

AUSTRALIAN BIOLOGICAL RESOURCES STUDY, CANBERRA



SPECIES PLANTARUM

FLORA OF THE WORLD

Part 6. JUNCACEAE 1: Rostkovia to Luzula

compiled by Jan Kirschner



Department of the Environment and Heritage

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INTRODUCTION

Species Plantarum aims to provide in concise format, and with standardised data fields, basic taxonomic information on the vascular plants of the world, including accepted names and synonyms with bibliographic data, types of names, keys and descriptions from family to varietal levels, geographical distributions, ecological information and other related matters, and to publish it in both hard copy and electronic form.

The format of the *Species Plantarum* is based on that of *Flora of Australia*, with some departures made necessary by the different scale of the project. Initially at least, the series is being edited and published for the Species Plantarum Project and IOPI by the Australian Biological Resources Study (ABRS), producers of *Flora of Australia*.

Treatments are contributed on a voluntary basis. Each part of *Species Plantarum* is intended to provide a complete account of a family, subfamily, large genus or other related taxonomic group. While treatments of small families may be shorter, it is intended that contributions will, in general, cover at least 50 to 100 species. The taxonomy adopted is that of the author, although the family delimitations recommended are initially those of R.K.Brummitt, *Vascular Plant Families and Genera* (1992). The order of taxa within families, genera and species in the *Species Plantarum* is intended to reflect natural relationships, so far as this is possible in a linear sequence.

Maps are provided for each species, or in those cases where infraspecific taxa are recognised, for each of the terminal taxa. Distribution maps are based on those in R.K.Brummitt, *World Geographical Scheme for Recording Plant Distributions* ed. 2 (2001), and the 'countries' adopted are those of Level 3 and 4 of that work. Description of distribution follows the same work, with a two-digit code for regions and a three-letter code for the 'country'. Upper case letters for the 'country' indicate native distribution; lower case letters indicate that the taxon is only present in that 'country' as an introduced and naturalised plant. If a taxon is extinct in a 'country', this is indicated by a dagger. Distribution of species as cultivated plants is not included.

Misapplied and invalid names are, in general, omitted. Journal titles are abbreviated according to G.D.R.Bridson & E.R.Smith, *Botanico-Periodicum-Huntianum / Supplementum* (1991). Book titles are abbreviated according to F.A.Stafleu & R.S.Cowan, *Taxonomic Literature* (2nd edn) Vols 1–7, and *Supplements* (1976–), except that upper case initial letters are used for proper names and significant words. Authors of plant names are abbreviated according to R.K.Brummitt & C.E.Powell, *Authors of Plant Names* (1992).

A separate part, *Introduction to the Series*, provides a history of the project, a glossary, guide for contributors and key to the conventions used in describing distribution. These resources will also be available on the World Wide Web, initially through the ABRS site (currently <http://www.anbg.gov.au/abrs/flora/spplant/spplant.htm>) with links from the IOPI site (currently <http://life.csu.edu.au/iopi/iopihome>) and others.

A.E.Orchard
Canberra
May 2002

PREFACE

This volume is the first of a three-part treatment of the Juncaceae. Parts 2 and 3 are written as this goes to press and are scheduled for publication very shortly.

The co-operative monographic study was completed in the period 1997 to 2000, under grant no. 206/97/0936 of the Czech National Grant Agency. Almost all the current experts in the taxonomy of the family kindly participated in the project, and their expertise covered both the centres of taxonomic diversity and the most intricate groups in the family. The monograph thus presents the cumulative knowledge of the Juncaceae at this time. Some groups received special attention and their accounts represent new revisions (e.g., *Luzula* sect. *Atlanticae*, sect. *Alpinae*, subg. *Pterodes*) or recent revisions were incorporated (e.g., *Juncus* sect. *Caespitosi*, in part, and *Juncus* sect. *Juncus*). The project benefited from an important coincidence: the Juncaceae have been included in recent volumes of important regional or continental floras, either published in 1999 or 2000, or prepared for publication; the authors of several regional accounts participated in our project (including those from *Flora of North America*, *Flora of China*, *Flora of Australia* and *Flora Neotropica*). Despite this, some groups or sections still require a thorough revision in future, and a number of questions remain unanswered, particularly in *Luzula* sect. *Luzula* in China and Japan, *Juncus* sect. *Stygiopsis* and *Juncus* sect. *Juncotypus*.

While the text represents the combined work of many authors, the final version was prepared by JK, and he accepts responsibility for any errors or missing data.

In addition to the authors and advisers, many other botanists participated in solving numerous problems with old literature, nomenclatural problems and geographical distribution. I would like to express my thanks for their generous help. Invaluable technical assistance was provided by Ms Věra Matějovičová. Dr R.K.Brummitt of Kew, the Secretary of the *Flora of the World* project, showed unfailing interest, and without his support the present volumes would never have come into being.

Jan Kirschner
Pruhonice
May 2002

JUNCACEAE

Juncaceae Juss., *Gen. Pl.* 43 (1789)

Type: *Juncus* L.

Perennial, usually rhizomatous, less often annual herbs, glabrous or with hairy leaf margins; rarely leaf abaxial surface with simple, many-celled trichomes. Silica bodies \pm absent; oxalate raphides absent; stomata paracytic. Stem erect to ascending, rarely procumbent, usually terete, leafless or leaf-bearing. Leaves linear or filiform, spirally arranged, rarely distichous; sheath closed or open, often auriculate; auricles rarely joined to form a ligule-like structure; blades of basal leaves sometimes reduced (cataphylls). Inflorescence terminal, rarely pseudolateral (bract resembles a continuation of stem), compound, cymose or racemose, panicle-like or anthelate, many-flowered with flowers in many to one terminal heads or spike-like clusters; lower inflorescence bracts usually herbaceous; each branch with membranous bract and adaxial prophyll; flower bracteoles 1–2 or absent; rarely inflorescence reduced to a single terminal or lateral (subterminal) flower. Flowers small, usually up to 8 mm long (rarely to 40 mm), actinomorphic, hypogynous, usually hermaphrodite, rarely unisexual (dioecious or monoecious). Perianth segments 6, in two whorls, glumaceous, usually \pm equal, free. Stamens 6 in two whorls or inner whorl reduced; filaments filiform to flattened; anthers 2-thecate, 4-sporangiate, oblong to linear, basifixed, dehiscence lateral; connective rarely with a projection; pollen in tetrads. Carpels 3, connate; ovary superior, unilocular or 3-septate to 3-locular; style 1, distally 3-branched (stigmas), papillae \pm adaxial. Fruit an orbicular to oblong-ellipsoid loculicidal (rarely circumscissile) capsule. Seeds 3–many; endosperm starchy; embryo small, broadly cylindrical; outer seed-coat hyaline, whitish to brownish, loose to adpressed, sometimes forming apical and/or basal appendages; inner seed-coat usually brown to castaneous.

Seven genera, c. 440 species, almost cosmopolitan, common from temperate to polar regions; mostly in the mountains in the tropics.

Closely related to the South African monotypic *Prioniaceae* (S.L.Munro & H.P.Linder, *Syst. Bot.* 23: 43–55 (1998)) and to *Thurniaceae* and *Cyperaceae* (D.Simpson, in P.J.Rudall *et al.* (eds.), *Monocot. Syst. Evol.* 497–509 (1995)).

G.Engelmann, A revision of the North American species of the genus *Juncus*, with a description of new and imperfectly known species, *Trans. Acad. Sci. St. Louis* 2: 424–458 (1866), 459–499 (1868); F.G.P.Buchenau, Monographia Juncacearum, *Bot. Jahrb. Syst.* 12: 1–495 (1890); F.G.P.Buchenau, Juncaceae, in H.G.A.Engler, *Pflanzenr.* (iv.36) Heft 25: 1–284 (1906); F.Vierhapper, Juncaceae, in H.G.A.Engler & K.Prantl, *Nat. Pflanzenfam.* 2nd edn, 15a: 192–224 (1930); M.Barros, Las Juncáceas de la Argentina, Chile y Uruguay, *Darwiniana* 10: 279–460 (1953); D.F.Cutler, Juncales, in C.R.Metcalf, *Anat. Monocot.* 4: 1–358 (1969); L.J.Novara, Contribución al conocimiento de las inflorescencias de *Juncus* y su significación taxonómica, *Kurtziana* 9: 41–61 (1976); V.S.Novikov, Konspekt sistemy roda *Juncus* L. (Juncaceae), *Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol.* 95(5): 111–125 (1990); S.Snogerup, A revision of *Juncus* subgen. *Juncus* (Juncaceae), *Willdenowia* 23: 23–73 (1993); H.Balslev, *Fl. Neotrop. Monogr.* 68: 1–168 (1996); H.Balslev, Juncaceae, in K.Kubitzki (ed.), *The families and genera of vascular plants*, pp. 252–260 (1998); R.E.Brooks, S.E.Clemants & J.Coffey Swab, 209. *Juncaceae* Jussieu. Rush Family, in *Flora of North America North of Mexico* 22: 211–267 (2000); Wu Guofang & S.E.Clemants, Juncaceae, in Wu Zhengyi & P.H.Raven, *Fl. China* 24, *Flagellariaceae through Marantaceae*, pp. 44–69 (2000).

Throughout the text, unless otherwise stated, the term seed is used for seeds excluding their appendages.

- 1 Flowers solitary; anthers mucronate (if anthers not mucronate then outer tepals at least 15 mm long); auricles never lacerate
- 2 Plants not cushion-forming; upper part of stem leafless; flower terminal
- 3 Flower bracts 2; lower bract herbaceous, conspicuously longer than perianth; upper bract \pm equalling perianth; capsule suborbicular to obovoid, obtuse, to c. 5 mm long; seeds without conspicuous appendages **1. Rostkovia**
- 3: Flower bracts 1 or 2, membranous, much shorter than perianth; capsule oblong to ellipsoidal, trigonous, acuminate, at least 7 mm long; seeds with two distinct appendages **2. Marsippospermum**
- 2: Plants cushion-forming; upper part of stem densely covered with leaves; flower lateral (subterminal, axillary)
- 4 Leaves regularly distichous; gynophore developed, elongating during capsule ripening **5. Distichia**
- 4: Leaves \pm spirally arranged; gynophore absent
- 5 Flower with 1 bracteole; leaf blade with margins finely denticulate, with apex acute but not hard nor prickly **4. Patosia**
- 5: Flowers with 2 bracteoles; leaf blade with smooth margins, with apex acute, hard, prickly **3. Oxychloë**
- 1: Flowers in multi-flowered inflorescences; anthers not mucronate (if flowers occasionally solitary then tepals shorter than 10 mm); if anthers minutely mucronate then auricles lacerate
- 6 Capsule 3-seeded; leaves densely to very sparsely ciliate; flowers always with basal bracteoles; leaf sheath closed, rarely partially dissected **6. Luzula**
- 6: Capsule many-seeded; leaves not hairy; flowers with or without bracteoles; leaf sheath open, rarely closed **7. Juncus**

1. ROSTKOVIA

Rostkovia Desv., *J. Bot. (Desvaux)* 1: 324 (1809)

Type: *Rostkovia magellanica* (Lam.) Hook.f.

Perennial herbs, erect, glabrous. Stems leafless. Leaves all basal, spirally arranged, linear or with reduced blade; stomata restricted to 2 narrow bands of lighter color, one on each side of the midrib. Flower bracts 2, with the longer one erect to suberect, much exceeding the flower, and the other \pm equalling tepals. Flower terminal (pseudolateral), single, large, hermaphrodite. Tepals castaneous-brown to dark brown; margins membranous, distally involute. Stamens 6; anthers linear; connective with apical mucro to 0.5 mm. Ovary sessile. Style with 3 tapering twining stigmas. Capsule subglobose, unilocular or slightly triseptate, sessile. Seeds many, \pm ovoid; appendage absent; base with a paler patch or apiculate; seed-coat with fine longitudinal pattern, with cells narrow elongated and pointed.

Two species, one endemic to Tristan da Cunha, the other distributed in New Zealand, the Sub-Antarctic Islands, the southernmost part of South America to Patagonia, and disjunctly in Ecuador.

Leaves up to 1 mm wide, straight, stiff, acute; style 2.5–4.0 mm

1. R. magellanica

Leaves usually 1.2–1.7 mm wide, arcuate to circinnate, subacute-subobtuse; style 1.5–2.0 mm

2. R. tristanensis

JUNCACEAE

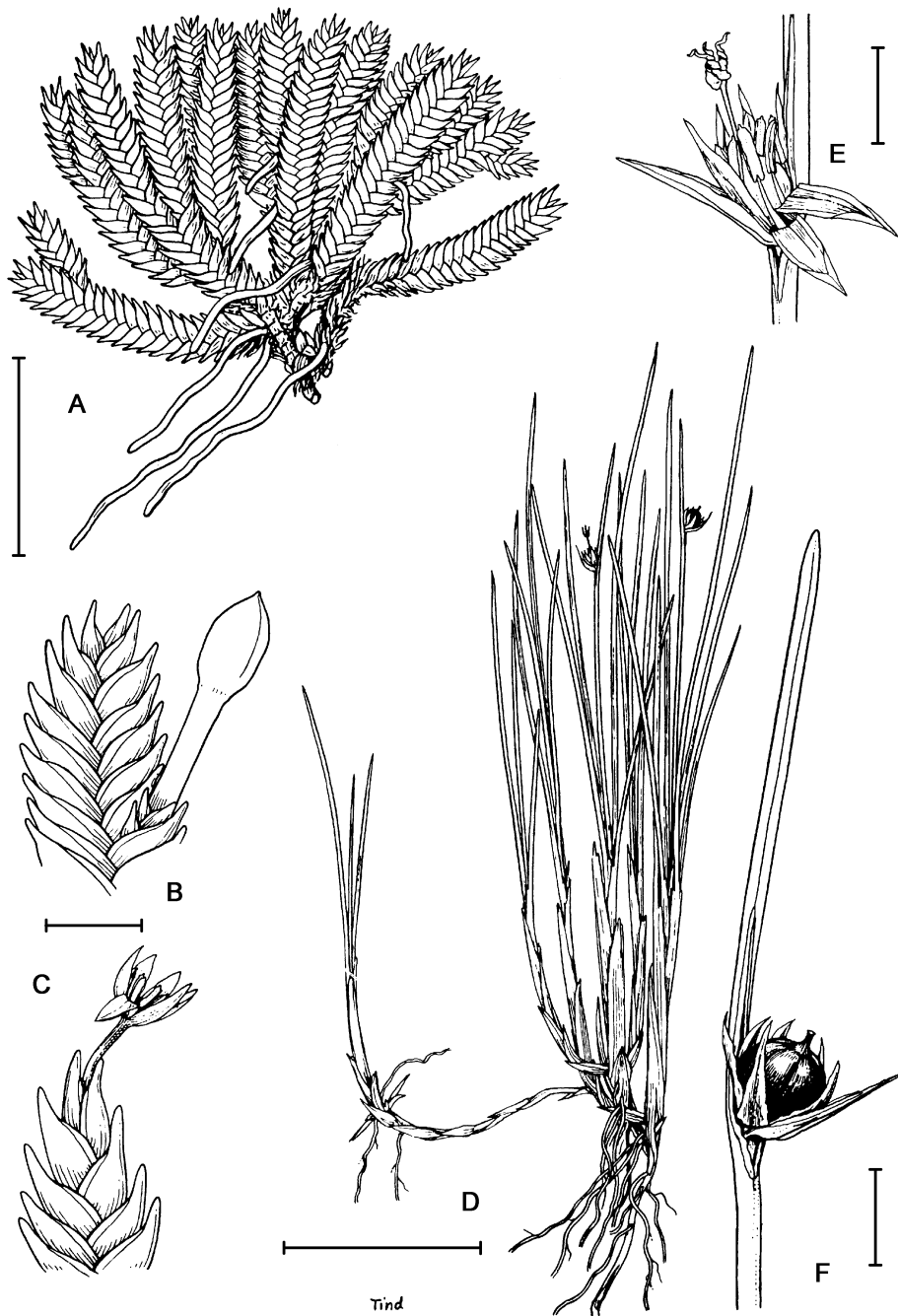


Figure 1. *Distichia muscoides*. **A**, habit; **B**, fruiting shoot showing the capsule lifted on gynophore; **C**, staminate flowering shoot (**A**, *L.Holm-Nielsen et al.* 6732, AAU; **B**, *B.Øllgaard & H.Balslev* 8435, AAU; **C**, *Jameson s.n.*, K). *Rostkovia magellanica*. **D**, habit; **E**, flower; **F**, fruit. (**A-C**, *B.Øllgaard & H.Balslev* 9772, AAU). Scale bars: **A**, **D** = 5 cm; **B**, **C**, **E**, **F** = 2 mm. Drawn by K. Tind. Originally published in G.Harling & B.Sparre (eds.), *Fl. Ecuador* 11: 6, fig. 1 (1979), reproduced with permission, from H.Balslev, *Fl. Neotrop. Monogr.* 68: 40, fig. 20 (1996), © 1996, The New York Botanical Garden.

