demarcated, or demarcated short to slightly extended proximal part, 1.0–2.5 mm long, averaging 19–42% of total scale length, whitish, greenish, pale beige-brown to pale orange-brown, with small reddish-brown longitudinal spots, with medial part frequently grayish or forming a ± extended blackish triangle, with narrow-hyaline or whitish marginal and distal parts, very often covered with small dark reddish longitudinal spots, mostly lanceolate, sometimes elliptic, 4.2–6.3 × 1.2–1.5(–1.8) mm, the widest part near the middle

FIGS. 1–20. Spikelets, proximal (pfs) and medial fertile scales (mfs), and achenes of six *Eriophorum* taxa. **1–3.** *Eriophorum russeolum* subsp. *russeolum*. **1.** Spikelet (*Gauthier & Roy 83-45* QFA). **2a.** Mfs. (*Payette & Légère LM-148* QFA). **2b.** Mfs. (*Deshaye 90-3090* QUE). **3a.** Achene (*Gauthier & Roy 83-41* QFA). **3b.** Achene (*Lemieux 21731* QFA). **4–6.** *Eriophorum* ×*medium* subsp. *medium*. **4.** Spikelet (*Blondeau 501* QFA). **5a.** Mfs. (*Robinson 74b* GH). **5b.** Mfs. (*Blondeau 501* QFA). **5c.** Mfs. (*Ouellet s.n. 1974* CAN). **6a–b.** Achenes (*Robinson 74b* GH). **7–10.** *Eriophorum scheuchzeri* subsp. *scheuchzeri*. **7.** Spikelet (*Blondeau PDLB-88339* QFA). **8a.** Pfs. (*Dutilly et al 7991* DAO). **8b.** Pfs. (*Blondeau 85036* QFA). **9a.** Mfs. (*Calder 2308* DAO). **9b.** Mfs. (*Blondeau 85036* QFA). **9c.** Mfs. (*Deshaye 80* QFA). **10a.** Achene (*Calder 2308* DAO). **10b.** Achene (*Dutilly et al 87313* QFA). **11–14.** *Eriophorum scheuchzeri* subsp. *arcticum*. **11.** Spikelet (*Blondeau 85060* QFA). **12.** Pfs. (*Dutilly et al 87516* SFS). **13a.** Mfs. (*Forbes 70* DAO). **13b.** Mfs. (*Dutilly et al 87562* QFA). **14a–b.** Achenes (*Dutilly et al 87516* SFS). **15–17.** *Eriophorum* ×*medium* subsp. *album*. **15.** Spikelet (*Blondeau 84435* QFA). **16a.** Mfs. (*Polunin 2599* CAN). **16b.** Mfs. (*Garneau 91-405M* QFA). **16c.** Mfs. (*Cayouette J82-212* DAO). **17a.** Achene (*Soper s.n. 1925* CAN–Holotype). **17b.** Achene (*Cayouette J82-212* DAO). **18–20.** *Eriophorum russeolum* subsp. *leiocarpum*. **18.** Spikelet (*Dutilly et al 20806* QFA). **19a.** Mfs. (*Brisson & Forest 20502* QUE). **19b.** Mfs. (*Dignard 98-159* QUE). **20a.** Achene (*Deshaye 90-1593* QUE). **20b.** Achene (*Dignard 98-159* QUE). Scale bar for Fig. 1 and all the spikelets equals 2 cm; for Fig. 2 and all fertile scales equals 3 mm; for Fig. 3 and all achenes equals 1 mm.

TABLE 1. Selected morphological differences of *Eriophorum* ×*medium* hybrids and their respective parents, also including *E. chamissonis*.

Characters (1)	Characters (2)	*E. chamissonis*	*E. russeolum* subsp. *russeolum*	*E.* ×*medium* subsp. *medium*	*E. scheuchzeri* subsp. *scheuchzeri*	*E.* ×*medium* subsp. *album*	*E. russeolum* subsp. *leiocarpum*
Spikelet	shape (mature)	spherical or widely obovoid	obovoid to ellipsoid	hemispherical, ovoid or ellipsoid	hemispherical	hemispherical, ovoid or obovoid	ellipsoid or obovoid
"	color of bristles	pale beige-brown	orange-brown to dark orange-brown	pale orange-brown to orange-brown	white or cream white	white or dull white	white or dull white
"	length (cm)	2.0–6.0	1.5–4.0	1.4–4.0	1.0–3.0	1.6–4.0	2.0–4.0
First proximal scale	length (mm)	12–23(–30)	7–14(–18)	7–11(–17)	5–12	7.1–11.5	(5.7–)7–16.5
Medial fertile scales	proximal part length (mm)	1.0–2.5	1.5–3.5	0.9–1.5	0.1–0.9	0.5–1.7	0.8–3.2
	% of proximal part to maximum length	19–42	30–49	17–27(–37)	2–25	9–34	(11–)18–57
"	proximal part color pattern	whitish, greenish, pale beige-brown	orange-brown to beige-brown	whitish, pale green or pale beige	whitish or pale green	whitish, pale green or pale beige	orange-brown, pale brown, pale green or whitish
"	color pattern of other parts	grayish, or blackish medial triangle with narrow-hyaline margins, with small dark longitudinal spots	dark wide medial triangle with wide-hyaline margins	blackish with usually narrow-hyaline margins	dark grey or blackish with dark or narrow hyaline margins	dark medial triangle with reduced hyaline margins	usually dark wide medial triangle with wide or reduced hyaline margins
"	greatest width (mm)	1.2–1.5(–1.8)	1.3–2.2	0.7–1.3	0.4–1.0	0.6–1.1	(0.8–)1.0–2.4

TABLE 1. continued

Characters (1)	Characters (2)	*E. chamissonis*	*E. russeolum* subsp. *russeolum*	*E.* ×*medium* subsp. *medium*	*E. scheuchzeri* subsp. *scheuchzeri*	*E.* ×*medium* subsp. *album*	*E. russeolum* subsp. *leiocarpum*
"	position of the greatest width	below or near middle	above or near middle	below middle	below middle or near base	below middle	above, below or near middle
"	apex	acute	acute, rarely obtuse or acuminate	acuminate	narrowly acuminate	acuminate	acute
"	width (mm) at 0.2 mm below the apex	0.3–0.5	0.2–0.5(–0.9)	0.1–0.3	0.05–0.1(–0.2)	0.15–0.3(–0.4)	0.25–0.6
Hypogynous bristles	length (mm)	25–40	25–32	15–20	10–25	(10–)22–32	12–30
Anther	length (mm)	0.7–1.6	1.5–3.1	0.8–1.5(–1.8)	0.35–0.8	0.9–1.6	(1.3–)1.5-3.1
Stigmatic branches	length (mm)	1.5–2.6	1.2–1.8	0.7–2.0	0.5–1.3	1.0–2.2	1.3–3.2
Achene	shape	ellipsoid or slightly obovoid	obovoid or ellipsoid	frequently narrowly obovoid	narrowly obovoid	narrowly obovoid or narrowly ellipsoid	obovoid or ellipsoid
"	width (mm)	0.8–1.1	0.75–1.3	0.6–0.9(–1.1)	0.5–0.85	0.6–0.9	0.6–1.2
"	surface (pubescence)	glabrous or scabrous	glabrous or scabrous	glabrous	glabrous	glabrous	glabrous or scabrous
"	beak width at base (mm)	0.1–0.2	0.1–0.25	0.1–0.15	0.05–0.1	0.1	0.1–0.2
"	beak shape	straight, rarely oblique	straight, rarely oblique	straight or oblique	more often oblique than straight	straight or oblique	more often straight than oblique

TABLE 2. Selected morphological differences between the two subspecies of *Eriophorum scheuchzeri*.

Characters	*E. scheuchzeri* subsp. *scheuchzeri*	*E. scheuchzeri* subsp. *arcticum*
Spikelet shape	hemispherical	spherical
Proximal fertile scale pattern	missing hyaline margins or reduced margins well-separated from darker body	conspicuous hyaline margins passing to inner various tones of gray, to darker medial and basal parts
Medial fertile scale shape	narrowly lanceolate	lanceolate
Medial fertile scale width at the middle (mm)	0.3–0.7(–0.9)	(0.5–)0.7–1.4(–1.6)
Medial fertile scale apex	narrowly acuminate	acuminate
Medial fertile scale width (mm) at ca. 0.2 mm below the apex	mostly 0.1	mostly 0.2
Anther length (mm)	0.35–0.8	0.6–1.0
Achene color	brown to olive-brown	orange-brown to dark reddish-brown
Achene surface	glossy	dull

or below, with 1–3 incomplete nerves, acute, 0.3–0.5 mm wide at 0.2 mm below the apex. Perianth of 50–80 hypogynous bristles, pale beige-brown (or whitish in f. *turneri* Raymond), 25–40 mm long. Stamens with filaments about as wide as perianth bristles, anthers pale yellow, 0.7–1.6 mm long. Styles with 3(–4) stigmatic branches closed or sometimes spreading at maturity, branches 1.5–2.6 mm long. Achenes orange-brown, ellipsoid or slightly obovoid, trigonous to compressed-trigonous, glabrous or scabrous in the distal part, mostly dull, 1.9–2.6 × 0.8–1.1 mm, base cuneate, apex obtuse, with a straight beak, rarely oblique, slightly conical, 0.2–0.5 mm long, 0.1–0.2 mm wide at base.

Distribution and habitat.—*Eriophorum chamissonis* is restricted to northwestern North America, in Alaska and British Columbia. It is found in various kinds of sphagnum and minerotrophic bogs, marshy and beaver meadows, shallow ponds, muskeg, and heat tundra.

Discussion.—This taxon has a long history of various interpretations, of which the most important are those of Raymond (1954) and Novoselova (1993). As many morphological features of *E. chamissonis* overlap with those of *E. russeolum*, *E. chamissonis* has been frequently mistakenly reported in eastern North America (Raymond 1954; Novoselova 1993) and in eastern Russia. Material from Russia has been reassigned by Novoselova to other taxa such as *E. mandshuricum* Meinsch. subsp. *mandshuricum* or subsp. *sibiricum* Novoselova.

Eriophorum chamissonis is best differentiated from *E. russeolum* subsp. *russeolum* by the following characters (see also Table 1): mostly spherical spikelets with pale beige-brown bristles (typically obovoid spikelets with red-brown

to dark orange-brown bristles in *E. russeolum*), anthers 0.7–1.6 mm (1.5–3.1 mm in *E. russeolum*), and various color pattern and shape of medial fertile scales: grayish to blackish middle and distal parts, sometimes with a more defined blackish triangle, with usually narrow-hyaline or whitish marginal and distal parts, very often covered with small dark reddish longitudinal spots (see Novoselova 1993, Fig. 1a), mostly lanceolate, the largest width below or near the middle (usually dark wide medial triangle with wide-hyaline margins, mostly without dark longitudinal spots, typically obovate, sometimes lanceolate or elliptic, the largest width above or near the middle in *E. russeolum*).

There are some individuals in northeastern North America with occasional pale orange-brown spikelets, shorter anthers (0.9–1.9 mm), darker, elliptic or lanceolate medial fertile scales with the largest width sometimes below the middle. At first glance, they could be considered within the variation of *E. chamissonis*, but they differ by two main characters. In *E. chamissonis* the first proximal sterile scale is 12–23(–30) mm long and the stem diameter below the inflorescence is 1.0–2.2 mm, whereas the odd northeastern material has the corresponding measurements of 8–11 mm long and 0.6–1.2 mm in diameter respectively. Those specimens are considered in this paper to be atypical *E. russeolum* subsp. *russeolum* or backcrosses of *E.* ×*medium* subsp. *medium* with *E. russeolum* subsp. *russeolum*. See the discussion below under *E. russeolum* subsp. *russeolum*.

In addition, micromorphological differences in the achene surface of *E. chamissonis* and *E. russeolum* have been pointed out by Tucker and Miller (1990). They also consider *E. chamissonis* to be a western North American species.

Selected specimens: **CANADA. British Columbia:** Hart Highway N of Prince George, 8 mi N of Ft. McLeod, 3 Aug 1954, *J.A. Calder et al. 13949* (DAO); near Hilliers between Parksville and Alberni, 49°16'N–124°46'W, 13 Jun 1961, *J.A. Calder & K.T. MacKay 30390* (DAO); near Kispiox River, about 12 mi NNW of Kispiox, N of Hazelton, 19 Aug 1954, *J.A. Calder et al. 14728* (DAO); along Kitsumkalum Lake road, about 8 mi N of Terrace, 22 Aug 1954, *J.A. Calder et al. 14907* (DAO); Hope Island, off N end of Vancouver Island, between Roller Bay and Mexicana Point, 5 Jul 1961, *J.A. Calder & K. T. MacKay 31290* (DAO); Lake Beautiful, 30 Jul 1935, *P.P. Henson s.n.* (DAO); between Prince Rupert and Galloway rapids, 18 Jul 1954, *J.A. Calder et al. 13216* (DAO); Queen Charlotte Islands (QCI), Graham Island, about 3/4 mi SW of Jalun Lake and 9 mi W of head of Naden Harbour, 1 Jul 1964, *J.A. Calder & R.L. Taylor 35663* (DAO); QCI, Graham Island, Masset Inlet, Mamin River delta at Juskatla, 15 Jun 1957, *R.L. Taylor 124* (DAO); QCI, Graham Island, about 8 mi on road from Port Clements to Tlell, 9 Jun 1957, *J.A. Calder et al. 21358* (DAO); QCI, Graham Island, 4 mi W of Tlell on road to Port Clements, 26 Jun 1964, *J.A. Calder & R.L. Taylor 35457* (DAO); QCI, Graham Island, 2–3 mi E of Tow Hill, 20 Jul 1957, *J.A. Calder et al. 22756* (DAO); QCI, Graham Island, about 1 1/2–2 mi W of Tow Hill and E of Masset, 19 Jul 1957, *J.A. Calder et al. 22726* (DAO); QCI, Moresby Island, Cumshewa Inlet, a few mi N of Moresby Logging Camp, 29 Jun 1957, *J.A. Calder et al. 21938* (DAO); Seeley Lake, S of Hazelton, 24 Jun 1949, *R. Pillsbury 191* (DAO); Sicamous-Revelstoke Highway, E end of Victor Lake, 7 Jun 1953, *J.A. Calder & D.B.O. Savile 8796* (DAO); Southern Cariboo Mountains, Wells Gray Provincial Park, E side of Battle Mt., 1.5 mi NE of Stevens Lake, 25 Jul 1961, *L. & T. Ahti 7092* (DAO); 1 mi NW of Trout Lake on road from Beaton to Kaslo, 10 Jun 1954, *J.A. Calder & D. B. O. Savile 8964* (DAO); about 1 mi N of Trout Lake, 50°39'N–117°34'W, 25 Jun 1962, *J.A. Calder & K.W. Spicer 33647* (DAO). **UNITED STATES. Alaska:** Attu

Island, Peaceful Valley, near Navy Town, 52°50'N-173°11'W, 18 Aug 1983, *B.F. Friedman (83-59) & J.A. Michaelson* (DAO, 2 collections); Eagle River, near Juneau, 28 Jun 1940, *J.P. Anderson 6201* (DAO, 2 collections).

***Eriophorum russeolum—Eriophorum scheuchzeri* complex**

A) Taxa with orange-brown spikelets (**Figs. 1–6**)

1. Eriophorum russeolum Fries in Hartman subsp. **russeolum**, Handb. Scand. Fl. ed. 3:13. 1838. TYPE: SWEDEN. TORNE LAPPMARK: Karesuando, *L.L. Laestadius s.n.* (LECTOTYPE, designated here: "Lappon. Tornens. Karesuando, *L.L. Laestadius s.n.* Herbarium normale Fasc. 3, no 67" UPS V-108936!, DAO (photograph)! The sheet selected bears three specimens, the middle one clearly rhizomatous.

Eriophorum russeolum var. *majus* Sommier, Fl. Ob Infer. 103. 1896. TYPE: RUSSIA. WESTERN SIBERIA: Ob River, *E. Sommier s.n.* (LECTOTYPE, designated here: "Siberia, ad flumen Ob, ripae laevae terra firma Muzhi, solo subpaludoso, sphagnoso, 4-VIII-1880, *E. Sommier s.n.*" FI!, DAO (photograph)! The four specimens on the sheet have scabrous achenes and medial fertile scales with wide-hyaline margins.

Herbs perennial with short to elongate rhizomes. Vegetative shoots 1–3, 19–32 cm high, leaf margins mostly glabrous. Stems erect, glabrous, mostly terete in cross section, 15–55 cm high, 0.7–1.6 mm in diameter below the inflorescence. Leaves basal and cauline 2–6. Proximal sheaths brown, pale brown to gray-brown, with orange-brown spots on distal membranous parts, ligules obtuse. Highest distal sheath situated above, below or near the medial part of the stem, 1.6–3.5 mm wide, with reduced blades. Blades of proximal sheaths flat to slightly cymbiform, 30–240 × 0.9–1.6 mm, glabrous or rarely scabrous in distal parts, the apex obtuse to rounded. Blades of distal sheaths 2–18 × 0.9–1.2 mm. Spikelets solitary, typically obovoid at maturity (Fig. 1), but often ellipsoid, 1.5–4.0 × 1.5–5.0 cm, with 100–150 florets. Proximal scales 3–7, without florets. First proximal scale olive-brown to dark olive-green, becoming pale beige to hyaline in distal parts, triangular-lanceolate, elliptic to ovate, 7–14(–18) × 3.4–4.4 mm, with 3–8 orange-brown nerves converging below the apex, acute, acuminate or rarely short-awned. Medial fertile scales with well demarcated and extended proximal part (Fig. 2), 1.5–3.5 mm long, averaging 30–49% of total scale length, orange-brown to beige-brown, with medial part forming a ± extended dark triangle, with wide-hyaline or whitish marginal and distal parts, typically obovate (Fig. 2a), sometimes lanceolate or elliptic, 4.0–7.5 × 1.3–2.2 mm, the widest part near the middle or above, rarely below, with 1 incomplete nerve, obtuse, acute or acuminate, 0.2–0.5(–0.9) mm wide at 0.2 mm below the apex. Perianth of 50–70 hypogynous bristles, pale to dark orange-brown or red-brown (Fig. 1), 25–32 mm long. Stamens with filaments about as wide as perianth bristles, anthers yellow, 1.5–3.1 mm long. Styles with 3 stigmatic branches open to spreading at maturity, branches 1.2–1.8 mm long. Achenes pale olive-green, gray-olive, dark olive-green or brownish (Fig. 3), obovoid or ellipsoid, trigonous to compressed-trigonous, glabrous (Fig. 3b) or scabrous (Fig. 3a) in the distal part, lustrous or

slightly lustrous, 2.05–2.70 × 0.75–1.30 mm, base cuneate, apex obtuse to slightly rounded, with a straight beak (Fig. 3a), rarely oblique (Fig. 3b), conical, 0.2–0.6 mm long, 0.1–0.25 mm wide at base. Figs. 1–3.