1. *Rostkovia magellanica* (Lam.) Hook.f., *Fl. Antarct.* 1: 81 (1844)

Juncus magellanicus Lam., *Encycl.* 3: 266 (1789); *Rostkovia sphaerocarpa* Desv., *J. Bot. (Desvaux)* 1: 327, pl. 12, fig. 2 (1809), *nom. illeg.* T: Chile. Magallanes: Magellan Strait, *P. Commerson s.n.*; holo: P, photo AAU; iso: P, US.

Rostkovia magellanica (Lam.) Hook.f. f. *pumila* Albov, *Revista Mus. La Plata, Secc. Bot.* 7: 353 (1896). T: Argentina, Tierra del Fuego, left bank of Río Grande, 6 Mar 1896, *N. Albov 808*; holo: LP, photo NY; iso: SI.

Illustrations: F.G.P. Buchenau, in H.G.A. Engler, *Pflanzenr.* (iv.36) 25: 40, fig. 34 (1906); M. Barros, *Darwiniana* 10: 306, fig. 8 (1953); H. Balslev, *Brittonia* 31: 244, fig. 1 (1979); H. Balslev, *Fl. Neotrop. Monogr.* 68: 40, fig. 20, D-F (1996).

Map: H. Balslev, *Brittonia* 31: 245, fig. 2 (1979).

Perennials, loosely caespitose, 15–30 cm tall; rhizome erect or ascending, sometimes short creeping, 1.5–2.5 mm diam., usually covered with brown 1.0–1.5 cm long scales inserted 0.5–1.0 cm apart. Stem 0.5–1.0 mm diam.; cataphylls 2–4 per stem, to 7 cm long, longitudinally ridged, light brown, with smooth red-brown margins; rudimentary blade to 4 mm long. Basal leaves 15–25 cm long, to 1 mm wide; tip acute; auricles c. 1 mm long, rounded; blades straight, stiff, ±flat, slightly trigonous or canaliculate, narrowly grooved along abaxial midrib. Flower bracts 2; lower bract long, herbaceous, 4 cm long; upper bract scale-like, to 1 cm long. Pedicel 1–3 mm long. Tepals equal, lanceolate, 6–7 mm long, dark reddish brown, gradually scarious toward the margin, obtuse, seemingly acuminate because of the involute scarious margins. Stamens c. 4.5 mm long; anthers c. 2.5–3.0 mm long, mucronate; filaments linear, flat, to 3 mm long, usually shorter than anthers; style 3.0–4.5 mm long; stigmas c. 2.5–3.0 mm long. Capsule c. 4 mm in diam., thick-walled, dark brown to black, shining. Seeds oblong to ovoid, c. 1.2–1.7 × 0.7–0.9 mm, dark, almost blackish, glossy with fine color pattern of longitudinal blackish rectangles. 2n=56, *fide* E.J. Beuzenberg & J.B. Hair, *New Zealand J. Bot.* 21: 15 (1983). Fig. 1.

Rostkovia magellanica occupies a wide and very disjunct range: New Zealand main islands and Antipodean Is., South Georgia, Falkland Islands, southernmost Chile and Argentina, and Ecuador. 51: ATP, NZS. 83: ECU. 85: AGS, CLS. 90: FAL, SGE. Mossy bogs and wet depressions, from sea level (in the south) up to 3400 m (in Ecuador). Map 1.

51. ANTIPODEAN IS.: Campbell Is., Mt Lyall, 19 Dec 1975, *D.R. Given 9173* (K); Campbell Is., Dec 1840, *J.D. Hooker 640* (K). 83. ECUADOR: Morona-Santiago, between Alao and Huamboya near pass, 3550–3950 m, *B. Øllgaard et al. 38239* (AAU, F, MO, NY, QCA); *S. Laegaard 55422* (AAU, QCA, W). 85. ARGENTINA SOUTH: Argentina, Patagonia, Rio Fosiles, N of Lago San Martín, 1000 m, 6 Jan 1909, *C.J.F. Skottsberg s.n.* (UPS); Santa Cruz, Lago Argentino, Brazo Onelli, 660 m, *F.B. Vervoort 4632* (K, LIL); Tierra del Fuego, Sierra Alvear, Paso Garibaldi, 800 m, *D.M. Moore 1587* (K). CHILE SOUTH: Tierra del Fuego, Estancia Camerón, Campo Zapata, 21 Mar 1964, *D.M. Moore 1114* (K); Tierra del Fuego west, Fjordo Agostini, 22 Feb 1929, *H. Roivainen s.n.* (H). 90. FALKLAND IS.: Port Stanley, Mt Williams, 28 Feb 1904, *S. Birger* (LD). SOUTH GEORGIA: Cumberland Bay, Darthmouth Pt., 2 Jan 1959, *W. Bonner 95* (BM); King Edward Point, 28 Feb 1957, *Smith 1074* (K).

2. *Rostkovia tristanensis* Christoph., *Results Norweg. Sci. Exped. Tristan da Cunha* 11: 3 (1944)

T: Tristan da Cunha, above Soggy Plain, 1100–1200 m, 19 Feb 1938, *Y. Mejlund 1516*; holo: O, photo NY; iso: BM, GH, K, LD, O, S.

Illustrations: E. Christophersen, *Res. Norweg. Sci. Exped. Tristan da Cunha* 11: 4 and 5, figs. 2, 3 (1944).

Perennials, loosely caespitose, to 16 cm tall; rhizome creeping to ascending, often stoloniferous, covered with scales; stems erect, rigid, 0.7–1.0 mm in diam.; cataphylls coriaceous, with two prominent veins, to 3–5 cm long; rudimentary blade to c. 2 mm; basal leaves usually to 10–12 cm long, 1.2–1.7 mm wide, flat, canaliculate, arcuate to circinnate, subobtusate to subacute. Flower bracts 2; lower bract 1.2–1.9 (–2.5) cm long; upper bract slightly shorter to ±equalling perianth. Pedicel short. Tepals subequal, lanceolate, castaneous-brown; margins membranous-stramineous, ±involute; outer tepals 8–10 mm long; inner tepals 7–9 mm long. Stamens 5–6 mm; anthers c. 2 mm long; filaments to 4 mm long; style 1.5–2.0 mm; stigmas 1.5–2.5 mm. Capsule obovoid, 4.5–5.5 mm long, ±brown, shining to dull. Seeds narrowly ovoid, 1.0–1.2 mm long, shining, with fine longitudinal pattern.

JUNCACEAE (*Rostkovia*)

Endemic to Tristan da Cunha. Known only from the rich type collection. 90: TDC Tristan da Cunha, above Soggy Plain, 19 Feb 1938, *Y.Mejland 1516* (BM, GH, K, LD, photo NY, O, S). Mountain *Empetrum* heathland at 1100–1200 m. Map 2.

On Gough Island (90. TDC), plants of intermediate character between *R. magellanica* and *R. tristanensis* were collected in 1956 [Hog's Tooth, c. 700 m, peat among trachyte blocks, *N.M.Wace 132* (BM)]. They approach the former in having narrow, straight, erect, stiff leaves and shorter tepals; they are close to *R. tristanensis* in short anthers (c. 1.7–1.9 mm), shorter than filaments, probably short stigmas and paler perianth colour. As both *R. tristanensis* and the Gough Is. plants are known from rather limited material, resolution of this discrepancy must await fuller collections. Possibly, *R. tristanensis* may vary in its leaf characters.

2. MARSIPPOSPERMUM

Marsippospermum Desv., *J. Bot. (Desvaux)* 1: 328 (1808); *Juncus* sect. *Marsippospermum* (Desv.) E.Mey., *Syn. Junc.* 52 (1822)

Type: *Marsippospermum calyculatum* Desv., *nom. Illeg.*, = *Juncus grandiflorus* L.f.

Perennial herbs, erect, glabrous. Leaves 1–2 (–3) cauline; sterile shoots with 1–3 (–5) cauliform terete leaves; pith parenchymatous; cataphylls distinctly developed; stomatal lines distributed evenly. Flower bracts 1–2, short, membranous. Flowers borne singly, terminal, large, usually 10–40 mm long; tepals linear-lanceolate, acuminate, pale. Stamens 6; anthers linear, longer than filaments; connective with or without apical projection. Ovary sessile. Style with 3 ±tapering stigmas. Capsule oblong-trigonous or ellipsoid-trigonous, acuminate, imperfectly triseptate, with upper part recurved after dehiscence. Seeds many; seed-coat forming two long tail-like appendages.

Four species; one endemic to New Zealand, the others confined to southernmost South America and Falkland Islands.

- 1 Connective with a distinct apical projection at least 0.7 mm long; overall length of seeds less than 2.7 mm
- 2 Connective with an apical projection 1.8–2.0 mm long; outer tepals 1.1–1.5 cm long; leaves of sterile shoots c. 0.5 mm in diam.
[South America] **4. M. reichei**
- 2: Connective with an apical projection 0.7–0.9 mm long; outer tepals 1.7–2.7 cm long; leaves of sterile shoots 0.6–0.9 mm in diam.
[New Zealand] **3. M. gracile**
- 1: Connective ±without apical projection; overall length of seeds at least 4.0 mm
- 3 Outer tepals usually 3.2–4.0 cm long; anthers usually 8–10 mm long; capsule 1.7–2.5 cm long; seeds 5.0–6.5 mm long including appendages **1. M. grandiflorum**
- 3: Outer tepals usually 1.6–2.3 cm long; anthers usually 4–7 mm long; capsule 1.1–1.5 cm long; seeds 4.0–5.0 mm long including appendages **2. M. philippii**

1. Marsippospermum grandiflorum (L.f.) Hook., *Icon. Pl. new ser.*, 2 [6]: tab. 533 (1843)

Juncus grandiflorus L.f., *Suppl. Pl.* 1: 209 (1781); *Marsippospermum calyculatum* Desv., *J. Bot. (Desvaux)* 1: 330 (1808), *nom. illeg.*; *Rostkovia grandiflora* (L.f.) Hook.f., *Fl. Antarct.* 2: 357 (1847). T: Tierra del Fuego, *Baeck*; holo: S; plants from the same gathering: 1774, *J.R.Forster*, & *G.Forster & Sparmann*; possible iso: C, *fide* B.Hansen & P.Wagner, *Allertonia* 7: 337 (1998).

Illustrations: W.J.Hooker, *Icon. Pl. new ser.*, 2 [6]: tab. 533 (1843); M.Barros, *Darwiniana* 10: 310, fig. 9 (1953); S.Parkinson, in D.M.Moore, *Fl. Tierra del Fuego* 320, fig. 254, 322, fig. 260 (1993).

Map: D.M.Moore, *Fl. Tierra del Fuego* 318 map 36 j (1993).

Perennials, loosely caespitose; rhizome stout, creeping, with internodes short, to 1–2 cm long; stems in rows, usually 25–40 (–60) cm long, c. 1.5 mm in diam. Cataphylls 2 (–3), loose, pale brown; sheaths obtuse; blade setiform, usually 2–4 mm; cauline leaf usually single; auricles short, obtuse. Leaves of sterile shoots single, cauliform, terete, equalling to much exceeding stems, c. 2 mm in diam., ±smooth to slightly striate; tip acute to subobtuse. Bracteoles 2, membranous, broadly ovate, obtuse, usually 2–4 mm long. Tepals linear-lanceolate, pale stramineous to scarious, irregularly unequal; outer tepals usually 3.2–4.0 cm long; inner tepals c. 2.0–2.5 (–3.5) cm long. Stamens 6, much shorter than perianth, usually 10–11 mm long. Anthers 8–10 mm long; pollen sacs slightly overtopping connective; tips later erecto-patent and hence anthers bicorniculate at apex. Filaments to c. 2 mm long. Style c. 5–6 mm long; stigmas 8–10 mm long. Capsule oblong-ellipsoidal, ±trigonus, acuminate, usually 1.7–2.2 (–2.5) cm long, pale brown, shining. Seeds pale brown, ±ellipsoidal, with body c. 1.0 mm long, 0.4–0.5 mm wide, or 5.0–6.5 mm long including the two whitish subequal tail-like appendages each 1.7–2.4 mm long. Fig. 2.

Southern South America, from Los Lagos, Chile, and Neuquén, Argentina, to Tierra del Fuego, and Falkland Is. 85: AGS, CLS. 90: FAL. Bogs, peaty grasslands, wet sands, moorland, usually at altitudes below 800 m. Map 3.

85. ARGENTINA SOUTH: Santa Cruz, Lago Argentino, Brazo Onelli, 700 m, *F.B.Vervoort 4602* (W); Tierra del Fuego, Isla de los Estados, Bahía Colnett, 28 Feb 1968, *D.M.Moore 2043* (UPS); SW Patagonia, Cerro Buenos Aires, 900 ft, 4 Jan 1959, *P.W.James 681* (BM). CHILE SOUTH: Hermite Is., Cape Horn, *J.D.Hooker* (K); Taitao Peninsula, San Rafael, between 46° and 47°, *M.Gusinde 476* (W); Tierra del Fuego, Bahía Blanca, *D.M.Moore 2281* (H, K); Tierra del Fuego, Porvenir, *P.Dusén 261* (UPS); Los Lagos, Chiloé, Cordillera San Pedro, 8 Oct 1958, *Godley 418c* (BM). 90. FALKLAND IS.: W Falkland, Mt Cook, 800', *Vallentin s.n.* (K); Stanley Harbour, Klondyke, 14 Nov 1907, *C.J.F.Skottsberg 22* (LD, UPS)

2. *Marsippospermum philippii* (Buchenau) Hauman, *Anales Mus. Nac. Hist. Nat. Buenos Aires* 27: 295 (1915)

Marsippospermum grandiflorum var. *philippii* Buchenau, *Bot. Jahrb. Syst.* 12: 68 (1890); *Rostkovia gracilis* Phil., *Linnaea* 29: 75 (1857), *nom. illeg.*. T: Chile, 'In monte Doce del Febrero inter lacus Todos los Santos & Nahuelhuapi', 1600 m, *Fonk*; holo: SGO, n.v.

Illustration: M.Barros, *Darwiniana* 10: 310, fig. 9 (1953).

Perennials, densely caespitose; rhizome stout, branched, ascending or short with internodes very abbreviated; stem 15–25 (–33) cm long, c. 1 mm in diam.; cataphylls 3–4 (–5), obtuse, pale brown with blade mucroniform and 0.3–1.5 mm long; cauline leaf usually single; auricles narrow, distinct; sterile shoots usually single-leaved. Leaves overtopping stem; apex acute, smooth. Bracteoles 2, membranous, obtuse, broadly rounded, c. 1.0–1.5 mm long. Tepals linear-lanceolate, acuminate, scarious to stramineous, unequal; outer tepals 1.6–2.3 cm long; inner tepals c. 1.3–1.5 cm. Stamens 6; anthers 4–7 mm long; filaments (0.7–) 1.2–1.5 mm long; ovary c. 3 mm long; style c. 3 mm long; stigmas c. 5 mm long. Capsule ellipsoid-trigonus, acuminate, brown, shining, 1.1–1.5 cm long. Seeds 1.0–1.1 mm long, or 4.0–5.0 mm long including two whitish subequal tail-like appendages 1.2–1.5 mm and 1.5–1.7 mm long.

Confined to the southern part of C Chile and Neuquén and Río Negro in SW Argentina. 85: AGS, CLC. Peaty grassland, bogs, up to 2200 m. Map 4.

85. ARGENTINA SOUTH: Río Negro, Cerro López, 1700 m, *A.Burkart* (SI 6177). CHILE CENTRAL: Baños de Chillán, Aguas Calientes, 2200 m, Mar 1927, *E.Werdermann 1302* (K, S).

3. *Marsippospermum gracile* (Hook.f.) Buchenau, *Junc. S.-Amer.* 374 (1879)

Rostkovia gracilis Hook.f., *Fl. Antarct.* 2(1): 83, tab. 47 (1844); *Juncus gracilis* (Hook.f.) Walp., *Ann. Bot. Syst.* 1: 878 (1849), *nom. illeg.*, non R.Br.; *Juncus hookeridis* Steud., *Syn. Pl. Glumac.* 2: 307 (1855). T: New Zealand, Antipodean Is., Lord Auckland's Islands, above Rendezvous Harbour, Nov 1840, *J.D.Hooker*; lecto: K, *fide* E.Edgar in L.B.Moore & E.Edgar, *Fl. New Zealand* 2: 58 (1970).

JUNCACEAE (*Marsippospermum*)

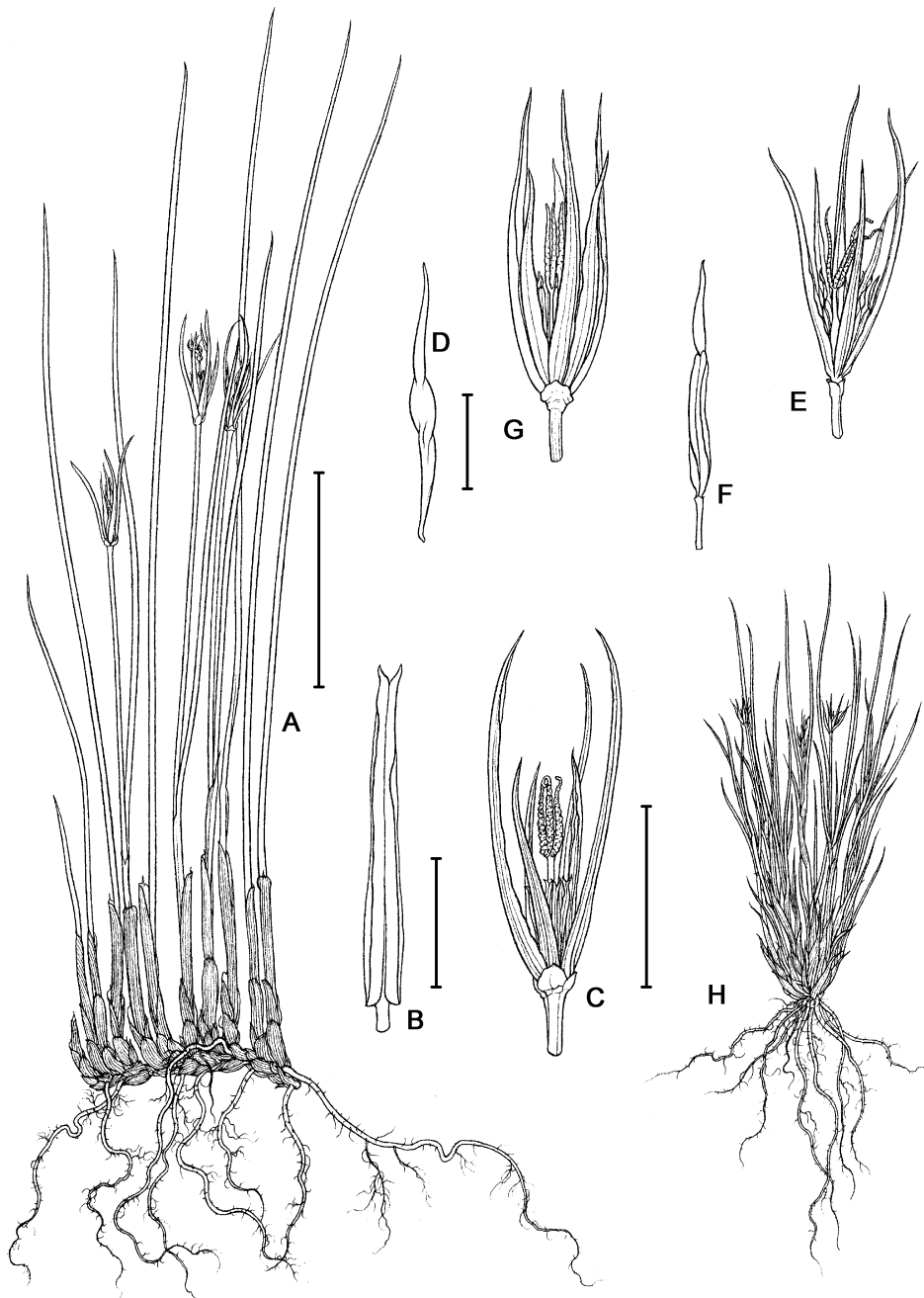


Figure 2. *Marsippospermum grandiflorum*. A, habit; B, anther; C, flower; D, seed. *M. reichei*. H, habit; E, flower; F, stamen. *M. gracile*. G, flower. (A–D, D.M.Moore 2043, UPS; C.J.F.Skottsberg 22, UPS; H, C.J.F.Skottsberg 725, S, UPS; E, F, P.Dusén 5905, UPS; G, E.Hörandl & Hadaček 8089, W). Scale bars: A, H = 8 cm; B, F = 3 mm; C, E, G = 2 mm; D = 2 mm. Drawn by © E.Smrčinová.

Rostkovia novae-zelandiae Buchanan, *Trans. & Proc. New Zealand Inst.* 4: 227 (1872); *Marsippospermum gracile* var. *novae-zelandiae* (Buchanan) Buchenau, *Bot. Jahrb. Syst.* 12: 69 (1890). T: New Zealand. Nelson Mtns, *H.H.Travers*; syn: K; 'mountains of Canterbury' *J.F.J. von Haast*; syn: K.

Illustrations: J.D.Hooker, *Fl. Antarct.* 2(1): 83, tab. 47 (1844); F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 35, fig. 28 (1906); L.B.Moore & J.B.Irwin, *Oxford Book New Zealand Pl.* 199, fig. 2 (1978).

Perennials, densely caespitose; rhizome horizontal, rarely ascending, with internodes very abbreviated; stems crowded in dense rows, usually 10–30 cm tall; lower cataphylls ovate to rounded, greyish stramineous, wrinkled, with blade reduced to mucro 0.3–0.7 mm long; upper cataphylls usually up to 5–6 cm long, obtuse above, straw-brown, rarely reddish brown, slightly shining to dull, with blade fragile, subulate, usually to 1.5 cm long; shoots erect, extravaginal. Leaves terete, much exceeding stems, ±rigid, ±striate, bright green, ±shining above, usually 20–35 cm long, 0.6–0.9 mm in diam., acute, ±papillose near apex; basal leaves 1–3 per shoot; cauline leaves usually single, with long sheath. Bract(eole) solitary, ovate, obtuse, membranous, 2.0–2.5 mm long. Tepals unequal, erect, entire, acuminate to subaristate, straw-brown to stramineous, margins ±membranous; outer tepals usually 1.7–2.7 mm long, inner tepals usually 1.3–1.9 mm long, up to 1.5 mm wide. Stamens 6; anthers c. 5 mm long, apiculate; filaments c. 1.7–2.0 mm long; connective prominent; mucro 0.7–0.9 mm long; style dark, c. 2.5 mm; stigmas dark, c. 5 mm. Capsule oblong-ellipsoidal, subacuminate, mucronate, usually 8–10 mm long, pale brown to castaneous brown. Seeds straw-brown, oblong ellipsoidal, c. 0.9–1.1 × c. 0.6 mm; seed-coat distinct; overall length 2.3–2.7 mm including unequal appendages c. 0.4–0.6 mm and c. 0.8–1.1 mm long. Fig. 2.

Endemic to South Island and Antipodean Islands, New Zealand. 51: NZS, ATP. Moist places among rocks, marshes, moist alpine meadows, 150–2100 m. Map 5.

51. NEW ZEALAND SOUTH: South Is., Fiordland Nat. Park, from Homer Hut to Gertrude Valley, 1100–1200 m, *E.Hörandl & Hadaček 8089* (W); Canterbury, Arthur Pass, 1874, *S.Berggren* (K); Canterbury, Arthur Pass, Blimit Peak, 20 Jan 1928, *W.R.B.Oliver* (K); Canterbury, Kelly's Hill, Feb 1874, *S.Berggren* (LD, S, UPS); Nelson, Mt Arthur, *T.F.Cheeseman s.n.* (H). ANTIPODEAN IS.: Campbell Is., Mt Azimuth, *D.R.Given 9115* (K).

4. *Marsippospermum reichei* Buchenau, *Ber. Deutsch. Bot. Ges.* 19: 160 (1901)

Rostkovia reichei (Buchenau) Hosseus, *Trab. Inst. Bot. Farmacol.* 33: 24 (1915), *n.v.* T: Chile, 'In regione nivis aeternae (1000 m s.m.) montis Patagoniae australis in oriente urbis Bahía Ultima Esperanza, c. 50°30' ', Feb 1900, *K.F.Reiche*; syn: *n.v.*

Illustration: M.Barros, *Darwiniana* 10: 310, fig. 9 (1953).

Map: D.M.Moore, *Fl. Tierra del Fuego* 324, map 37, a (1993).

Perennials, densely caespitose; rhizome short, ascending, with internodes very abbreviated; stems usually 5–10 cm tall, to 0.7 mm in diam. Cataphylls castaneous brown at base, shining, ±gradually tapered to ±obtuse apex; blade setiform, 2–5 mm long. Cauline leaves 1–3, sub-basal; sheaths to 3–4 cm long; blade to c. 5–7 cm long. Sterile shoots (2–) 3 (–4)-phyllous; leaves filiform, c. 0.5 mm in diam., usually 10–15 (–20) cm long, much overtopping stem, with tip acute. Bracteole single, membranous, obtuse, to c. 1 mm long. Tepals linear to linear-lanceolate, c. 0.5 mm wide, acuminate, membranous to stramineous, unequal; outer tepals usually (1.1–) 1.3–1.5 cm long; inner tepals (0.9–) 1.1–1.2 cm long. Stamens 6, 5–6 mm long; anthers usually 3.0–3.5 mm long; connective with distinct 1.8–2.0 mm long apical projection; filaments 1.1–1.5 mm long. Style short, c. 1.2–1.5 mm long; stigmas c. 4 mm long. Capsule oblong-trigonous, acuminate, usually 7–9 mm long, pale brown, shining. Seeds castaneous-brown, 0.8–0.9 mm long, or 1.7–2.0 mm long including two unequal whitish appendages c. 0.3 and c. 0.5 mm long. Fig. 2.

Southernmost South America, from Neuquén southwards to Tierra del Fuego in Argentina, province of Magallanes and Islas Wollaston in Chile. 85: AGS, CLS. Wet rocks, gravelly open substrates along streams, up to 1000 m. Map 6.

85. ARGENTINA: Santa Cruz, Lago San Martín, Río Fossiles, 1000 m, 27 Mar 1905, *P.Dusén s.n.* (K); *loc. cit.* *P.Dusén 5905* (UPS); *loc. cit.* *P.Dusén 13223* (SI). CHILE/ARGENTINA: S Patagonia, Sierra Baguales, 1500 m, *C.J.F.Skottsberg 725* (S, UPS).

JUNCACEAE

3. OXYCHLOË

Oxychloë Phil., *Fl. Atacam.* 52 (1860); *Distichia* sect. *Oxychloë* (Phil.) Benth. & Hook.f., *Gen. Pl.* 3: 867 (1883).

Type: *Oxychloë andina* Phil.

Andesia Hauman, *Anales Mus. Nac. Hist. Nat. Buenos Aires* 27: 287 (1915). T: *Andesia bisexualis* (Kuntze) Hauman

Perennial herbs, cushion-forming, glabrous; cushions dense, prickly. Rhizome branched, ascending. Stems ±erect, ±regularly forked, with proximal part densely covered with persisting wilted leaf bases. Leaves regularly and densely spirally inserted along stem; blade equal to or longer than sheath, terete, smooth, with apex acute, hard-pointed, prickly. Inflorescence reduced to a single lateral (axillary) subterminal flower with two scarious bracteoles; pedicel of variable length. Flowers unisexual or hermaphrodite (plants polygamous-dioecious or diclino-dioecious). Tepals glumaceous or papery with margins hyaline, lanceolate or ovate-lanceolate, often unequal. Staminate flower with 6 stamens shorter than or equalling tepals; anthers elongated, mucronate, much longer than the very short flattened ±triangular filament. Stigmas tapering. Capsule trilocular to triseptate, loculicidal to circumscissile. Seeds many, ovoid to pyriform; seed-coat distinct, forming inconspicuous appendage, whitish-yellowish, minutely reticulate, with cells slightly elongated longitudinally.