Distribution and habitat.—This typical subspecies is amphi-Atlantic, ranging from central Russia westward to Northern Europe and eastern North America, from Newfoundland, Labrador, the Maritime provinces, Quebec, the islands of Nunavut in James Bay to Ontario. Its ecological affinities in North America are boreal and its range does not extend far beyond the treeline. It is found mostly in fens or minerotrophic bogs of various kinds, at the edge of pools, ponds or on lakeshores, the typical habitats for all six taxa in the *E. russeolum* and *E. scheuchzeri* groups.

Discussion.—This is the most common taxon with orange-brown spikelets in northeastern North America. Its distinguishing features are the typically obovoid spikelets and their orange-brown to dark orange-brown color (Fig. 1). The characters of the medial fertile scales are important (Table 1, Fig. 2): a unique color pattern consisting of a long demarcated proximal part, usually orange-brown, that covers up to half the length of the scale (Fig. 2a), a central zone represented by a wide black triangle, and wide marginal and distal whitish or hyaline parts; a wide lanceolate, elliptical or obovate shape, the widest of all the taxa considered here (1.3–2.2 mm), the widest area situated above (Fig. 2a) or near the middle (Fig. 2b) of the scale, with a mostly acute apex (better indicated by measurements taken at 0.2 mm below the apex: 0.2–0.5(–0.9) mm) (Table 1). Anthers and achenes are the longest and largest of all orange-brown taxa. Achenes (Fig. 3) are about equally glabrous or scabrous (Table 1, Fig. 3), which is a bit different from data reported for material from Russia and northwestern Europe (Berggren 1969; Novoselova 1993). Achene beaks are the longest of all the taxa (0.2–0.6 mm) and the widest at the base (0.1–0.25 mm); they are more often straight than oblique. The achene beaks of *E.* ×*medium* subsp. *medium* differ in that they are shorter, narrower and more frequently oblique (Table 1, Fig. 6).

Variation is also encountered in a group of specimens considered atypical because of darker and narrower medial scales, shorter anthers (mostly 1.3–1.9 mm), more frequently glabrous achenes, and achenes with narrower beaks. When these atypical specimens are found outside the range of the hybrid *E.* ×*medium* subsp. *medium*, they could be interpreted as expressions of the variation of *E. russeolum* subsp. *russeolum*. When they occur within the range of that hybrid they could also represent backcrosses of *E.* ×*medium* subsp. *medium* with *E. russeolum* subsp. *russeolum*. Experimental and field studies will be needed to help solve the problem represented by these atypical specimens.

2. Eriophorum ×medium Andersson subsp. **medium**, Bot. Not. 1857:62. 1857. (*Eriophorum russeolum* subsp. *russeolum* × *E. scheuchzeri* subsp. *scheuchzeri*) TYPE: SWEDEN. LULE LAPPMARK: prope Quickjock, *N.J. Andersson s.n.* (HOLOTYPE: S, not seen).

Eriophorum ×*gauthieri* Boivin, Provancheria 25:43. 1992. TYPE: CANADA: LABRADOR, Grady and Cross Islands, 26 Jul 1933, *G. Gardner 18* (HOLOTYPE: QFA!; ISOTYPE: QFA!).

Herbs perennial with short to elongate rhizomes. Vegetative shoots 1–3, 8–24 cm high, leaf margins mostly glabrous. Stems erect, glabrous, mostly terete in cross section, 16–42 cm high, 0.7–1.5(–1.7) mm in diameter below the inflorescence. Leaves basal and cauline 3–7. Proximal sheaths green, olive-green, beige-brown, reddish brown to dark brown, with orange-brown spots on distal membranous parts, ligules obtuse. Highest distal sheath situated below the medial part of the stem, 1.8–3.4 mm wide, with reduced blades. Blades of proximal sheaths flat to slightly cymbiform, 50–190 × 0.7–1.6 mm, glabrous or rarely scabrous in distal parts, the apex obtuse to rounded. Blades of distal sheaths 1–13 × 0.4–0.9 mm. Spikelets solitary, hemispherical (Fig. 4), sometimes ovoid or ellipsoid at maturity, 1.4–4.0 × 0.9–6.0 cm, with 100–150 florets. Proximal scales 3–5, without florets. First proximal scale dark olive-brown to blackish, becoming hyaline brown in marginal and distal parts, ovate, 7–11(–17) × 2.2–4.7 mm, with 5–10 orange-brown or pale brown nerves converging below the apex, acuminate. Medial fertile scales with reduced proximal part (Fig. 5), 0.9–1.5 mm long, averaging 17–27(–37) % of total scale length, whitish, pale green or pale beige, with medial and distal parts blackish (Fig. 5a), with marginal and distal parts reduced-hyaline (Figs. 5b–c), lanceolate, 3.6–7.3(–8.0) × 0.7–1.3 mm, the widest part mostly below the middle, with 1 incomplete nerve, acuminate, mostly 0.1–0.3 mm wide at 0.2 mm below the apex. Perianth of 30–50 hypogynous bristles, orange-brown to pale orange-brown (Fig. 4) or red-brown, 15–20 mm long. Stamens with filaments about as wide as perianth bristles, anthers yellow, 0.8–1.5(–1.8) mm long. Styles with 3 stigmatic branches mostly closed at maturity, branches 0.7–2.0 mm long. Achenes chestnut brown (Fig. 6), obovoid, mostly narrowly obovoid, rarely ellipsoid, compressed-trigonous, glabrous, slightly lustrous, 1.6–2.5 × 0.6–0.9(–1.1) mm, base cuneate, apex acute or obtuse, with a straight (Fig. 6b) or oblique beak (Fig. 6a), mostly cylindrical, 0.2–0.3 mm long, 0.1–0.15 mm wide at base. Figs. 4–6.

Distribution.—Described from Scandinavian material, up until now this hybrid had been found only in north central Russia, westward to northern Scandinavia (Novoselova 1993, 1994a). Reports of *E. medium* from an almost continuous range in the Russian Arctic (Tolmachev 1996) do not in every case represent hybrids between *E. russeolum* subsp. *russeolum* and *E. scheuchzeri*, because they refer to a taxon bearing white or orange-brown spikelets. *Eriophorum* ×*medium* subsp. *medium* can now be added to the flora of North America based on collections in Labrador and northern Quebec (Nunavik), ranging from ca 51°N to 59°N. Previous reports of *E.* ×*medium* in North America, mostly from the Northwest, did not represent hybrids between *E. russeolum* subsp. *russeolum* and *E. scheuchzeri* subsp. *scheuchzeri*. *E.* ×*medium* is a boreal amphi-Atlantic taxon like one of its parents, *E. russeolum* subsp. *russeolum*.

Discussion.—This hybrid is occasional in the sympatric range of its two parental species in eastern North America. It had not been previously detected despite the fact that many morphological characters are intermediate between those of the two parents (Table 1). The orange-brown spikelets are more often than not paler and smaller (Fig. 4) than those of *E. russeolum* subsp. *russeolum*, and their shape is highly variable, more often than not hemispherical, like those of *E. scheuchzeri* subsp. *scheuchzeri* (Fig. 7). Anther lengths are intermediate (0.8–1.5 mm) as are the majority of achene characters. The main differences are illustrated by the medial fertile scales which are closer to those of *E. scheuchzeri* subsp. *scheuchzeri* in the preponderance of blackish color, in the frequent reduction of marginal and distal hyaline parts, in the color variation and shortness of proximal parts, in the narrow width (0.7–1.3 mm) and acuminate apex, and in the maximum width mostly being located below the middle (Table 1, Figs. 5, 9). This is in accordance with Novoselova's observations (1993) of *E.* ×*medium* in Russia and northwestern Europe. Some individuals from North America have medial scales with more developed hyaline margins and a narrow central blackish triangle (Fig. 5c), corresponding to material from northern Europe studied by Faegri (1958: Fig. 1D–E) and reported to belong in part to *E.* ×*medium*. I observed the same pattern in some individuals of the hybrid between *E. russeolum* subsp. *leiocarpum* and *E. scheuchzeri* subsp. *scheuchzeri* (Fig. 16c).