Five species at high altitudes of the Andes in South America, from Peru to north Patagonia in Argentina. The overall similarity among the species is high, the species are difficult to cultivate, and the genus requires a thorough taxonomic and population study.

- | | | |
|----|---|-----------------------------------|
| 1 | Leaf blade 40–60 mm long | 5. <i>O. mendocina</i> |
| 1: | Leaf blade 10–30 mm long | |
| 2 | Leaf blade up to 20 mm long | |
| 3 | Perianth c. 7–8 mm long; capsule 4–5 mm long, shorter than perianth; all flowers unisexual, with pistillate and staminate flowers on different shoots | 3. <i>O. castellanosii</i> |
| 3: | Perianth to 5 mm long; capsule 8–10 mm long, exceeding perianth; hermaphrodite and unisexual flowers on different shoots | 4. <i>O. haumaniana</i> |
| 2: | Leaf blade 20–30 mm long | |
| 4 | Capsule 8–10 mm long, longer than perianth; seeds 1.0–1.3 mm long; all flowers unisexual, with pistillate and staminate flowers on different shoots | 1. <i>O. andina</i> |
| 4: | Capsule c. 6 mm long, ±equalling perianth; seeds 0.6–0.8 mm long; hermaphrodite and unisexual flowers on different shoots | 2. <i>O. bisexualis</i> |

1. *Oxychloë andina* Phil., *Fl. Atacam.* 52, tab. 6c (1860)

Distichia andina (Phil.) Benth. & Hook.f., *Gen. Pl.* 3: 867 (1883). T: Chile, Antofagasta, Atacama desert, Zorras, 3200 m, Feb 1854, *R.A. Philippi s.n.*; lecto: SGO63055, *fide* H. Balslev, *Fl. Neotrop. Monogr.* 68: 49 (1996); isolecto: K, SGO37716.

Distichia macrocarpa Wedd. ex Buchenau, *Abh. Naturwiss. Vereine Bremen* 4: 123 (1874). T: Bolivia, La Paz, near Sorata, Vancuiri near Chuchu, 4500–5000 m, Jan–Mar 1857, *G. Mandon 1442*; holo: GOET, *n.v.*; iso: G, GH, K, NY, P, S.

Illustrations: F.G.P. Buchenau, *Junc. S.-Amer.*, Plate 3 (1879); M. Barros, *Darwiniana* 10: 297, fig. 4 (1953).

Perennials, compact, cushion-forming. Stems erect, much branched, distal part with leaves 8–10 cm. Leaves rigid and conical; blade 20–30 mm long, to 1.2 mm wide; auricles membranous, rounded, sometimes forming a ligule-like adaxial structure. Bracteoles scarious, unequal, 3.0–4.5 mm long. Flowers unisexual; pedicels 1–3 cm long, ±equal in both sexes. Staminate flowers with tepals narrowly lanceolate, scarious, stramineous, rarely castaneous; outer tepals 6.5–7.5 mm long; inner tepals 7.5–8.0 mm long; stamens 6; anthers

4–5 mm long, mucronate; filaments 0.3–0.5 mm long; pistil rudimentary. Pistillate flowers slightly smaller; tepals broadly lanceolate, 6–8 mm long; ovary ellipsoid, 2 mm long; style c. 2 mm long, stigmas filiform, elongated, c. 2–4 mm long, exserted. Capsule ovoid, with rigid, shining wall, 8–11 mm long, 4.0–4.5 mm wide. Seeds 1.0–1.3 mm long, 0.8–1.0 mm wide. $2n=16$ (Sasaki, 1937, *n.v.*, *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 32 (1996) 1996: 32; an old, doubtful count). Fig. 3.

Confined to the high Andes of Peru, Bolivia, N Chile and NW Argentina: Salta to San Juan. 83. PER, BOL. 85. AGW, CLN. Humid bogs, usually above 4000 m. Map 7.

83. PERU: Puno, San Antonio de Esquilache, 4700 m, *D.Stafford* 736 (F, K, WIS). BOLIVIA: La Paz, Murillo, Pacocota Pampa, 4200 m, *E.Asplund* 190 (UPS); Potosí, Sud Lipez, Cerro Tapaquillcha, 4200 m, *M.Liberman* 456 (LPB). 85. ARGENTINA NORTHWEST: Catamarca, Tinogasta, Tres Quebrados, 4200 m, *F.B.Vervoorst* 3234 (LIL, W); La Rioja, Cordillera de la Boca – Carneritos, *A.Krapovickas & A.T.Hunziker* 5671 (CORD); Salta, Valle La Ollada, between Cerro La Apacheta and the foot of Nevado de Cachi, 4500–4750 m, *V.Núñez* 581 (MCNS); San Juan, Valle del Cura, *R.Pérez Moreau* 30/45 (WU); San Juan, Reserva San Guillermo, Vega de los Corrales, *E.Nicora, E.R.Guaglianone & A.M.Ragonese* 8317 (SI, MCNS). CHILE NORTH: Ríofrío, 24°50' S, 3350 m, *R.A.Philippi* (SGO); Atacama, Chanaval, 7 km NE of Cerro Valiente, 3400 m, *I.M.Johnston* 4825 (F, GH, K, P, S, US).

2. *Oxychloë bisexualis* Kuntze, *Revis. Gen. Pl.* 3(2): 321 (1898)

Andesia bisexualis (Kuntze) Hauman, *Anales Mus. Nac. Hist. Nat. Buenos Aires* 27: 290 (1915). T: Argentina, Paso Cruz, 34° N, 2800 m, *O.Kuntze*; lecto: K, designated here; photo S.

Illustrations: L.Hauman, *Anales Mus. Nac. Hist. Nat. Buenos Aires* 27: 291, plate vi, fig. 1c (1915); M.Barros, *Darwiniana* 10: 306, fig. 8 (1953).

Dense perennials, cushion-forming. Stems ±erect, much-branched. Leaves only in the most distal part; sheath c. 3–4 cm long; blade rigid, semicylindrical in T.S., canaliculate at base, 2–3 cm long, 1.5–2.0 mm wide; auricles membranous, fused, forming a ligule-like structure. Bracteoles membranous-scarious, unequal; lower bracteoles 4.5 mm long; upper bracteoles 4 mm long. Flowers hermaphrodite or unisexual (plants polygamo-dioecious); pedicel thin, to 5 cm long, exceeding leaves. Tepals 6.5–7.5 mm long. Stamens 6; anthers elongated, 3.5–4.0 mm long, mucronate; filaments 0.3–0.5 mm long; ovary ovoid, brownish, 2.5–3.0 mm long; style slender, 3.5–4.0 mm; stigmas exserted, 1.5–2.0 mm. Capsule ovoid, ±trigonal, brownish, shining, c. 6 mm long, 2.0–2.5 mm wide. Seed minutely reticulate, c. 0.6–0.8 mm long.

Endemic to the Andean region in Argentina, from N Patagonia to Salta, and in N Chile. 85: AGS, AGW, CLN. Wet bogs, springs, 3300 to 4400 m. Map 8.

85. ARGENTINA NORTHWEST: Salta, 15 km N of Abra del Gallo, 10 km S of Mina La Poma, 4400 m, *L.Novara, A.Charpin & L.Albornoz* 5723 (MCNS); *A.Charpin & L.Novara* 20771 (G, MCNS); San Juan, Vega de Santa Rosa, 3300 m, *A.T.Hunziker & O.Caso* 4804 (CORD); Mendoza, Río Blanco, *L.Hauman* (BA 15631).

3. *Oxychloë castellanosi* Barros, *Lilloa* 23: 417, fig. 2 (1950)

T: Argentina, San Juan, Cordillera de Colangil, 'Los Champones', 5–6 Feb 1950, *A.Castellanos s.n.*; syn: LIL16042, LIL16069, LIL16133.

Oxychloë simulans Barros, *Darwiniana* 10: 301 (1953). T: Argentina, La Rioja, Sarmiento, Cordillera de los Andes 'El Zanjón', 3500 m, 6 Feb 1949, *A.Krapovickas & A.T.Hunziker*; holotype: BAB5817.

Illustrations: M.Barros, *Darwiniana* 10: 300, fig. 5, 6 (1953).

Dense perennials, cushion-forming. Stems erect, branched, (6–) 8–12 cm long; base covered with old sheaths; distal part with leaves usually not longer than 2–5 cm. Leaves imperfectly distichous; sheaths 1.2–1.5 cm long; auricles broad, obtuse, ±membranous; blades erecto-patent, rigid, canaliculate at base, cylindrical and gradually narrowing into pungent tip, 10–15 (–20) mm long, 0.7–1.2 mm wide. Bracteoles membranous-scarious, ovate, ±obtuse, unequal, 3.0–4.5 mm long. Flowers all unisexual. Staminate flowers on pedicels 1.2–2.0 cm; tepals scarious-membranous, with base stramineous to subcoriaceous; outer tepals 6.5–7.0 mm long; inner tepals 7–8 mm long; stamens 6; anthers 4.0–4.5 (–5.5) mm long, mucronulate, with mucro c. 0.3 mm long; filaments 0.5 mm long. Pistillate flowers on pedicels 5–7 (–15) mm

JUNCACEAE (*Oxychloë*)

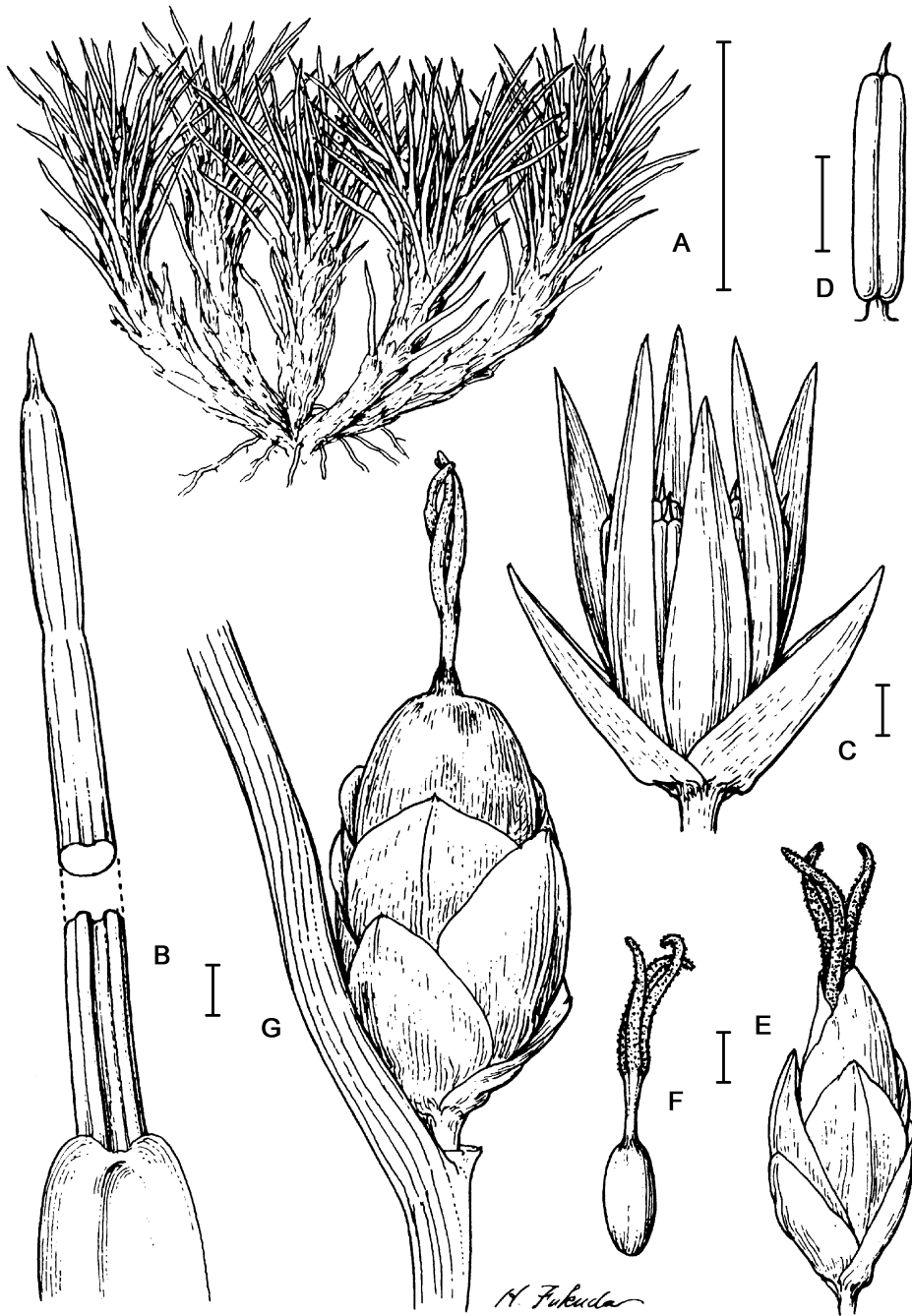


Figure 3. *Oxychloë andina*. **A**, habit; **B**, leaf; **C**, staminate flower, note two bracteoles at base of flower; **D**, stamen; **E**, pistillate flower at anthesis with exposed style; **F**, gynoecium; **G**, pistillate flower with mature fruit and remaining style and stigmas. (**A**, **B**, **F**, **E**, *H. Balslev 1150*, NY; **G**, *Werdermann 937*, **C**, **D**, *H. Balslev 1147*, NY). Scale bars: **A** = 5 cm; **B–G** = 1 mm. Drawn by H. Fukuda. Reproduced with permission, from H. Balslev, *Fl. Neotrop. Monogr.* 68: 50, fig. 24 (1996), © 1996, The New York Botanical Garden.

long, slightly smaller than male; tepals 6.5–7.0 mm long, more broadly lanceolate; ovary turbinate; style c. 3 mm long; stigmas not exerted or slightly so, 1.0–2.5 mm long. Capsule unilocular, ellipsoid to oblong-obovoid, rounded at the apex, 4.0–5.0 mm long. Seed ellipsoidal, c. 0.8–1.0 mm long.

Endemic to the west of Argentina, in the Cuyo Region, San Juan Province, and La Rioja Province. 85: AGW. Humid bogs and slopes, wet plains and stream banks in high elevations, above 4000 m. Map 9.

85. ARGENTINA NORTHWEST: San Juan, Cuyo, Cordillera de Colanguil, Los Champones, *A.Castellanos* s.n. (W, isosyn., duplicates of LIL16042 & 16133); San Juan, Reserva San Guillermo, Mina Los Caranchos, 4000 m, *Pujalte 103* (SI).

4. *Oxychloë haumaniana* (Barros) Barros, *Darwiniana* 10: 303 (1953)

Andesia haumaniana Barros, *Lilloa* 23: 419 (1950). T: Argentina, San Juan, Río Cura, 3900 m, 16 Feb 1950, *A.Castellanos*; holo: LIL16136.

Illustrations: M.Barros, *Darwiniana* 10: 304, fig. 7 (1953); M.Barros, *Lilloa* 23: 419, fig. 3 (1950).

Dense perennials, cushion-forming, 5–10 cm tall. Stem erect, much branched, covered with old sheaths, with living leaves only in distal part. Leaves imbricate, imperfectly distichous; sheaths brownish, 10–50 mm long, 4–7 mm wide; auricles asymmetrical, ligulate, membranous; blade narrowly cylindrical, rigid, surface minutely striate, 10–15 mm long, 1.0–1.2 mm wide; tip prickly. Bracteoles unequal; lower bracteoles subacute, 4–5 mm long, shortly mucronate; upper bracteoles subobtuse, c. 2.5 mm long. Flowers hermaphrodite or unisexual; perfect flowers on short peduncle, scarcely overtopping leaves; tepals acute, narrowly lanceolate, brownish-purplish with scarious margins, subequal, c. 5 mm long. Stamens 6; anthers c. 2.5 mm long, mucronulate; filaments 0.5–1.0 mm long. Unisexual flowers similar to the perfect ones, lacking one of the fertile whorls. Capsule hard-walled, ovoid, brownish, 8–10 mm long. Seeds obovoid, reticulate, whitish, 0.7–0.9 mm long.

Rare, endemic to San Juan Province in Argentina; known from the type collection only. 85: AGW. Wet slopes and plains in high Andes, at 3900 m. Map 10.

Similar to *O. bisexualis* but differs in having shorter leaf blade, up to 15 mm long, and smaller flowers, usually less than 5 mm.

5. *Oxychloë mendocina* Barros, *Lilloa* 28: 282, fig. 2 (1957)

T: Argentina, Mendoza, Tristeza, China Muerta, 23 Feb 1953, *A.Castellanos*; holo: LIL15365.

Illustration: M.Barros, *Darwiniana* 10: 304, fig. 7 (1953).

Dense perennials, compact, cushion-forming, usually to 8–10 cm tall. Stem erect, much branched, with basal internodes covered with old sheaths and fresh leaves only in the most distal part. Sheaths with membranous margins, 3–5 cm long; auricles forming a bilobed ligule; blade cylindrical, tapered into pudent apex, 4–6 cm long, 1–2 mm wide. Bracteoles unequal, ovate, membranous; lower bracteoles 4.5–5.0 mm long. Flowers hermaphrodite or unisexual, with the former on long filiform peduncles 3–5 cm long. Tepals lanceolate, purplish-castaneous, with margins membranous, subequal; outer tepals 7 mm long; inner tepals 7.5–8.5 mm long. Stamens 6; anthers mucronulate, 4.0–4.5 mm long; filaments 0.3–0.5 mm long. Female flowers with filiform staminodes; ovary turbinate; style c. 2 mm long, large; stigma exerted, c. 4–5 mm long. Capsule ovoid to ellipsoidal, 7.0–7.5 mm long, shorter than perianth. Seeds ellipsoidal, 0.8–0.9 mm long.

Endemic to Mendoza Province, W Argentina. 85: AGW. Humid bogs and springs, usually above 3500 m. Map 11.

85. ARGENTINA NORTHWEST: Mendoza, between Portezuelo de Rahuí and valley of Chacaycó, *F.Kurtz 6071* (CORD); Arroyo del Papel, 3000 m, *F.Kurtz 11127* (CORD); Mendoza, San Carlos, Laguna del Diamante, *A.Ruíz Leal 14561* (K).

JUNCACEAE

4. PATOSIA

Patosia Buchenau, *Bot. Jahrb. Syst.* 12: 63 (1890)

Distichia sect. *Patosia* (Buchenau) Kuntze in T.E. von Post & C.E.O.Kuntze, *Lex. Gen. Phan.* 182 (1903).
T: *Patosia clandestina* (Phil.) Buchenau

Perennial herbs, cushion-forming, glabrous. Stems ±regularly forked, dying back from the base, densely covered with persisting wilted leaves. Leaves regularly, densely, and alternately inserted along stem. Blade equal to or slightly shorter than sheath, flat or canaliculate; margins usually finely dentate. Inflorescence reduced to a single lateral sub-terminal flower. Plants dioecious or rarely with a few perfect flowers. Flower bracteole single. Tepals linear to lanceolate. Staminate flowers long pedicellate, exerted above the cushion; stamens 6, with long linear mucronate anthers on short filaments. Pistillate flowers sessile in axil of subapical leaf; ovary sessile; style long, filiform, with 3 filiform papillose stigmas. Capsule triseptate, sessile, narrowly ellipsoid. Seeds many; outer seed-coat spongy, irregularly wrinkled; inner seed-coat castaneous, hard.

A single species distributed along the Andes from Bolivia to Chile and Argentina.

1. *Patosia clandestina* (Phil.) Buchenau, *Bot. Jahrb. Syst.* 12 : 64 (1890), *nom. conserv. propos.*

Rostkovia clandestina Phil., *Linnaea* 29: 76 (1857); *Distichia clandestina* (Phil.) Buchenau, *Junc. S.-Amer.* 6: 370 (1879); *Oxychloë clandestina* (Phil.) Hauman, *Anales Mus. Nac. Hist. Nat. Buenos Aires* 27: 294 (1915).
T: Chile, Coquimbo, Los Patos, *R.A.Philippi s.n.*; syn: SGO, n.v.; iso: K.

Rostkovia brevifolia Phil., *Linnaea* 29: 76 (1857); *Oxychloë brevifolia* (Phil.) Buchenau, in A.H.R.Grisebach, *Symb. Fl. Argent.* 318 (1879). T: Chile, Laguna de Malvarco, Jan 1856, *J.N.E.Germain s.n.*; lecto: SGO63044, *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 46 (1996); isolecto: SGO46499, n.v.; K; Cordillera de Sant Jago, *R.A.Philippi s.n.*; para: BREM, GOET, SGO46497.

Patosia tucumanensis Castillon, *Bol. Mus. Hist. Nat. Tucuman* 7: 8 (1926); *Patosia clandestina* (Phil.) Buchenau var. *tucumanensis* (Castillon) Barros, *Darwiniana* 10: 295 (1953). T: Argentina, Tucumán, Valle de Tafí, Cerro Muños de la Piedra Pintada, Laguna de los Patos, 4100 m, 30 Dec 1916, *L.Castillón 6039*; holo: LIL, photo NY.

Illustrations: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 35, fig. 28 (1906); M.Barros, *Darwiniana* 10: 290, fig. 2, 293, fig. 3 (1953); H.Balslev, *Fl. Neotrop. Monogr.* 68: 47, fig. 23 (1996).

Perennials forming dense, very hard cushions up to several meters in diam. and 0.5 m high. Individual plants 5–15 cm long, ±regularly forked; stems covered with short spirally arranged wilted leaves and a few green leaves distally. Leaves 1.5–2 cm long, inserted 1–2 mm apart; sheaths as long as or longer than the blade, to 5 mm wide; auricles obtuse, sometimes fused and liguliform; blade linear, 0.5–0.7 mm wide, acuminate, proximally canaliculate, terete in the middle, distally flat with finely serrate margin; leaf seemingly jointed. Staminate flowers exerted on filiform pedicels 1–2 cm long; bracteole 4.0–4.5 mm long; tepals subequal, 5–7 mm long; anthers 2.5–3.5 mm long, mucronate; filaments c. 0.2–0.3 mm long. Pistillate flowers sessile and hidden in axil with only stigmas exerted above the cushion; tepals linear to lanceolate, to 18 mm long; ovary ellipsoid, to 2 mm long, tapering to the filiform 10 mm long style; stigmas 3, filiform, to 8 mm long, papillose, not tapering, exerted. Capsule narrowly ellipsoid, acuminate, 10 × 2 mm. Seeds of irregular shape. Fig. 4.

Confined to the high Andes from Bolivia to N and C Chile and from Jujuy to Neuquén, NW and SW Argentina. 83: BOL. 85: AGW, AGS, CLN, CLC. Alpine bogs, along streams, and in wet depressions, usually 3000–4000 m. Map 12.

83. BOLIVIA: La Paz, Pacajes, Comanche, 4100 m, *E.Asplund 2904* (UPS); *H.Balslev & S.G.Beck 1085* (AAU, LPB, NY); Cochabamba, Arque, road to Oruro, km 46, *P.Rojas 856* (LPB). 85. ARGENTINA: Mendoza, San Carlos, Laguna del Diamante, 3000 m, *A.Ruiz Leal 7240* (LIL); Neuquén, Copa-hué, 14 Feb 1941, *R.Pérez Moreau* (BA37746, WU); Neuquén, Baño de Palau, 2250 m, *Comber 297* (K). CHILE: Atacama, Copiapo, Sierra San Miguel, 3200 m, *I.M.Johnston 4925* (F, GH, K, P, S, US); Cordillera de Maule, *J.N.E.Germain* (K).

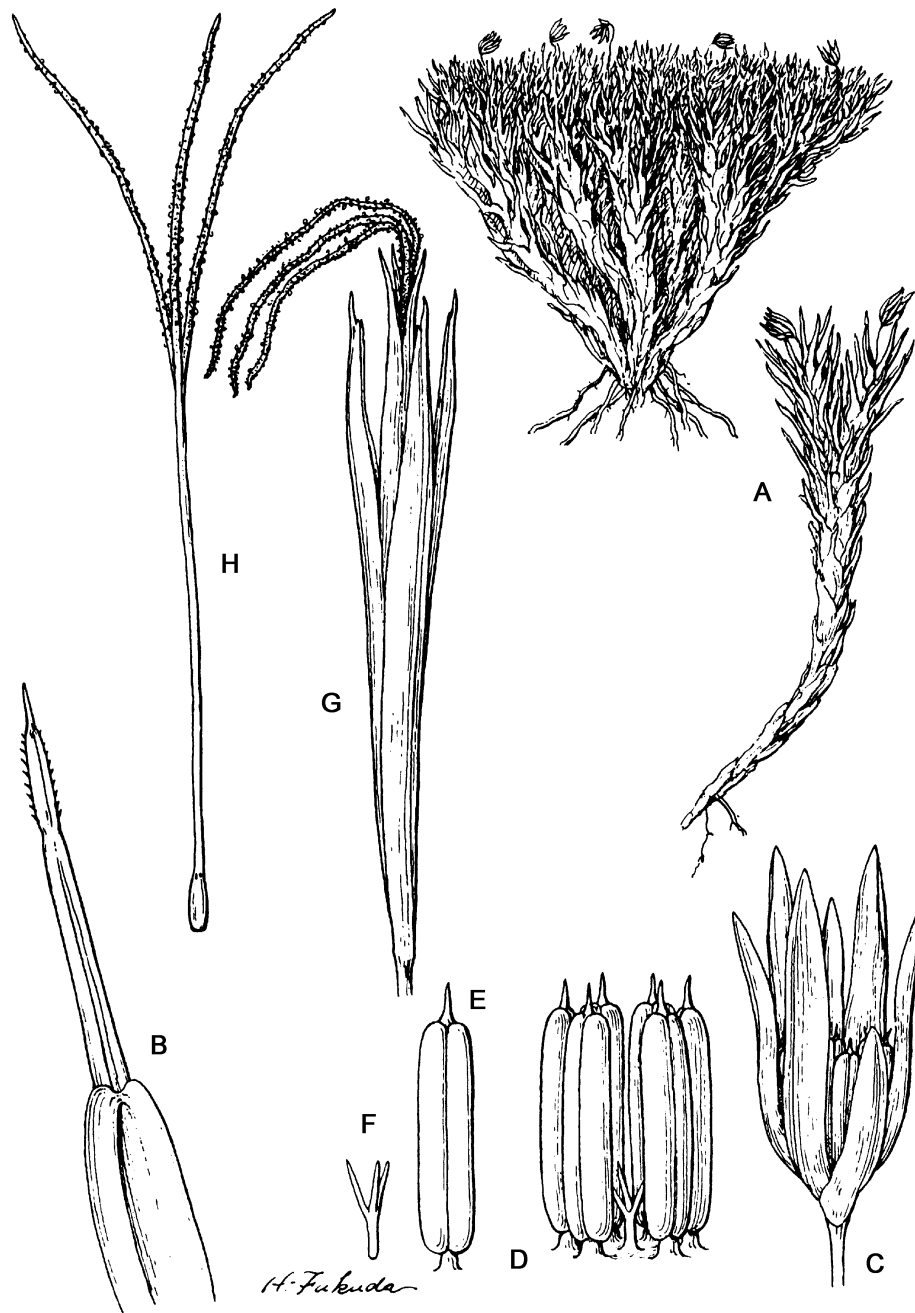


Figure 4. *Patosia clandestina*. **A**, habit of clone (top) and a single shoot (right); **B**, leaf with basal sheath, channelled central part, and slightly dorsiventrally flattened distal part with finely serrate margin; **C**, staminate flower, note one bracteole; **D**, androecium, note mucronate anthers and rudimentary pistillode; **E**, single anther, note short filament and apical mucronate tip; **F**, pistillode from staminate flower, note three rudimentary stigmas; **G**, pistillate flower with protruding stigmas; **H**, gynoeceum. (A–H, Johnston 4925). Scale bars: A = 5 cm; B–H = 1 mm. Drawn by H. Fukuda. Reproduced with permission, from H. Balslev, *Fl. Neotrop. Monogr.* 68: 47, fig. 23 (1996), © 1996, The New York Botanical Garden.

JUNCACEAE

5. DISTICHIA

Distichia Nees & Meyen, in F.J.F.Meyen, *Observ. Bot.* 128 (1843)

Type: *Distichia muscoides* Nees & Meyen

Goudotia Decne., *Ann. Sci. Nat., Bot., Sér.* 3, 4: 83 (1845); *Distichia* Nees & Meyen sect. *Goudotia* (Decne.) Benth. & Hook.f., *Gen. Pl.* 3: 367 (1883). T: *Goudotia tolimensis* Decne.