The examination of type material of *E.* ×*gauthieri* Boivin (1992), described from Labrador as the hybrid between *E. chamissonis* and *E. scheuchzeri*, shows that it is identical to *E.* ×*medium* subsp. *medium*. Boivin (1992) included both whitish and orange-brown taxa of *E. russeolum* within *E. chamissonis*.

The presence of well-formed achenes in many individuals seems to indicate that some specimens may have become stabilized enough to be considered orthospecies of hybrid origin, as has been hypothesized for plants in northern Europe (R. Elven, pers. comm.). Further studies are needed to confirm this hypothesis.

Specimens examined. **CANADA. Labrador:** Belle Isle, South Point, 51°53'N–55°24'W, 25 Jul 1986, *T.A. Hedderson 4061* (CAN); Black Island, 17–19 Jul 1938, *G. Gardner 38113* (QFA, 2 collections); Grady and Cross Islands, 26 Jul 1933, *G. Gardner 18 [B]* (QFA, 2 collections, holotype & isotype of *Eriophorum* ×*gauthieri* Boivin, mixed with *E. scheuchzeri* subsp. *scheuchzeri*); Indian Harbour & Fox Cove, 16 Jul 1892, *C. Waghorne 32288-B* (CAN); Knob Lake area, valley on Geren Hill, 23 Jul 1961, *J. Sangster s.n.* (MTMG); Lake Attikamagen, Northwest Bay, 54°59'N–66°41'W, 19 Jul 1953, *F. Harper 3630* (CAN); Port Manvers, 10 Aug 1922, *R. Robinson 74* (GH); Red Bay, on Strait of Belle Isle, 23 Jul 1996, *M.J. Oldham 19156* (MICH). **Québec: Nunavik:** Abloviak Fjord, [59°27'N–65°10'W], 2 mi from head, 1 mi from shore, 20 Jul 1978, *H. Ouellet 82* (CAN, MT, SFS); environs de Kuujjuaq, ouest de la riv. Koksoak, env. 30 km au nord de Fort-Chimo, 58°22'N–68°14'W, 17 Jul 1982, *M. Blondeau 501* (Hb. Blondeau, QFA); Fort Chimo area, 58°07'N–68°23'W, 4 Aug 1948, *J.A. Calder 2338* (MT); Kangiqsualujjuaq, estuaire de la rivière George, 1 km au NNO du village, 58°41'40"N–65°58'05"W, 26 Jul 1984, *R. Gauthier 84-161* (MICH, QFA), *84-162* (QFA); idem, embouchure de la rivière George, 58°42'N–65°54'W, 20 Jul 1988, *M. Blondeau GR-88079* (QFA); Lac Ford, 59°13'N–70°08'W, 10 Jul 1975, *H. Ouellet s.n.* (CAN); Rivière Boniface, 57°45'N–76°09'W, 9 Aug 1987, *A. St-Louis 104* (QFA); idem, à l'est de la Passe au Renard, 57°43'50"N–76°07'20"W, 26 Jul 1991, *M. Garneau 91-553-M* (QFA); idem, à l'est du camp, 17 Jul 1994, *P. Levasseur 76*

(QFA); Rivière aux Feuilles, 18 km en amont du le rapide, ca 58°30'N–70°30'W, 18 Jul 1974, *H. Ouellet s.n.* (CAN); Rivière George, environ 3 milles à l'ouest du lac Indian House, ca 56°20'N–64°47'W, 29 Jul 1947, *J. Rousseau 564* (DAO, MT); idem, Lac Indian House, ca 56°25'N, 30 Jul 1947, *J. Rousseau 580* (DAO, MT); idem, près de Hades Hills, ca 56°58'N, 5 Aug 1947, *J. Rousseau 734* (MT).

B) Taxa with white spikelets (**Figs. 7–20**)

3. Eriophorum russeolum Fries in Hartman subsp. **leiocarpum** Novoselova, Bot. Žurn. (St. Petersburg) 78(8):86. 1993. TYPE: RUSSIA. FAR EAST: E Chukotka, in vicinus pagi Nutepelmen, vallis rivi in sinum Pyngo-pilchin influentes, 16 Aug 1969, *A.A. Neczaeva & T.V. Plieva s.n.* (HOLOTYPE: LE, not seen).

Herbs perennial with short to elongate rhizomes. Vegetative shoots 1–3, 15–21 cm high, leaf margins mostly glabrous. Stems erect, glabrous, mostly terete in cross section, 14–51 cm high, 0.7–1.5 mm in diameter below the inflorescence. Leaves basal and cauline 1–7. Proximal sheaths brown, pale brown, chestnut brown to dark brown, with orange-brown spots on distal membranous parts, ligules acute to obtuse. Highest distal sheath mostly situated below the medial part of the stem, 2.1–3.5 mm wide, with blades reduced or lacking. Blades of proximal sheaths flat to slightly cymbiform, 40–230 × 0.7–2.3 mm, mostly glabrous, the apex obtuse. Blades of distal sheaths 0.2–21 × 0.2–1.1 mm, or lacking. Spikelets solitary, ellipsoid or obovoid at maturity (Fig. 18), 2.0–4.0 × 1.5–3.5 cm, with 150 or more florets. Proximal scales 4–6, without florets. First proximal scale olive-brown, olive-green, dark gray to blackish, becoming pale beige to whitish hyaline in distal parts, lanceolate to ovate-lanceolate, (5.7–)7–16 × 3.0–5.3 mm, with 1–5 orange-brown or blackish nerves converging below the apex, acute or acuminate. Medial fertile scales with moderate to extended proximal part (Fig. 19), 0.8–3.2 mm long, averaging (11–)18–57% of total scale length, orange-brown, pale brown, pale green or whitish, with the medial part forming a ± extended dark triangle, with marginal and distal parts mostly wide-hyaline (Fig. 19a), obovate, lanceolate or elliptic, 3.7–8.4 × (0.8–)1.0–2.4 mm, the widest part near the middle or above, rarely below, with 1 incomplete nerve, acute, 0.25–0.6 mm wide at 0.2 mm below the apex. Perianth of 15–50 hypogynous bristles, white to dull white (Fig. 18), 12–30 mm long. Stamens with filaments about as wide as perianth bristles, anthers yellow or dark yellow, (1.3–)1.5–3.1 mm long. Styles with 3(–4) stigmatic branches barely open at maturity, branches 1.3–3.2 mm long. Achenes pale or dark olive-green, brownish or black-brownish (Fig. 20), obovoid (Fig. 20b) or ellipsoid (Fig. 20a), trigonous to compressed-trigonous, glabrous (Fig. 20b) or scabrous (Fig. 20a) in the distal part, slightly lustrous, 2.0–2.7 × 0.6–1.2 mm, base cuneate, apex obtuse, with a beak more straight than oblique, conical, 0.2–0.5 mm long, 0.1–0.2 mm wide at base. Figs. 18–20.

Distribution.—The group of *E. russeolum* with white spikelets has a very different range from the group with orange-brown spikelets and was found to be distinct enough to be considered a subspecies by Novoselova (1993). Its range is amphi-Beringian, discontinuous in northwestern Russia, continuous from

north central Russia eastward to Alaska, the Canadian Yukon and Northwest Territories, the islands and continental portion of Nunavut, the Prairie provinces as far east as Manitoba, with scattered sites in eastern North America: Ontario, Quebec, Labrador, New Brunswick and Nova Scotia, with an extension in Minnesota and Wisconsin. Reports of *E. chamissonis* s.l. from the Rocky Mountains (Ball & Wujek 2002) have not been searched for this study and I dont know if they could refer to *E. russeolum* subsp. *leiocarpum* or not. The present study brought collections from the northern part of Nunavik in Quebec (ca 60°–61°N) to light for the first time.

Discussion.—For a long period in the North American literature, the group of *E. russeolum* with white spikelets was called *E. russeolum* var. *albidum* F. Nylander, and even *E. chamissonis* var. *albidum* (F. Nylander) Fernald or f. *albidum* (F. Nylander) Fernald. In his protologue, Nylander (1846: 10) designated a specimen from Alaska (Kodiak Island) that has not yet been found at LE as the type of his variety. This is not in accordance with Novoselova (1993) who states that Nylander's variety, a taxon she considers a synonym for *E.* ×*medium* [subsp. *medium*], was described from Scandinavian material. Even if one accepts that *E. russeolum* var. *albidum* was described from within the actual range of *E. russeolum* subsp. *leiocarpum*, it is difficult to consider var. *albidum* a synonym for subsp. *leiocarpum* because of a major divergent character of the medial fertile scales in Nylander's protologue. Nylander described var. *albidum*'s fertile scales as being "narrowly-lanceolate" (squamis lineari-lanceolatis), whereas subsp. *leiocarpum*'s are typically obovate, elliptic or lanceolate (Fig. 19). Novoselova's name (subsp. *leiocarpum*) is retained here because the subspecific level is more appropriate for separating the almost non-sympatric *E. russeolum* taxa, and because *leiocarpum* was the first name to be attributed at the subspecific level.

Eriophorum russeolum subsp. *leiocarpum* is quite variable and some specimens can be considered merely as white-colored counterparts to orange-brown *E. russeolum*. Nevertheless, the spikelets of this subspecies tend to be more often ellipsoid than obovoid, the achenes more often obovoid than ellipsoid, and the achene beaks narrower on average than in subsp. *russeolum* (Table 1). This variation is encountered in all parts of subsp. *leiocarpum*'s North American range. Specimens from higher latitudes (e.g. Nunavut) tend to have more blackish medial scales (Fig. 19b), but all other characters are within the variation of the subspecies.

Specimens examined. **CANADA. Yukon:** Kluane National Park, Alder Creek, 60°18'15"N–137°21'45"W, 7 Aug 1974, *R.D. Wickstrom 318.11 K-AC* (DAO); Northern Richardson Mountains, 68°22'53"N–137°07'31"W, 7 Jul 1993, *V. Loewen & J. Staniforth 93-154* (DAO); Idem, 68°11'42"N–137°25'27"W, 17 Jul 1993, *V. Loewen & J. Staniforth 93-252* (DAO); North Yukon National Park, British Mountains, Firth River delta, 69°30'N–139°30'W, 26 Jul 1988, *C. Kennedy 174* (DAO). **Northwest Territories:** The Enterprise-Mackenzie River Highway, mile 50, 16 Jul 1959, *J.W. Thieret & R.J. Reich 5392* (DAO); Porter Lake, 61°44'N, 26 Jul 1970, *W.J. Cody 19107* (DAO); Small Tree Lake, 61°N–105°W, 20 Jul 1961, *J.S. Maini*

478 & J. M. A. Swan (DAO); Tuktoyaktuk Peninsula, Hutchison Bay, 69°42'N–132°18'W, 29–30 Jul 1981, *D.L. Allen & V. Stringer 7766* (DAO); Yellowknife, by lake in front of hospital, 62°27'N–114°22'W, 8 Aug 1949, *W.J. Cody & B. McCanse 3324* (DAO). **Nunavut:** Bylot Island, A. R. Camp, Site B-3, 73°24'N–80°43'W, 30 Jul 1983, *G. Scotter s.n.* (DAO); Chesterfield Inlet, 1/4 mi W of settlement, 63°21'N–90°42'W, 4 Aug 1950, *D.B.O. Savile & C.T. Watts 1277* (DAO); Rasmussen Lowlands, S of Murchison Lake, 68°05'43.8"N–92°39'22.8"W, 12 Jul 1994, *V. Johnston 1* (DAO). **Manitoba:** Vicinity of Churchill, 58°46'N–94°10'W, 14 Jul 1956, *W.B. Schofield & H.A. Crum 6664* (CAN); idem, 18 Jul 1956, *W.B. Schofield & H.A. Crum 6825* (CAN); Reindeer Lake, Sawbill, 57°37'N–101°44'W, 4 Aug 1951, *W.K.W. Baldwin 2327* (MICH); Wasagaming, South Onanole, 50°37'N–99°58'W, 8 Jun 1967, *W.K.W. Baldwin 10900* (MICH); York Factory, 22–26 Jul 1949, *H.J. Scoggan 5993* (CAN); idem, 20 Jul 1949, *H.J. Scoggan 5929* (CAN). **Ontario:** Cape Henrietta-Maria, Hudson Bay, 55°10'N–82°20'W, 12–18 Jul 1979, *R. A. Sims 2699B* (MICH); Cochrane district, 50°00'N–83°42'W, 10 Jul 1979, *J.L. Riley 10576* (CAN); 5 km N of Kesagami River, 50°14'N–80°12'W, 22 Aug 1983, *D.F. Brunton 4595* (CAN); Hudson Bay lowlands, Attawapiskat River, 53°08'N–83°18'W, 12 Jun 1957, *A.E. Porsild, W.K.W. Baldwin, H. & G. Sjörs 200060* (CAN); Thunder Bay District, Fort William, 48°24'N–89°16'W, 4 Jun 1972, *W. Hartley 1509* (CAN); City of Thunder Bay, NW side of Expressway in Northwood area of Intercity fen, 5 Jul 1978, *C.E. Garton 18297* (DAO); Thunber Bay Districy, Little Postagoni Lake, 2 Aug 1960, *C. E. Garton 7938* (DAO); S of Wabusk Island, about 25 km W of Cape Henrietta-Maria, 55°10'N–82°50'W, 19–20 Jul 1979, *R.A. Sims 2736A* (MICH). **Québec:** Nunavik, Nouveau-Québec, Lac Élizabeth, 55°40'N–75°34'W, 14 Aug 1977, *G. Lemieux 21031* (QFA (2 collections), CAN); Poste-de-la-Baleine, 55°17'N–77°46'W, 22 Jul 1969, *S. Brisson & P. Forest 20502* (QUE, QFA); idem, rive N, 3 1/2 mi à l'E du poste, 11 Aug 1970, *S. Brisson & P. Forest 22380* (SFS); Territoire du Nouveau-Québec, 55°46'N–76°13'W, 26 Aug 1990, *J. Deshaye 90-1593* (QUE); Rivière Chukotat, ca 2 km au N, 14 km au SSO du lac Hubert, 61°19'38"N–76°21'49"W, 8–9 Jul 2003, *J.F. Duchesne s.n.* (QUE); Rivière Korak, 60°58'N–76°58'W, 29 Jul 1987, *L. Dion K9-4* (QFBE); Rivière Povungnituk, 61°26'04"N–73°56'06"W, 7 Aug 1998, *N. Dignard 98-159* (QUE); Rivière Puvirnituq, environ 4 km au SO du lac Vaillant, 61°25'30"N–73°51'35"W, 7 Aug 1998, *R. Gauthier 98-148* (QFA); Baie James, Fort George, 5 Aug 1950, *E. Lepage 12572* (QFA, 2 collections); idem, 9 Aug 1950, *E. Lepage 12638* (QFA, 2 collections); Baie James, pointe Mesakonan, baie Hannah, 51°33'N–79°32'W, 16 Aug 1958, *A. Dutilly & E. Lepage 36739* (QFA); **Gaspé Co.:** Tabletop Mts., headwaters of the Magdalen River, 1000–1050 m. alt., 9 Aug 1906, *M.L. Fernald & J.F. Collins 73180* (CAN, MT); Tabletop Mts., Mt. Auclair, ca.1200 m. alt., 10 Aug 1923, *M.L. Fernald & L.B. Smith 25603* (CAN, MT). **Labrador:** Battle Harbour, [52°16'N], 24 Aug 1871, *C. Waghorne 16366-2* (CAN). **New Brunswick: Kent Co.:** near Rexton, 13 Jul 1957, *E.C. Smith et al. 16418* (CAN, DAO). **Nova Scotia: Cumberland Co.:** West Advocate, 12 Jun 1950, *E.C. Smith et al. 3109* (CAN). **UNITED STATES. ALASKA:** Nome River, 1 mi from the sea, 5 Jul 1947, *A. Dutilly, E. Lepage & H. O'Neill 20806* (QFA). **MINNESOTA. Becker Co.:** Itasca Park, E side of road to Morison Lake, 4 Jul 1933, *J.B. Moyle 727* (MINN). **Beltrami Co.:** 10.8 mi N of Waskish P.O., 13 Jul 1975, *G.B. Ownbey 4979* (MINN). **Blue Earth Co.:** bogs, [1883], *J. R. Sanberg s.n.* (MINN). **Cass Co.:** near Swamp Lake, 10 Jul 1995, *J. Boe 95071001* (MINN). **Clearwater Co.:** along Co. Rt. 39, about 1 mi N of Rt. 113, 11 Jun 1991, *V. E. McNeilus 91-406* (WIS). **Hennepin Co.:** about 1.5 mi SE of Chanhassen, 4 Aug 1992, *W.R. Smith 21238* (MINN). **Hubbard Co.:** Itasca Park, 10 Jul 1929, *C. O. Rosendahl 5908* (MINN). **Lake of the Woods Co.:** Brown's Lake area, Brown's Creek Trail, 21 Jun 1979, *J.S. Boe 328* (MINN); idem, SE of Mud Lake, 21 Jul 1980, *P.H. Glaser 1300* (MINN). **Morrison Co.:** Camp Ripley Military Reservation, 4 Jun 1991, *B. Delaney 91082* (MINN). **Roseau Co.:** Roseau River Peatland, about 18 mi NW of Roseau, 14 Jun 1984, *W.R. Smith 9181* (MINN). **Stearns Co.:** 6 mi S of St. Augusta, 21 May 1998, *M.D. Lee MDL2056* (MINN). **St. Louis Co.:** Cruiser Lake Trail, 48°28'22"N–92°48'49"W, 4 Aug 1977, *M.R. Smith 466* (MINN); idem, Highway 53, S of Kabetogama, 12 Jun 1950, *O. Lakela 10363* (MINN). **Wright Co.:** by Hwy 55 on the SE side of Maple Lake, 16 Jun 1998, *M.D. Lee & D. Wovcha MDL2140* (MINN). **WISCONSIN. Ashland Co.:** Long Island, lake Superior, S of Madeline Island, 10 Jun 1972, *R.G. Koch 7378* (WIS). **Bayfield Co.:** NW of Eagle Lake, 10 Jul 1996, *E.J. Judziewicz 11958* (WIS). **Douglas Co.:** SW side of junction of Co. A and

Empire Wilderness Road, 24 Jul 1996, *E.J. Judziewicz 11979* (WIS). **Iron Co.:** W side of old rail road grade at Sandrock, 17 Jul 1996, *E.J. Judziewicz 11938* (WIS).