Agapatea Steud., *Bot. Zeitung (Berlin)* 14: 391 (1856), *nom.inval.*; *Agapatea* Steud. ex Buchenau, *Abh. Naturwiss. Vereine Bremen* 4: 124 (1874), *nom. inval.*

Perennials with branched suberect rhizomes, glabrous, cushion-forming. Stems ±regularly forked and covered with persisting leaves which are wilted in proximal part and live in the most distal part. Leaves regularly densely and strictly distichously inserted along stem, with a wide sheath clasping the leaf above; blade shorter than or equalling sheath, terete. Inflorescence reduced to a single lateral subterminal flower. Plants dioecious. Bracteoles 2–4, minute, scarious. Tepals lanceolate, 4–10 mm long. Staminate flower long pedicellate. Stamens 6, with linear mucronate anthers about 10 times as long as the filaments. Pistillate flower short pedicellate; ovary on short gynophore; style with 3 filiform papillose stigmas. Capsule unilocular, lifted on a gynophore at ripening. Seeds many; outer seed-coat loose, irregularly wrinkled.

Three species confined to the high Andes from Colombia and Ecuador to N Chile and N Argentina.

- | | |
|---|--------------------------|
| 1 Leaf apex bluntly acute, without hair-like extension | 1. D. muscoides |
| 1: Leaf apex with hair-like extension or long acuminate | |
| 2 Leaf blade gradually tapering to the tip; auricles absent | 2. D. filamentosa |
| 2: Leaf blade linear, with tip long acuminate; auricles present | 3. D. acicularis |

1. *Distichia muscoides* Nees & Meyen, in F.J.F.Meyen, *Observ. Bot.* 129 (1843)

T: Peru, Puno, Pisacoma, 4500 m, Apr 1831, *Meyen s.n.*; holotype: B, probably destroyed; syn: BR, P, photo QCA.

Goudotia tolimensis Decne., *Ann. Sci. Nat., Bot., Sér.* 3, 4: 85 (1845); *Distichia tolimensis* (Decne.) Buchenau, *Bot. Jahrb. Syst.* 1: 141 (1880). T: Colombia, Tolima, 4600–5000 m, Feb 1828, *J.Goudot s.n.*; holotype: P; isotype: G, K, P.

Gaimardia boliviana Pax, *Repert. Spec. Nov. Regni Veg.* 5: 225 (1908). T: Bolivia, La Paz, am Fusse des Murarata Swamps, 5000 m, Oct 1906, *O.Buchtien 836*; holotype: B, probably destroyed; lectotype: US, *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 43 (1996); isotype: UPS, photo NY.

Agapatea peruviana Steud., in W.Lechler, *Berberid. Amer. Austral.* 56 (1857), *nom.inval.* Orig. coll.: Peru, Agapata, Jul 1854, *W.Lechler 1954* (G, GOET, K, M, P, all p.p.).

Illustrations: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 34, fig. 27 (1906) as *D. tolimensis*; M.Barros, *Darwiniana* 10: 290, fig. 2 (1953); H.Balslev, *Fl. Neotrop. Monogr.* 68: 40, fig. 20A–C, 44, fig. 221–J (1996); H.Balslev, in [The Asahi Shinbun World of Plants; in Japanese] 122: 35 (1996).

Perennials forming dense hard cushions up to several meters in diam. Single plants 5–15 cm long, with ±regularly forked shoots, covered with short, strictly distichous persistent stramineous or rarely dark brown wilted leaves, with only 2 or 3 most distal leaves green and projecting above the cushion. Leaves 1–2 cm long, inserted 1–2 mm apart; sheaths usually two thirds of entire leaf length, open, wide, V-shaped in T.S., with narrow and scarious margins, almost completely clasping the sheath of the leaf above; blade bluntly acute. Flowers in a subterminal leaf axil. Tepals subequal, 4.5–7.5 mm long. Staminate flowers on filiform pedicels 1–2 cm long. Stamens 2.0–3.5 mm long; anthers 1.8–3.0 mm long; filaments c. 0.2–0.3 mm long. Pistillate flowers hidden in the sheath of the supporting leaf, with only stigmas projecting above the shoot apex; style filiform, exceeding tepals; stigmas half as long as style. Gynophore elongating at fruit ripening, lifting the capsule slightly above the cushion. Capsule ellipsoid to ovoid, apically acute to slightly apiculate or obtuse, 5–7 × 2.5–3.5 mm, irregularly dehiscent, yellow-brown, unilocular. Seeds oblong, 1.0–1.5 × 0.5–1.0 mm, covered by the thick white outer seed-coat. Fig. 1, 5.

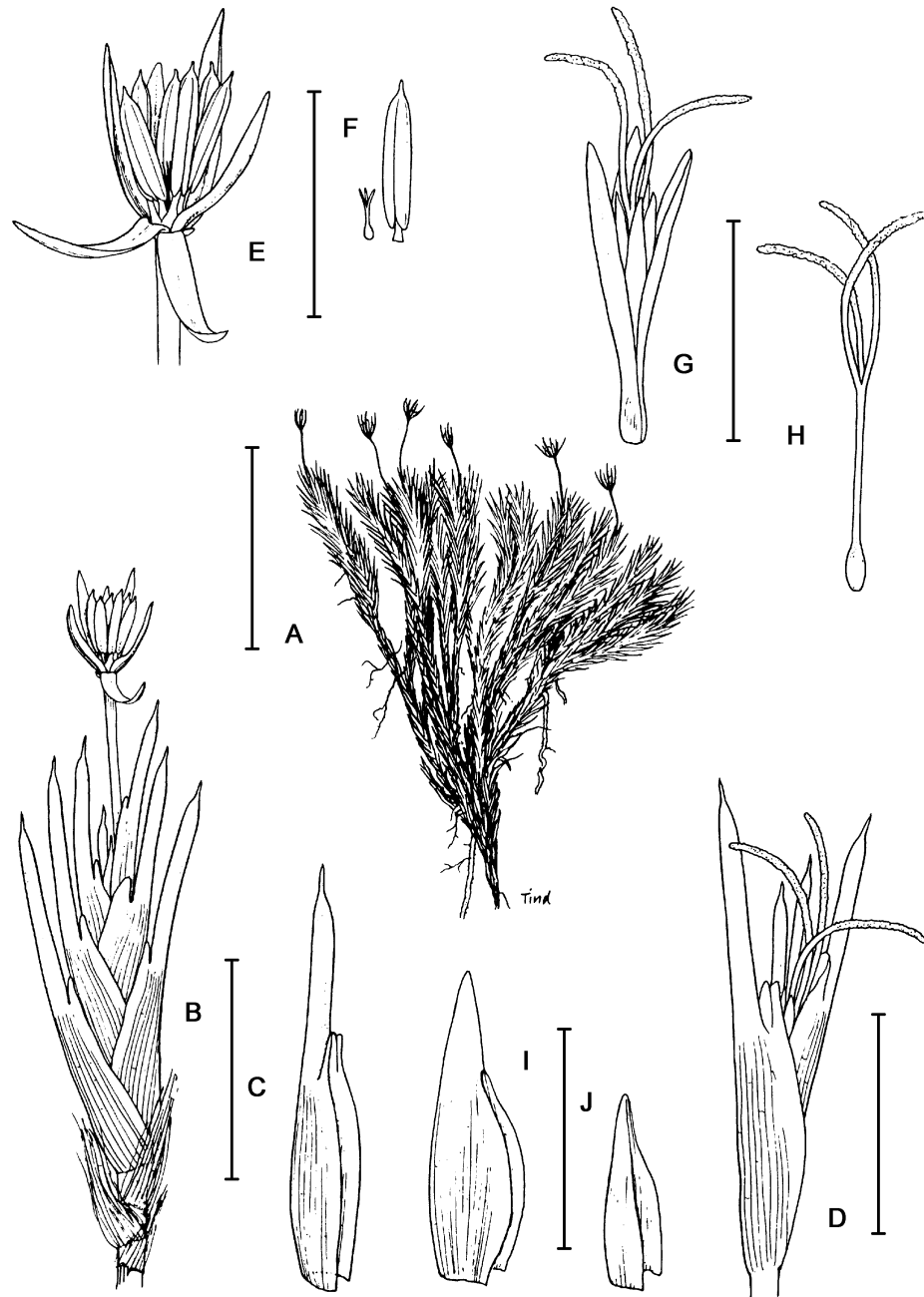


Figure 5. *Distichia acicularis*. **A**, habit, staminate plant; **B**, shoot apex with staminate flower; **C**, leaf; **D**, shoot apex with stigmas protruding from pistillate flower; **E**, staminate flower; **F**, stamen; **G**, pistillate flower; **H**, gynoecium. (**A-H**, *Laegaard 53236*, AAU). *Distichia muscoides*. **I**, **J**, leaves, note conical blade and lacking auricles. (**I**, **J**, *Laegaard 53111*, AAU). Scale bars: **A** = 5 cm; **B**, **C**, **D**, **I**, **J** = 10 mm; **E**, **F** = 5 mm; **G**, **H** = 5 mm. Drawn by K. Tind. Originally published in *Nordic J. Bot.* 6: 152, fig. 1 (1986), reproduced with permission, from H. Balslev, *Fl. Neotrop. Monogr.* 68: 44, fig. 22 (1996), © Lunds Botaniska Förening, © 1996, The New York Botanical Garden.

JUNCACEAE (*Distichia*)

Confined to the Andes from Colombia to northern Argentina. 83: BOL, CLM, ECU, PER. 85: AGW. In high-altitude paramo and puna vegetation, in boggy depressions and wet slopes with springs, usually from 4000–4600 m. The dense cushions are cut out and kept near houses, where they are used as fuel for cooking and heating by highland Indians. Map 13.

83. BOLIVIA: La Paz, Lago Zongo, S side of Huayna Potosí, 4700 m, *H.Balslev & S.G.Beck 1145* (AAU, CAS, LPB, NY); Oruro, Carangas, Sajama, 4200–5000 m, *E.Asplund 3984* (NY, S, UPS). COLOMBIA: Caldas, Nevado del Ruiz, Termales, 4200–4500 m, *J.-H.Humbert et al. 27076* (COL, GH, NY, S, SI, U, W); Santander, Páramo de Santurbán near Vetas, 3950–4160 m, *E.P.Killip & Smith 17576* (C, COL, F, GH, NY, S). ECUADOR: Azuay, Lago Luspa, 3800 m, *Ramsay 121 et al.* (K); Chimborazo, E slope of Mt Chimborazo, 4200 m, *E.Asplund 7807* (AAU, BR, CAS, K, NY, S, UPS). PERU: Arequipa, Pichu Pichu, 4100 m, *D.Stafford 691* (BM, K); Pasco, Huayllay, 4230–4610 m, *Boeke 1098* (AAU, NY). 85. ARGENTINA NORTHWEST: Salta, Los Andes, 15 km N of Abra del Gallo, 4400 m, *A.Charpin & L.J.Novara AC20775* (K); Tucumán, Cerro de las Animas, 4300 m, *L.Castillón 6038* (LIL).

2. *Distichia filamentosa* Buchenau, *Junc. S.-Amer.* 369 (1879)

T: Bolivia, La Paz, Larecaja, Sorata, Laguna de Juriquana prope Anilaya, 4500 m, ii–iv 1860, *G.Mandon 1443* p.p.; syn: G, GH, K, NY, P, S, UPS.

Agapatea filamentosa Buchenau, *Abh. Naturwiss. Vereine Bremen* 4: 124 (1874), *nom. inval.*; *Distichia filamentosa* Griseb., *Symb. Fl. Argent.* 318 (1879), *nom. inval.* Original material: Bolivia, La Paz, Sorata, San Pedro, 4500 m, 1860, *G.Mandon 1443* p.p.; GOET.

Perennials forming small cushions; shoots regularly forked, covered with short strictly distichous persistent stramineous or rarely dark brown wilted leaves, with only distal leaves green. Leaves c. 8–15 mm long; sheaths usually 6–8 mm long, c. 3–4 mm wide, with margins membranous; auricles ±not developed; blade usually 6–12 mm long, subconical-cylindric; tip with a 2–4 mm long filamentous extension. Flowers in a subterminal leaf axil. Tepals subequal, 4.5–7.5 mm long. Staminate flowers on 1–2 cm long filiform pedicels. Stamens 2.0–3.5 mm long; anthers 1.8–3.0 mm long; filaments c. 0.2–0.3 mm long. Pistillate flowers hidden in the sheath of the supporting leaf, with only stigmas projecting above the shoot apex; style filiform, exceeding the tepals; stigmas half as long as style. Gynophore elongating at fruit ripening, lifting the capsule slightly above the cushion. Capsule ellipsoid to ovoid, subobtuse, mucronulate, 8–9 mm long. Seeds c. 1.5 mm long.

A species known from the high Andes of La Paz province, Bolivia, from Arequipa in Peru and disjunctly from the province of Tarapaca in N Chile. 83: BOL, PER. 85: CLN. Flat shores of small ponds in alpine bogs, usually at 4000–4800 m. Map 14.

83. BOLIVIA: La Paz, Sorata, San Pedro, 4500 m, *G.Mandon 1443* p.p. (GOET); La Paz, Lago Zongo, S side of Huayna Potosí, 4700 m, *H.Balslev & S.G.Beck 1146* (AAU, CAS, LPB, NY); La Paz, Mt Sorata, 4400 m, *A.W.Hill 487* (B, K); La Paz, Murillo 6.4 km NE of La Cumbre, 4250 m, *J.C.Solomon & Uehling 12133* (AAU, MO); La Paz, from El Cumbre to Coroico, E of the pass, 4800–4920 m, 18 Jul 1995, *S.Laegaard 17669* (AAU). PERU: Arequipa, Chucara Crater, 16 Jan 1999, 4700 m, *B.Ruthsatz & S.G.Beck 10126* (AAU). 85. CHILE: Tarapacá, Parinacota, 4820 m, *B.Ruthsatz 8541* (AAU).

3. *Distichia acicularis* Balslev & Laegaard, *Nord. J. Bot.* 6: 151 (1986)

T: Ecuador, Azuay, Páramo de Soldados, 3700 m, 24 Oct 1984, *S.Laegaard 53236*; holotype: AAU; isotype: GB, K, NY, QCA, QCNE.

Illustrations: H.Balslev & S.Laegaard, *Nord. J. Bot.* 6: 152, fig. 1A–H (1986); H.Balslev, *Fl. Neotrop. Monogr.* 68: 44, fig. 22A–H (1996).

Map: H.Balslev & S.Laegaard, *Nord. J. Bot.* 6: 153, fig. 2 (1986).

Perennials forming loose cushions up to 50 cm in diam. Individual plants consisting of ±regularly forked shoots 5–15 cm long; proximal parts covered with stramineous wilted leaves; distal part with 6–8 green leaves. Leaves 1–2 cm long, completely clasping one another by the sheaths; sheaths equalling blades or shorter, 1.0–2.5 mm wide, U-shaped in T.S., with margins scarious; auricles pointed or rounded, 1–3 mm long, papery; blade linear, terete, 0.5–1.0 mm wide; apex drawn out into a long pointed tip. Staminate flower pedicels 1.5–3.0 cm long; tepals linear-lanceolate, 5–8 mm long; stamens 2–6 mm long; gynoeceum rudimentary, c. 1.5 mm long. Pistillate flower on pedicel c. 1 mm long; tepals linear-

lanceolate 7–10 mm long; ovary ovoid, c. 1×0.5 mm long; style 4–6 mm long; stigmas 5–7 mm long. Fruit and seed unknown. Fig. 5.