4. Eriophorum ×medium Andersson subsp. **album** J. Cayouette, subsp. nov. (*E. russeolum* subsp. *leiocarpum* × *E. scheuchzeri* subsp. *scheuchzeri*) TYPE: CANADA. NUNAVUT: Baffin Island, Nettiling Lake, 66°40'N–70°W, 28 Jul 1925, *J. Dewey Soper s.n.* (HOLOTYPE: CAN 25686).

A subspeciei typica setis albis vel subcremeis, (10–)22–32 mm longis differt. Verosimiliter hybrida inter *Eriophorum russeolum* subsp. *leiocarpum* et *Eriophorum scheuchzeri* subsp. *scheuchzeri*. Plantae perennes rhizomatibus abbreviatis vel elongatis. Culmi erecti, laeves, teretes, 22–40 cm alti, 0.8–1.1 mm diametro sub spiculis. Vagina superior culmi media parte inferiore inserta, raro ad medium, foliis 0.3–17 mm longis, 0.3–0.8 mm latis, vel nullis. Spiculae unicae, fructificatione hemisphaericae, ovoideae vel obovoideae, 1.6–4 cm altae, setis albis vel subcremeis. Squama sterilis infima 7.1–11.5 mm longa. Squamae fertiles medianae cum proximale parte breviore, 0.5–1.7 mm longa, 9–34% squamae totae longitudinis delemitante, albida, pallide viride vel pallide ferruginea, cum media parte anguste triangulariter atrata, cum marginibus et apice anguste hyalinis, 0.6–1.1 mm latae, squamae media parte inferiore maxima latitudine, apice acuminato, 0.15–0.3(–0.4) mm lato ad 0.2 mm infra apicem. Setae hypogyneae (10–)22–32 mm longae. Antherae 0.9–1.6 mm longae. Stigmatum rami tres vel quatuor, 1.0–2.2 mm longi. Achenia glabra, anguste obovoidea vel ellipsoidea, 0.6–0.9 mm lata, rostro recto vel curvato, praecipue cylindrico, basi 0.1 mm lato. Figs. 15–17.

Herbs perennial with short to elongate rhizomes. Vegetative shoots 1–2, 6–24 cm high, leaf margins mostly glabrous. Stems erect, glabrous, terete in cross section, 22–40 cm high, 0.8–1.1 mm in diameter below the inflorescence. Leaves basal and cauline 2–6. Proximal sheaths beige-brown to reddish brown, with orange-brown spots on distal membranous parts, ligules acute. Highest distal sheath situated below the medial part of the stem, rarely near the middle, 2.2–2.9 mm wide, with blades reduced or lacking. Blades of proximal sheaths flat to slightly cymbiform, 120–150 × 0.8–0.9 mm, glabrous, the apex obtuse. Blades of distal sheaths 0.3–17 × 0.3–0.8 mm, or lacking. Spikelets solitary, hemispherical, ovoid or obovoid at maturity (Fig. 15), 1.6–4.0 × 2.0–4.5 cm, with about 150 florets. Proximal scales 3–5, without florets. First proximal scale dark olive-green or blackish, becoming brown-hyaline or brown-beige in distal and marginal parts, ovate to ovate-lanceolate, 7.1–11.5 × 2.6–3.7 mm, with 3–5 brown to orange-brown nerves converging below the apex, acuminate. Medial fertile scales with a reduced proximal part (Fig. 16), 0.5–1.7 mm long, averaging 9–34% of total scale length, whitish, pale green or pale beige, with the medial part blackish forming a narrow triangle (Fig. 16b), with marginal and distal parts reduced-hyaline (Figs. 16a–b), lanceolate, 3.8–6.7 × 0.6–1.1 mm, the widest part mostly below the middle, with 1 incomplete nerve, acuminate, 0.15–0.3(–0.4) mm wide at 0.2 mm below the apex. Perianth of about 50 hypogynous bristles, white to dull white (Fig. 15), (10–)22–32 mm long. Stamens with filaments about as wide as perianth bristles, anthers yellow-green, 0.9–1.6 mm long. Styles with 3(–4) stigmatic branches mostly closed at maturity, branches 1.0–2.2 mm long. Achenes beige-brown to orange-brown (Fig. 17), narrowly obovoid or narrowly ellipsoid,

compressed-trigonous or slightly biconvex, glabrous, slightly lustrous, 1.9–2.5 × 0.6–0.9 mm, base cuneate, apex obtuse, with a straight (Fig. 17b) or oblique (Fig. 17a) beak, mostly cylindrical, 0.2–0.3 mm long, 0.1 mm wide at base. Figs. 15–17.

Distribution.—This nothosubspecies is currently known only in northeastern Canada, from continental Nunavut (Chesterfield Inlet), the Nunavut part of the Arctic Archipelago (Baffin and Southampton Islands, from 63°N to 66°N), south to northern Quebec (Nunavik), in the northernmost part of the peninsula (61°N–62°N) and at treeline near Hudson Bay (57°N–58°N). Since the sympatric range of the two parental taxa covers large parts of the Nunavut and Northwest Territories, the western Canadian provinces, Alaska, and eastern to western parts of Russia, *E.* ×*medium* subsp. *album* is likely to be discovered in some of these major areas. Nevertheless, no specimen from outside of northeastern Canada has yet been identified as this hybrid subspecies (Novoselova pers. comm.). There is a slight possibility that the taxon described from Alaska as *E. russeolum* var. *albidum* by Nylander (1846: 10) and bearing "narrowly lanceolate scales" could refer to that new nothosubspecies, but the type should be searched and examined.

Discussion.—A grouping among specimens that did not fit the normal variation of either *E. russeolum* subsp. *leiocarpum* or *E. scheuchzeri* subsp. *scheuchzeri* was perceived and formally given the taxonomic status of a new nothosubspecies. Although different from these taxa, the specimens shared most of the characteristics of *E.* ×*medium* subsp. *medium* except for the color of the spikelets and the length of the stigmatic branches (Table 1). The two subspecies of *E.* ×*medium* share size, shape, apex, color pattern, and maximum width below the middle of the medial fertile scales (Figs. 5, 16); medium-sized anthers (0.9–1.6 mm); and important achene characters (shape, width, beak width and shape) (Table 1, Figs. 6, 17). The shared characters are intermediate between those of *E. russeolum* subsp. *leiocarpum* and *E. scheuchzeri* subsp. *scheuchzeri*. Even if some characters of the hybrid subspecies overlap with extremes of variation of *E. russeolum* subsp. *leiocarpum*, I prefer to consider this taxon as a hybrid because many characters are intermediate between those of the two parental taxa (Table 1). A similar situation has been encountered and studied in a few Arctic *Ranunculus* hybrids (Cayouette et al. 1997).

Some specimens cited as paratypes have been previously considered by other authors as hybrids or potential hybrids involving the whitish *E. russeolum* and *E. scheuchzeri*. Polunin so annotated several specimens from Nunavut (CAN) and later discussed the possibility of *E. russeolum*–*E. scheuchzeri* hybridization (Polunin 1940: 100). Boivin (1992) cited one Polunin collection of the then undescribed *E.* ×*medium* subsp. *album* from Nunavut as a paratype of *E.* ×*gauthieri*, a taxon that Boivin believed to be an *E. chamissonis* × *E. scheuchzeri* combination. All these published remarks match the description of *E.* ×*medium* subsp. *album*.

A form of *E.* ×*medium* subsp. *medium* with white spikelets known as f.

candidum (Norman) Blomgren, has been described from Scandinavia (Hylander 1982). Although not yet known in North America, this form may be expected in the vicinity of the treeline in northern Quebec, where the two subspecies of *E. russeolum* coexist with *E. scheuchzeri*. In the event of its discovery there, *E.* ×*medium* subsp. *medium* f. *candidum* might be mistaken for *E.* ×*medium* subsp. *album*. To avoid any possible confusion, I have selected a type specimen for *E.* ×*medium* subsp. *album* from Nunavut (Baffin Island), where only *E. russeolum* subsp. *leiocarpum* is sympatric with *E. scheuchzeri* subsp. *scheuchzeri*. To date, all specimens of subsp. *album* collected at the treeline in northern Quebec have turned out to be similar to the type specimen selected from Baffin Island (66°N).

As for the typical hybrid subspecies, some paratypes of *E.* ×*medium* subsp. *album* have been seen with good mature achenes, indicating that subsp. *album* has perhaps become a stabilized orthospecies of hybrid origin in some areas. Further investigations are needed to clarify this interpretation.