Found in the Western Cordillera of the Ecuadorian Andes at 1–3° S latitude. 83: ECU. High altitude spring bog areas, in seeping water, along streams, 3200–4200 m. Map 15.

83. ECUADOR: Azuay, Páramo las Cajas W of Sayausí and Cuenca, 4100 m, *H.Balslev 1481* (AAU, NY, QCA); Azuay, Páramo de Soldados, 3700–3800 m, *S.Laegaard 53240* (UPS); Bolívar, road between Guaranda and Riobamba at km 10, 3200 m, *S.Laegaard 51275* (AAU, MO, QCA); Chimborazo, Azul–Osogachi road, 4000–4200 m, *S.Laegaard 71009* (AAU, QCA); Cotopaxi, road between Latacunga and Quevedo, 18 km W of Pujilí, 3700 m, *H.Balslev 1060* (AAU, NY, QCA); Tungurahua, road between Ambato and Guaranda, 3800 m, *S.Laegaard 51265* (AAU, QCA, QCNE).

6. LUZULA

Luzula DC. in J.B.A.P. de M. de Lamarck & A.P. de Candolle, *Fl. Franç.*, 3rd edn, 3: 158 (1805), *nom. cons.*

Juncoides Ség., *Pl. Veron.* 3: 88 (1754), *nom. rejic.* T: *Luzula campestris* (L.) DC.

Luzula sect. *Gymnodes* Griseb., *Spic. Fl. Rumel.* 2: 405 (1846); *Gymnodes* (Griseb.) Fourr., *Ann. Soc. Linn. Lyon*, sér. 2, 17: 172 (1869); *Juncoides* sect. *Gymnodes* (Griseb.) Kuntze in T.E. von Post & C.E.O.Kuntze, *Lex. Gen. Phan.* 303 (1903). T: not designated.

Nemorinia Fourr., *Ann. Soc. Linn. Lyon*, sér. 2, 17: 172 (1869). T: *Luzula forsteri* (Sm.) DC. [see *Luzula* subg. *Pterodes*]

Perennial (rarely annual) herbs, rhizomatous, seldom cushion-forming, with sparsely to densely ciliate leaves, rarely leaves abaxially hairy; trichomes simple, many-celled. Leaves scale-like on rhizomes, bractlike below the inflorescence, usually narrowly linear, rarely linear-lanceolate, flat to concave; sheaths closed (rarely slightly dissected); auricles absent. Bracts leaf-like to scarious. Inflorescence diverse, usually many-flowered, either cymose with flowers borne singly and pseudo-paniculate, or racemose and then borne singly or in few-flowered clusters in much branched panicles or decompound anthelate inflorescences, or in spike-like clusters, either pedunculate or congested in many-flowered dense heads. Each flower subtended by a small bract at pedicel base and 1–2 subtire to fimbriate bracteoles just below flower. Flowers hermaphrodite, perfect. Tepals 6, equal to \pm unequal, \pm lanceolate (linear-lanceolate to ovate-lanceolate), glumaceous, glabrous or ciliate-fimbriate. Stamens 3–6; anthers oblong to linear; filaments filiform to linear; ovary sessile; style thin, 0.1–c. 4 mm long; stigmas 3, suberect, twining. Capsule \pm ovoid-trigonus, unilocular. Seeds 3, with or without appendages (caruncula); outer seed-coat tight, usually hyaline, less often whitish or brownish. $x = 6$ (sometimes changed by fragmentation, mostly simultaneous (agmatoploidy), or fusion ($x = 3$)), *fide* H.Nordenskiöld, *Hereditas* 37: 325–355 (1951), 42: 7–73 (1956).

A genus of 115 species, almost cosmopolitan, much rarer in the tropics, with major diversity centres in SW Europe, the Far East, W North America, temperate South America (the Andes) and Australia and New Zealand. Not important economically.

F.G.P.Buchenau, *Monographia Juncacearum*, *Bot. Jahrb. Syst.* 12: 1–495 (1890); F.G.P.Buchenau, *Juncaceae*, in H.G.A.Engler, *Pflanzenr.* (iv.36) Heft 25: 1–284 (1906); H.Nordenskiöld, Cyto-taxonomical studies in the genus *Luzula* I, II, *Hereditas* 37: 325–355 (1951), 42: 7–73 (1956); L.Hämet-Ahti, A synopsis of the species of *Luzula*, subgenus *Anthelaea* Griseb. (Juncaceae) indigenous in North America, *Ann. Bot. Fenn.* 8: 368–381 (1971); V.S.Novikov, Konspekt sistemy roda *Luzula* DC. (Juncaceae), *Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol.* 95(6): 63–70 (1990); J.Kirschner, An account of natural hybridization within *Luzula* sect. *Luzula* (Juncaceae) in Europe, *Preslia* 63: 81–112 (1991); J.Kirschner, Karyological differentiation of *Luzula* sect. *Luzula* in Europe, *Thaiszia* 2: 11–39 (1992); J.Kirschner, Taxonomic survey of *Luzula* sect. *Luzula* (Juncaceae) in Europe, *Folia Geobot. Phytotax.* 28: 141–182 (1993).

The genus is characterized by chromosomes with diffuse or polycentric centromeres, and, during its evolution, it undergoes (often repeatedly) a simultaneous chromosome

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fragmentation. The phenomenon is called agmatoploidy; in consequence, a mere chromosome number does not give information about the ploidy level. Chromosome numbers are therefore given with data on karyotype; unfragmented chromosomes are designated AL, half-sized chromosomes BL and quarter-sized ones are called CL.

For the compilation of descriptions, seeds were measured in dorsal view, seed length excludes the appendage, and lower flowers of clusters were examined for floral traits (tepals and capsule segments first liberated from inflorescence).

KEY TO SUBGENERA AND SECTIONS

- 1 Annuals; inflorescence cymose; $n = 3$ subg. 1. **Marlenia**
- 1: Perennials; inflorescence racemose; $n = 6$
- 2 Seed appendage apical (distal), large subg. 3. **Pterodes**
- 2: Seed appendage basal or absent, but distal end of seed sometimes with a minute pale patch of loose outer seed-coat
- 3 Flowers usually borne singly in the inflorescence, rarely some in groups of 2–5; inflorescence much branched sect. 4. **Diprophyllatae**
- 3: Flowers in dense pedunculate clusters or wholly congested, or in groups of (2) 3–5 (to many) flowers in the whole inflorescence; inflorescence sparsely branched, unbranched or much branched
- 4 Leaf tip obtuse to subobtuse, often slightly swollen, rarely with a spinuliform mucro
- 5 Leaf tip obtuse, not swollen, with a spinuliform mucro **49. *Luzula nivalis***
- 5: Leaf tip obtuse or subobtuse, slightly swollen or not swollen, without spinuliform mucro sect. 7. **Luzula**
- 4: Leaf tip acute to acuminate, not swollen
- 6 Inflorescence usually nodding, less often erect (then stamens 3 or tepals ciliate; high Andes), spike-like or paniculate (a panicle of \pm dense spike-like clusters), clusters congested or interrupted at base sect. 5. **Alpinae**
- 6: Inflorescence erect to suberect, if slightly nodding then much branched, loose, of (2) 3–5 (20)-flowered groups, anthelate (or corymbose) or umbelloid, of distinct clusters (if congested then stamens 6, tepals glabrous; N hemisphere)
- 7 Inflorescence much branched, (doubly) anthelate, terminal groups mostly of 2–4 (8) flowers, head-like sect. 1. **Anthelaea**
- 7: Inflorescence sparsely branched or unbranched, umbelloid to subcongested, of distinct pedunculate clusters (or wholly contracted), clusters 3–8 (\pm many)-flowered
- 8 Tepals \pm membranous; seeds \pm globose, smooth sect. 2. **Atlanticae**
- 8: Tepals coloured (usually castaneous-brown); seeds broadly ovoid to ellipsoid, surface sculptured
- 9 Seeds $1.7\text{--}1.9 \times 1.3\text{--}1.4$ mm; rhizome thick, nodulose sect. 3. **Nodulosae**
- 9: Seeds $0.9\text{--}1.3 \times 0.5\text{--}0.3$ mm; rhizome thin or indistinct
- 10 Leaf margin smooth **91. *L. acutifolia***
- 10: Leaf margin densely papillose-serrulate sect. 6. **Thyrsanochlamydeae**

Subg. 1. MARLENIA**Luzula** subg. **Marlenia** Ebinger, *Brittonia* 15: 173 (1963)*Ebingeria* Chrtek & Křisa, *Preslia* 46: 210 (1974). T: *Luzula elegans* Lowe*Luzula* sect. *Triprophyllatae* Satake in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 25 (1938). T: *Luzula purpurea* E.Mey.

Annuals. Leaves acute; apex extending to a hair, sometimes two hairs; leaf margin without sclerenchyma. Inflorescence cymose; flowers borne singly, terminal. Endodermis with walls evenly thickened (O-shaped in T.S.). Seeds smooth; appendage absent. $n = 3$.

A monotypic, remarkably distinct subgenus. The only species, *Luzula elegans*, is native to Macaronesia and introduced to Portugal.

1. Luzula elegans Lowe, *Trans. Cambridge Philos. Soc.* 6: 532 (1838)*Ebingeria elegans* (Lowe) Chrtek & Křisa, *Preslia* 46: 211 (1974). T: [Madeira] 'in rupibus convallium Maderae murisque rarior'; [no locality] 8 May 1838, *R.T.Lowe 646*; syn: BM.*Luzula purpurea* Link [in C.L. von Buch] ex E.Mey., *Linnaea* 22: 397 (1849); *Juncooides purpurea* (E.Mey.) Kuntze, *Revis. Gen. Pl.* 2: 725 (1891). T: [Canary Is.] La Palma, Orotava, *C.L.Buch*; syn: *n.v.*; Tenerife, *Forsyth*; syn: K, *n.v.*; Tenerife, *Lenormand*; syn: LE, *n.v.**Luzula berthelotii* Nees ex Kunth, *Enum. Pl.* 3: 298 (1841). T: 'In sylvia de las Mercedes Insulae Teneriffae'; Tenerife, *P.B.Webb*; *holo*: B, destroyed; iso: K, BM.Illustration: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 50, fig. 40 (1906); J.E.Ebinger, *Brittonia* 15: 170, fig. 1, 3, 172, fig. 5, 8, 9 (1963).Map: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 87 (1965).

Annuals, usually 1–2-stemmed, 8–17 (–25) cm. Basal leaves several, to 12 cm long, 1.2–2.8 mm wide. Cauline leaves 2–4, to 10 cm long, to c. 2.5–3.0 mm wide; margins \pm smooth, sparsely hairy, with hairs long, especially near sheath mouth; apex acute, usually \pm extended to a single or sometimes two hairs. Inflorescence bract herbaceous, c. 2–4 cm long, surrounding pseudorhachis; middle bracts purplish-membranous with scarious ciliate margins. Bracteoles purplish-membranous, ovate, acuminate, c. 2.0–2.5 mm long. Inflorescence a loose divaricate panicle usually 5–13 cm long, almost evenly branched or distally denser; branches thin, smooth; flowers borne singly. Tepals \pm equal or outer slightly longer, \pm ovate, with outer tepals purplish with decreasing colour intensity towards membranous margins, (2.4–) 2.7–2.9 (–3.2) mm long, acute and mucronate; midrib usually distinctly papillose near apex; inner tepals wholly translucent-membranous or midrib purplish; apex usually emarginate and mucronate. Stamens 6; anthers 0.3–0.5 mm long; filaments 0.4–0.8 mm long; style 0.2–0.3 mm long; stigmas 0.3–0.5 mm long, not exerted. Capsule ovoid-subglobose, pale brown to pale purplish, thin-walled, \pm acute to subobtuse; segments 1.4–1.8 mm long, c. 1.3–1.5 mm wide; mucro short. Seeds subglobular 0.8–0.9 \times 0.6–0.7 mm long, smooth, shining, pale castaneous-brown; appendage absent. $2n=6$, *fide* N.Malheiros & D.Castro, *Nature* 160: 156 (1947); H.Nordenskiöld, *Hereditas* 37: 327 (1951).

Native to Madeira, Canary Is. (Gran Canaria, Tenerife, Gomera, Hierro, La Palma), naturalized in Portugal (Estremadura and Coimbra). 12: por. 21: CNY, MDR. On rocks, walls, dry slopes, along paths. Map 16.

12. PORTUGAL: Coimbra, 1879, *Moller* (WU); Estremadura, Sacavém, Quinta dos Almasteres, 26 Apr 1946, *Fontés & Rainha* (LD). 21. CANARY IS: Tenerife, El Boquerón, 6 Mar 1988, *R.Lindberg* (S); Tenerife, Güímar, Barranco del Río, 25 Apr 1933, *E.Asplund* (S, UPS); Gran Canaria, between San Mateo and Valsequillo, 1250 m, *C.C.Townsend 78/2* (K); Hierro, from Valverde to Frontera, *C.E.Jarvis & Murphy 298* (BM); Hierro, El Golfo, Risco de Jinama, *J.F.N.Bornmüller [Pl. Exs. Canar.] 2907* (LD, P, PR); La Palma, Barranco de las Angustias, 1000 m, Mar 1906, *C.-J.M.Pitard 694* (SAM). MADEIRA: Madeira, between Ribeira Frio and Balcoes, 1100 m, 29 Apr 1952, *G.Een & Persson* (S); Madeira, São Roque, *G.Mandon [Pl. Mader.] 248* (K, P, PR).

In many respects close to the N African *Luzula atlantica* ($2n=12$). The chromosome number of *L. elegans* is unique in the genus, and there is a plausible suggestion that the number is a result of chromosome fusion.

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Subg. 2. LUZULA

Luzula B. *Stachyophora* C.Koch, *Linnaea* 21: 625 (1848). T: not designated [sections *Alpinae*, *Anthelaea* and *Luzula* represented].

Perennials. Leaves with acute, mucronate or obtuse tips. Inflorescence racemose; flowers borne singly in much branched decomposed inflorescences, or in few- to many-flowered head-like groups, or in pedunculate clusters, sometimes wholly congested. Endodermis of cells with U-shaped thickened walls in T.S. Seeds finely reticulate or smooth; appendages basal or ±absent.

Sect. 1. ANTHELAEA

Luzula sect. **Anthelaea** Griseb., *Spic. Fl. Rumel.* 2: 404 (1846)

Luzula subg. *Anthelaea* (Griseb.) Buchenau, *Bot. Jahrb. Syst.* 1: 113 (1880); *Juncooides* sect. *Anthelaea* (Griseb.) Kuntze, in T.E. von Post & C.E.O.Kuntze, *Lex. Gen. Phan.* 303 (1903); *Luzula* subsect. *Anthelaea* [Griseb.] Novikov, *Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol.* 95(6): 66 (1990). T: *Luzula maxima* (Reichard) DC.; lecto, designated here.