PARATYPES. **CANADA. Nunavut:** Baffin Island, Clyde, 15 Sep 1936, *N. Polunin 2599* (CAN); idem, Frobisher Bay, head of Tarr Inlet, 24 Jul 1965, *I.A. McLaren 34* (CAN); idem, Frobisher Bay, vicinity of Air Base, 18 Jul 1953, *V.C. Wynne-Edwards 9324* (CAN); idem, Lake Harbour, 26–28 Jul 1936, *N. Polunin 1172* (GH); Chesterfield Inlet, 1/2 mi NW of settlement, 63°21'N–90°21'W, 15 Aug 1950, *D.B.O. Savile & C.T. Watts 1437* (DAO); Southampton Island, Coral Harbour, 64°10'N–83°15'W, 1 Jul 1976, *S. White 761093* (TRTE). **Québec:** Nunavik, Cratère du Nouveau-Québec, 61°22'18"N–74°10'30"W, 28 Jul 2000, *N. Dignard & J. Gagnon 00-174* (QUE); Golfe de Richmond, 1971–1973, *S. Payette et al. GR-121 A* (QFA, mixed with *E. scheuchzeri*); environs d'Ivujivik, 62°24'N–77°55'W, 28 Jul 1984, *M. Blondeau 84435* (Hb. Blondeau, QFA); lac Chavigny, entre le lac Chavigny et le lac au sud, 58°03'N–75°05'W, 29 Jul 1982, *J. Cayouette J82-212* (DAO, QFA); rivière Boniface, 9.5 km à l'ouest de la Passe du Loup, 57°45'10"N–76°20'25"W, 21 Jul 1991, *M. Garneau 91-405-M* (QFA); idem, rivière Boniface, tronçon de la rivière à l'ouest de la Passe du Loup, 57°45'10"N–76°20'25"W, 25 Jul 1991, *M. Garneau 91-496-M* (QFA); au nord de la petite rivière Puvirnituq, 61°26'N–75°15'W, 16 Jul 1985, *L. Dion 1.1-4* (QFBE); territoire du Nouveau-Québec, 56E39'N–74E51W', 5 Sep 1989, *J. Deshaye FOR89-85* (QUE).

5. Eriophorum scheuchzeri Hoppe subsp. **scheuchzeri**, Bot. Taschenb. 104, plate 7. 1800. TYPE: AUSTRIA ("... am Tuscher Tauern") (HOLOTYPE: W, monocots destroyed, see Holmgren et al. 1990).

Herbs perennial with short to elongate rhizomes. Vegetative shoots 1–3, 5–30 cm high, leaf margins glabrous. Stems erect, glabrous, terete in cross section, 9–42 cm high, 0.6–1.5(–1.8) mm in diameter below the inflorescence. Leaves basal and cauline 3–5. Proximal sheaths pale green at first, becoming pale or dark orange-brown, with orange-brown spots on distal membranous parts, ligules acute or obtuse. Highest distal sheath very often situated below the medial part of the stem, 2.1–3.6 mm wide, with blades reduced or lacking. Blades of proximal sheaths flat to slightly cymbiform, 25–130 × 0.5–1.4 mm, glabrous or rarely scabrous in distal parts, the apex mostly acute. Blades of distal sheaths shorter, 0.2–55 × 0.2–1.0 mm, or lacking. Spikelets solitary, typically hemispherical at maturity (Fig. 7), 1.0–3.0 × 1.4–4.5 cm, with 150 or more florets. Proximal scales 5–6, without florets. First proximal scale olive-brown or blackish, becoming pale brown, yel-

lowish brown or pale beige in distal parts, and pale beige or hyaline on the margins, widely lanceolate or ovate, 5–12 × 1.6–4.3 mm, with 4–9 beige or olive nerves converging below the apex, acuminate. Medial fertile scales with a short proximal part (Fig. 9), 0.1–0.9 mm long, averaging 2–25% of total scale length, pale green or whitish, with the medial part blackish or dark gray, with marginal parts blackish (Fig. 9a) or narrowly hyaline (Figs. 9b–c), and the distal part dark or hyaline, narrowly lanceolate, 3.2–5.3 × 0.4–1.0 mm, the widest part below the middle or close to the base, with width at the middle 0.3–0.7(–0.9) mm, with 1 incomplete nerve, narrowly acuminate, 0.05–0.1(–0.2) mm wide at 0.2 mm below the apex. Proximal fertile scales very similar (Fig. 8), blackish, with well-delimited narrow hyaline margins (Fig. 8b) or with hyaline margins lacking (Fig. 8a). Perianth of about 30 hypogynous bristles, white or cream white (Fig. 7), 15–25 mm long. Stamens with filaments about as wide as perianth bristles, anthers yellow or pale yellow, 0.35–0.8 mm long. Styles with 3(–4) stigmatic branches barely open at maturity, branches 0.5–1.3 mm long. Achenes beige-brown to olive-brown (Fig. 10), narrowly obovoid, obscurely trigonous, slightly biconvex or plano-convex, glabrous, slightly lustrous, 1.7–2.4 × 0.5–0.85 mm, base cuneate, apex acute, with a beak more often oblique or curved (Fig. 10b) than straight (Fig. 10a), mostly cylindrical, 0.15–0.4 mm long, 0.05–0.1 mm wide at base. Figs. 7–10.

Distribution.—*Eriophorum scheuchzeri* was recently subdivided into two subspecies by Novoselova (1994b), and the typical subspecies is very common and widespread in the southern parts of the Arctic zones. *Eriophorum scheuchzeri* subsp. *scheuchzeri* is an arctic-alpine circumpolar taxon (Novoselova 1994a, 1994b). In North America, it covers both Arctic and Boreal zones (Hultén and Fries 1986). In northeastern North America, it is sympatric with both subspecies of *E. russeolum*, ranging southward to Labrador, Newfoundland, and the southern reaches of James Bay at about 51°N (Scoggan 1978).

Discussion.—The typical subspecies of *E. scheuchzeri* differs from other rhizomatous taxa with solitary whitish spikelets, including their hybrids with the two subspecies of *E. russeolum*, by having the shortest anthers (0.35–0.8 mm) and the narrowest (0.4–1.0 mm) and the most narrowly acuminate medial fertile scales (Table 1, Fig. 9). These scales are dark gray or blackish with narrow hyaline margins or with hyaline margins absent. Achenes are narrowly obovoid, obscurely trigonous, their beaks narrowly cylindrical, and more often oblique than straight (Table 1, Fig. 10). The main differences between subsp. *scheuchzeri* and subsp. *arcticum* are given in Table 2.

6. Eriophorum scheuchzeri Hoppe subsp. **arcticum** Novoselova, Bot. Žurn. (St. Petersburg) 79(4):112. 1994. TYPE: RUSSIA. JENISSEJSK, hibernaculum inter sinus Wildii et Stellingii, 23 Jul 1915, *I. Trzhemesky 35* (HOLOTYPE: LE, not seen).

Herbs perennial with short to elongate rhizomes. Vegetative shoots 1–3, 4–7 cm high, leaf margins glabrous. Stems erect, glabrous, terete in cross section, 11–28

cm high, 0.7–1.6(–1.8) mm in diameter below the inflorescence. Leaves basal and cauline 1–4. Proximal sheaths apple green first, becoming pale orange-brown, with or without orange-brown spots on distal membranous parts, ligules acute or obtuse. Highest distal sheath most often situated below the medial part of the stem or near the base, 2.2–3.4 mm wide, with blades reduced or mostly lacking. Blades of proximal sheaths flat to slightly cymbiform, 15–80 × 0.5–1.1 mm, glabrous, the apex mostly obtuse. Blades of distal sheaths shorter, 2–20 × 0.4–0.8 mm, or mostly lacking. Spikelets solitary, typically spherical (Fig. 11) or slightly flattened at maturity, 1.5–2.5 × 1.5–4.0 cm, with 100 or more florets. Proximal scales 1–4, without florets. First proximal scale blackish, becoming pale brown or pale beige in distal parts, with well developed hyaline margins, ovate-lanceolate, 6–9 × 2.9–4.2 mm, with 3–7 brown or gray nerves converging below the apex, acute. Medial fertile scales with a short proximal part (Fig. 13), 0.5–1.0 mm long, averaging 8–21% of total scale length, pale green, pale brown or blackish, with the medial part grayish or dark gray-brown, with marginal parts dark (Fig. 13b) or narrowly hyaline (Fig. 13a), and the distal part dark or hyaline, lanceolate, 4.0–6.0 × 0.7–1.5(–1.7) mm, the widest part below the middle, with width at the middle (0.5–) 0.7–1.4(–1.6) mm, with 1 incomplete nerve, acuminate, 0.1–0.25(–0.3) mm wide at 0.2 mm below the apex. Proximal fertile scales different (Fig. 12), bicolor, with lower and medial parts dark but gradually passing into various tones of gray and conspicuous marginal and distal hyaline areas. Perianth of 25–40 hypogynous bristles, white (Fig. 11), 16–25 mm long. Stamens with filaments about as wide as perianth bristles, anthers yellow or pale yellow, 0.6–1.0 mm long. Styles with 3 stigmatic branches barely open at maturity, branches 0.7–1.5 mm long. Achenes orange-brown to dark reddish-brown (Fig. 14), narrowly obovoid, mostly biconvex or slightly plano-convex, glabrous, mostly dull, 1.5–2.2 × 0.5–0.7(–0.9) mm, base cuneate, apex acute, with a beak more often oblique or curved (Fig. 14a) than straight (Fig. 14b), mostly cylindrical, 0.15–0.3 mm long, 0.05–0.1 wide at base. Figs. 11–14.

Distribution.—Like *Eriophorum scheuchzeri* subsp. *scheuchzeri*, subsp. *arcticum* is at least partially circumpolar, according to Novoselova (1994a, 1994b), but its range is more High Arctic than the typical subspecies, as is illustrated by its distribution in northern Russia. Novoselova claims that subsp. *arcticum* ranges across Alaska, Arctic North America and Greenland. My results confirm its presence in the Canadian High Arctic Nunavut (from at least 67°N to 81°N) and establish its southern limits on islands in Hudson Bay and in Arctic Quebec at latitude 59°N or 60°N (see specimens examined). Since one cited collection is from Port Burwell, Quebec, its presence in adjacent northern Labrador is expected, but no specimen has yet been positively identified.

Discussion.—Differences between the two subspecies were pointed out by Novoselova (1994b). Since no North American specimens of subsp. *arcticum* were cited in her work, the attempt was made to uncover voucher collections of

the subspecies in order to discover the most useful characters to differentiate between the two *E. scheuchzeri* taxa. The results are highlighted in Table 2 and have been confirmed by Novoselova (pers. comm.). The best characteristics were noticed in the color pattern of the proximal fertile scales (Figs. 8, 12), and in the widths of the medial fertile scales if measured near the middle of the scales and at 0.2 mm below the apex (Figs. 9, 13). Scales were wider in subsp. *arcticum* and acuminate (Fig. 13), instead of being narrowly acuminate (Fig. 9) as in the typical subspecies. Mature spikelets tended to be spherical (Fig. 11) in subsp. *arcticum*, rather than hemispherical (Fig. 7) as in subsp. *scheuchzeri*. A color difference was observed in mature achenes (Table 2, Figs. 10, 14). At the southernmost limit of *E. scheuchzeri* subsp. *arcticum* and elsewhere in the sympatric range of the two subspecies, a few specimens tend to be of intermediate nature.

Since only a few voucher specimens of subsp. *arcticum* were collected within the borders of Quebec, I have proposed that it be added to the provincial list of threatened and endangered vascular plant species.

Specimens examined. **CANADA. Nunavut:** Axel Heiberg Island, 79°54' N–87°43' W, 19 Jul 1980, *G.W. Scotter & S.C. Zoltai 45048* (DAO); Baffin Island, head of Clyde Fjord, Jul 1950, *M.E. Hale Jr. 40* (WIS); Devon Island, Truelove Lowland, 75°38' N–84°30' W, 24 Jul 1989, *B.C. Forbes 70* (DAO); Cambridge Bay, 69°03' N–104°50' W, 7 Aug 1950, *E.H.N. Smith & G.K. Sweatman 42* (DAO); Ellesmere Island, east coast, between Baird Inlet and Tanquary Glacier, 78°29' N–76°31' W, 20 Jul 1979, *J. Bridgland 694* (DAO); idem, Eureka, 80°01' N–86°00' W, 19 Aug 1953, *P.F. Bruggeman 697* (DAO); idem, Eureka, 79°59' N–85°50' W, 16–18 Jul 1980, *G.W. Scotter & S.C. Zoltai 45292* (DAO); idem, Hazen Camp, 81°49' N–71°21' W, 9 Jul 1962, *D.B.O. Savile 4583* (DAO); idem, Skraeling Island, 78°36.5' N–75°38.5' W, 20 Jul 1981, *W. Blake Jr. 24-1* (DAO); Ottawa Islands [wrongly considered as North Sleeper Islands, see Morisset and Payette (1980)], 2 Aug 1939, *G. Gardner 39891 [a]* (MT, QFA); idem [not N. Sleeper Islands], 59°17' N–80°40' W, 2 Sep 1939, *A. Dutilly, H. O'Neill, & M. Duman 87562* (QFA); Ottawa Island Archipelago, Pattee Island, 59°42' N–80°09' W, 27 Aug 1939, *A. Dutilly, H. O'Neill, & M. Duman 87516* (CAN, DAO, QFA, SFS); Prince Charles Island, 67°51'27" N–75°06'07.2" W, 7 Jul 1997, *V. Johnston 97-161* (DAO); Somerset Island, 72°49' N–92°56' W, 19 Jul 1975, *S.C. Zoltai 751135* (DAO); Southhampton Island, Coral Harbor, 64°09' N–83°18' W, 16 Jul 1948, *W.J. Cody 1348* (DAO, WIS). **Québec:** environs d'Akulivik, 60°48' N–78°12' W, 8 Jul 1985, *M. Blondeau 85060* (QFA); environs d'Ivujivik, 62°24' N–77°55' W, 17 Jul 1984, *M. Blondeau 84235B* (QFA); Ivujivik, 62°25' N–78°05' W, 23 Jul 1938, *M. Duman 1874* (QFA); Port Burwell, 60°22' N–64°50' W, 30–31 Aug 1927, *M.O. Malte 118677* (CAN).

KEY TO TAXA (INCLUDING *ERIOPHORUM CHAMISSONIS* AND ATYPICAL *E. RUSSEOLUM* SUBSP. *RUSSEOLUM*)

1. Spikelets with dark to pale orange-brown bristles.
   2. Medial fertile scales 0.7–1.3 mm wide, acuminate, 0.1–0.3 mm wide at 0.2 mm below the apex; achenes narrowly obovoid, glabrous; hypogynous bristles 30–50, 15–20 mm long _____ **Eriophorum ×medium** subsp. **medium**
   2. Medial fertile scales 1.2–2.2 mm wide, acute, rarely obtuse or acuminate, 0.2–0.5(–0.9) mm wide at 0.2 mm below the apex; achenes obovoid or ellipsoid, glabrous or scabrous; hypogynous bristles 50–80, 25–40 mm long.
      3. Anthers 1.5–3.1 mm long; medial scales with conspicuous hyaline margins and apex, the widest area near the middle or above; spikelets typically obovoid, with dark to pale orange-brown bristles _____ **Eriophorum russeolum** subsp. **russeolum**

3. Anthers 0.7–1.6(–1.9) mm long; medial scales often with reduced hyaline margins and apex, the widest area not above the middle; spikelets various, spherical, obovoid, or hemispherical, with pale beige-brown to darker bristles.
   4. Spikelets spherical, with pale beige-brown bristles; first proximal scale 12–23(–30) mm long; stem below the inflorescence 1.0–2.2 mm wide; medial scales covered with small reddish-brown longitudinal spots in hyaline areas; achene beak rarely curved; western North America _____ **Eriophorum chamissonis**
   4. Spikelets obovoid or hemispherical, with pale to dark orange-brown bristles; first proximal scale 8–11 mm long; stem below the inflorescence 0.6–1.2 mm wide; medial scales usually without reddish-brown longitudinal spots; achene beak frequently curved; amphi-Atlantic _____ atypical **Eriophorum russeolum** and/or intermediates between **E. ×medium** and **E. russeolum**

1. Spikelets with white to whitish bristles.
   5. Medial scales (0.8–)1.0–2.4 mm wide, acute, 0.25–0.6 mm wide at 0.2 mm below the apex, widest mostly at the middle or above, with well developed hyaline margins; anthers (1.3–)1.5–3.1 mm long; achenes ellipsoid or obovoid, scabrous or glabrous, beak base 0.1–0.2 mm wide ____ **Eriophorum russeolum** subsp. **leiocarpum**
   5. Medial scales 0.3–1.5(–1.7) mm wide, acuminate to narrowly acuminate, 0.05–0.3(–0.4) mm wide at 0.2 mm below the apex, widest below the middle or close to the base, with frequently reduced hyaline margins; anthers 0.35–1.6 mm long; achenes narrowly obovoid, always glabrous, beak base 0.05–0.1 mm wide.
      6. Anthers 0.9–1.6 mm long; hypogynous bristles (10–)22–32 mm long; stigmatic branches 1.0–2.2 mm long _____ **Eriophorum ×medium** subsp. **album**
      6. Anthers 0.35–1.0 mm long; hypogynous bristles 10–25 mm long; stigmatic branches 0.5–1.3(–1.5) mm long _____ **Eriophorum scheuchzeri** s.l.
         7. Spikelets hemispherical; proximal fertile scales dark, with dark margins or reduced hyaline margins sharply differentiated from the darker parts; medial scales narrowly acuminate (usually 0.1 mm wide at 0.2 mm below the apex), 0.3–0.7(–0.9) mm wide near the middle; mature achenes beige brown to olive-brown, slightly lustrous _____ **Eriophorum scheuchzeri** subsp. **scheuchzeri**
         7. Spikelets spherical; proximal fertile scales bicolored, with lower and medial parts dark but gradually passing to various tones of gray and conspicuous marginal and apical hyaline areas; medial scales acuminate (usually 0.2 mm wide at 0.2 mm below the apex), (0.5–)0.7–1.4(–1.6) mm wide near the middle; mature achenes orange-brown to dark reddish-brown, mostly dull _____ **Eriophorum scheuchzeri** subsp. **arcticum**

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