Luzula maxima (Reichard) DC., *Preslia* 46: 211 (1974). T: *Luzula luzuloides* (Lam.) Dandy & E.Willm.

Perennials, usually with ascending branched rhizomes. Leaves with acute tips. Lower bract herbaceous. Inflorescence decomposed, an anthela of anthelas. Terminal clusters usually of 2–4 flowers, tepals usually 2.5–5.5 mm long. Seed appendage basal, short, 0.1–0.2 mm, fibrillate.

A mostly European section with 10 species centred to the Alps, SW Europe and Macaronesia. Most of the species are endemics confined to small areas.

- 1 Tepals conspicuously unequal, with inner ones longer
- 2 Tepals white
- 3 Tepals (2.0–) 2.3–3.2 mm long 9. **L. luzuloides**
- 3: Tepals 4.2–5.5 mm long 6. **L. nivea**
- 2: Tepals yellow, purplish, coppery-coloured or grey-brownish
- 4 Tepals yellow; flower clusters usually 10–15-flowered, glomeruliform; tepals up to 3.2 mm long 8. **L. lutea**
- 4: Tepals purplish, brownish-purplish or coppery-coloured (later sometimes becoming grey-brownish); flower clusters 2–8-flowered; tepals usually longer than 3.5 mm
- 5 Tepals 4.4–5.0 mm, purplish or bright copper-coloured; style 1.4–1.6 mm long; stigmas 1.0–1.4 mm long 3. **L. purpureosplendens**
- 5: Tepals 3.0–4.2 mm, copper-coloured or brownish-purplish; style 0.8–1.2 mm long; stigmas c. 0.6–1.1 mm long 9. **L. luzuloides**
- 1: Tepals equal or subequal
- 6 Bracteoles linear-lanceolate, at least 3.5 mm long; tepals 5.0–6.5 mm long. [Madeira] 2. **L. seubertii**
- 6: Bracteoles ovate or ovate-lanceolate, up to 3 mm long; tepals up to 5 mm long, usually much shorter
- 7 Flowers white, dirty white, cream-white or whitish membranous
- 8 Inflorescence dense, ±subcontracted; flower clusters usually (3–) 5–15-flowered
- 9 Basal leaves 3–4 mm wide; capsules 1.9–2.2 mm long including mucro; abaxial leaf surface hairy or glabrous, with margins ciliate 4. **L. lactea**

- 9: Basal leaves 13–19 mm wide; capsules c. 2.5 mm including mucro; abaxial leaf surface glabrous, with margins often subglabrous **5. *L. canariensis***
- 8: Inflorescence lax or ±dense, ±evenly branched, not subcontracted; flower clusters 2–5 (–7)-flowered
- 10: Anthers bifurcate in distal $1/5$ – $1/3$; bracteoles 2.0–2.5 mm long **7. *L. pedemontana***
- 10: Anthers not bifurcate; bracteoles 1.0–1.5 mm long **9. *L. luzuloides***
- 7: Flowers ±brown, castaneous-brown, brownish copper-coloured or membranous with castaneous-brown midrib
- 11: Style 0.8–1.2 mm long; stigmas less than 1.5 mm long; tepals with purplish or coppery colour/tinge **9. *L. luzuloides***
- 11: Style 1.6–2.2 mm long; stigmas longer than 2 mm; tepals without purplish or coppery colour/tinge **10. *L. sylvatica***

2. *Luzula seubertii* Lowe, *J. Bot. (Hooker)* 8: 300 (1856)

Juncoides seubertii (Lowe) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891). T: 'In salebrosis rupestribus umbrosis Maderae'. Madeira, Serra do Seixal, Cruzinhas, 23 Jul 1855, *R.T.Lowe*; lecto: K, *designated here*; isolecto: P; other authentic specimens from type locality: K, LD.

Illustration: M.J.Cannon, in J.R.Press & M.J.Short, *Fl. Madeira*, plate 53, fig. 4 (1994).

Map: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 87 (1965).

Perennials, usually 40–80 cm tall, densely ciliate, loosely caespitose; rhizome creeping to ascending, long, often with dark fibrous cover; stolons ascending. Basal leaves few, up to 35–40 cm long, usually (6–) 8–11 mm wide; sheaths brown. Cauline leaves 3–5; upper leaves usually 5–8 cm long, 3–5 mm wide. All leaves with acuminate tip; margins ±smooth. Lower bracts ±herbaceous, 2–7 cm long; apex long acuminate, much shorter than inflorescence. Inflorescence decomposed lax, with slightly drooping rich anthela to 15 cm long; branches smooth; terminal parts of inflorescence branches anthelate; terminal flower groups loose (1–4-flowered); peduncle visible and usually (0.5–) 1.5–5.0 (–8.0) mm long. Bracteoles linear-lanceolate, long acuminate, carinate, membranous to pale straw-brown, sparsely long ciliate, 3.5–5.5 mm long. Tepals linear-lanceolate, gradually tapering to long acuminate tip, equal to subequal, usually (5.0–) 5.5–6.5 mm long, pale straw-brown with membranous margins. Stamens 6; anthers 1.3–1.6 mm long; filaments c. 1.0 mm long; ovary 1.2–1.3 mm long; style 1.0–1.3 mm long; stigmas 1.5–2.8 mm long. Capsule pale brown, ±shining, ovoid, ±acuminate; mucro c. 0.3–0.5 mm long; capsule segments 2.8–3.0 × 1.6–1.9 mm. Seeds oblong-ovoid, dark brown, 1.3–1.4 mm long, 0.9–1.0 mm wide; appendage brownish, 0.1–0.2 mm long, fibrillate. $2n=12$, *vide* N.Malheiros & A.Gardé, *Agron. Lusit.* 9: 76 (1947).

Endemic to mountains of Madeira. 21: MDR. Dry mountain grassland and shrubby slopes, usually on rocky ground. Map 17.

21. MADEIRA: Serra do Seixal, Cruzinhas, 18 Jul 1850, *R.T.Lowe* (LD, K); Serra do Seixal, Cruzinhas, 30 May 1863, *R.T.Lowe* (BM, K); Mt Torrinhos, 29 Jun 1828, *P.B.Webb* (K); Boco de Boroaca, Pico dos Arrieros, 1200–1500 m, *G.Mandon [Pl. Mader.]* 247 (BM, K, P, PR, W); Levada do M. Medonho, Aug 1892, *Murray* (BM).

3. *Luzula purpureosplendens* Seub., *Fl. Azor.* 23 (1844)

Luzula elegans Guthnick [in C.F.F.Hochstetter] ex E.Mey., *Linnaea* 22: 392 (1849), *nom. illeg.*; *Luzula purpurea* H.C.Watson, *London J. Bot.* 3: 608 (1844), *nom. illeg.* T: Azores, *H.J.Guthnick* [in C.F.Hochstetter, *Herb. Azor.*] 126; lecto: K, *designated here*; isolecto: BM, P, W.

Luzula azorica H.C.Watson, *London J. Bot.* 2: 408 (1843), *nom. inval.* Authentic material: Azores, 1842, *H.C.Watson*; K.

Illustration: M.A.Seubert, *Fl. Azor.*, Plate iv, fig. 2. (1844).

Perennials, 25–45 (–60) cm tall, caespitose to loosely caespitose; rhizome ascending, branched; stolons numerous, ascending, with bases covered with brown to purplish castaneous-brown cataphylls. Basal leaves numerous, usually 15–22 cm long, 3–4.5 (–6) mm

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wide. Cauline leaves 1.5–3.5 (–8.0) cm long. All leaves subulate; margins ±smooth, ciliate to glabrescent, slightly swollen. Lower bract subherbaceous, erect, 1.2–2.5 cm long, much shorter than inflorescence. Inflorescence decomposed, ±erect, usually 4–5 × 3–4 cm, dense, with each main branch bearing anthela of short pedunculate usually 2–6-flowered clusters. Bracteoles purplish membranous to pale grey, ±lanceolate, sparsely ciliate, 2.5–3.0 mm long. Tepals narrowly oblong-lanceolate, glabrous, ±unequal, with inner tepals often conspicuously longer, 4.4–5.0 mm long, purplish-coppery with hyaline margin, later becoming greyish pale brown; midrib often pale. Stamens 6; anthers 1.6–1.9 mm long; filaments c. 0.5 mm long; style c. 1.4–1.6 mm long; stigmas 1.0–1.4 mm long. Capsule subglobular, abruptly narrowing to mucro 0.3–0.5 mm long, dark castaneous-brown, shining; capsule segments 1.8–2.0 × c. 1.2 mm including mucro. Seeds dark brown, oblong-ovoid, c. 0.9 mm long, 0.7–0.8 mm wide; appendage indistinct, c. 0.1 mm long, fibrillate.

Endemic to the Azores. 21: AZO. Open broad-leaved woodlands, shrubby slopes, deforested mountain summit areas. Map 18.

21. AZORES: São Miguel, *Hunt* (K, UPS, W); São Miguel, Lagoa das Sete Cidades, *O.Degener & I.Degener 36253* (S); São Miguel, Ribeira Grande, Lagoa do Fogo, 755 m, 14 May 2000, *J.Kirschner* (PRA); São Miguel, Furnas, Terra Nostra Park, 14 May 2000, *J.Kirschner* (PRA); Pico, between Lages and Cais do Pico, 11 May 1937, *H.Persson* (S); Pico, Santa Luzia, 400 m, *M.L.Gonçalves 1105* (BM); ‘in sylvaticis insul. Azoricarum’, *H.J.Guthnick s.n.* (W); Flores, Rocha do Junco, *M.L.Gonçalves 4264* (BM); Faial, Caldeira Grande, 4 May 1937, *H.Persson s.n.* (H).

4. *Luzula lactea* (Link) E.Mey., *Syn. Luzul.* 15 (1823)

Juncus lacteus Link, *J. Bot. (Schrader)* 2: 316 (1799); *Juncus brevifolius* Link ex Rostk., *De Junco* 35 (1801); *Luzula brevifolia* (Rostk.) Poir., *Encycl., Suppl.* 3: 532 (1813); *Juncoides lactea* (Link) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891). T: [Portugal] ‘zwischen den Felsen am Gerez’ [Serra do Gerês], *J.H.F.Link*; holotype: B-W.

Maps: P.Montserrat, *Anales Inst. Bot. Cavanilles* 21(2): map 2 (1964); H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 87 (1965).

Perennials, usually 30–55 cm tall, loosely caespitose; rhizome ±creeping; stolons subterranean, ±ascending, to 12 cm long, with brown cataphylls and sparse fibrous cover. Basal leaves usually 8–15 cm long, often circinate, flat, c. 3–4 mm wide; cauline leaves 3–5, usually 3–7 cm long, c. 2 mm wide; sheaths dissected, ±dilated above, membranous bordered, ±abruptly narrowing to blade. All leaves with subulate apex; margins papillose-serrulate. Lower bract usually 2.0–3.5 cm long, subherbaceous, shorter or rarely ±longer than inflorescence. Inflorescence decomposed, dense, usually 2–5 × 1.5–5 cm, with each main branch bearing dense anthela of 5–30 glomerate (usually 5–15-flowered) clusters. Bracteoles ±membranous, transparent, ovate-lanceolate, 2.5–3.0 mm long, sparsely ciliate. Tepals ±equal, glabrous, oblong-lanceolate, (4.0–) 4.2–4.6 (–5.2) mm long, ±white, subtransparent-ivory white to dirty whitish; midrib sometimes prominent. Stamens 6; anthers 1.1–1.5 (–1.8) mm long; filaments 1.5–1.9 mm long; style 1.9–2.2 mm long; stigmas 0.6–1.1 mm long. Capsule narrowly ovoid, acuminate, mucronate, castaneous-brown, shining; capsule segments 1.9–2.2 × c. 1.0 mm, including mucro 0.2–0.4 mm long. Seeds ellipsoidal, pale brown, shining, ±paler apically, 1.0–1.1 mm long, c. 0.6 mm wide; appendage 0.1–0.2 mm long, fibrillate.

Confined to the mountains of Spain and Portugal. Two taxa are recognized on the basis of the leaf indumentum; intermediates in the southern part of the geographical range, and occasional coexistence of the two varieties within populations, suggest that this character is of doubtful taxonomic value. A late flowering species. Reported from Azores but no material seen (probably a misidentification of a late, ±greyish-flowered *L. purpureosplendens*).

Abaxial surface of leaves glabrous, with margins ciliate

4a. var. *lactea*

Abaxial surface of (at least some) leaves densely hairy

4b. var. *velutina*

4a. *Luzula lactea* (Link) E.Mey. var. *lactea*

Juncus stoechadanthos Brot., *Fl. Lusit.* 1: 516 (1804). T: Portugal, 'in summis montosis Gerez', *J.H.F.Link*; holo: B, destroyed, probably a duplicate of the type of *L. lactea*.

Illustration: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 57, fig. 43 (1906).

Leaf margin ciliate to glabrescent; abaxial surface glabrous. Basal leaves arcuate to straight, less often circinate. $2n=12$, *fide* N.Malheiros & A.Gardé, *Agron. Lusit.* 9: 76 (1947).

Mountains of NW and central Spain and northernmost Portugal. 12: POR, SPA. Open dry oak woodlands and clearings. Map 19.

12. PORTUGAL: Serra da Estrela, Facarão, 1500 m, *M.Ferreira* [*A.Kneucker, Cyper. Junc. Exs.*] 210 (PR, W, WU). SPAIN: Soria, Sierra de Urbión, 5 Jul 1958, *N.Y.Sandwith* 5366 (K); Puerto de Leitariagos, 7 Aug 1835, *M.C.Durieu* [*Pl. Select. Hisp. Lusit.*] 214 (K, W); Sierra de Guadarrama, Cercedilla, *C.Vicioso* (LD, M); Sierra de Guadarrama, Cercedilla, 18 Jul 1924, *Ginzberger* (WU); Sierra de Guadarrama, Puerto de Navacerrada, 1800 m, *K.H.Rechinger* 62610 (W); Sierra de Guadarrama, Puerto de Navacerrada, *E.Levier* (W 13429); León, Cordillera Cantabrica, between Valverde and Puerto de Vegarada, Cerullada, 1200 m, *B. de Retz* 76163 (LD).

Intermediates between the two varieties also occur in Serra do Gerez (LD). The type material of *L. lactea* in B-W has only been seen as a photograph.

4b. *Luzula lactea* var. *velutina* (Lange) Cout., *Bol. Soc. Brot.* 8: 122 (1890)

Luzula velutina Lange, *Vidensk. Meddel. Dansk. Naturhist. Foren. Kjöbenhavn* 1881: 93 (1881); *Luzula lactea* subsp. *velutina* (Lange) Nyman, *Consp. Fl. Eur.* 4: 751 (1882). T: 'In monte Serra do Ratico c. Murca Lusitaniae' [Ponte do Ratinho, Murça], Jul. 1880, *M.Ferreira*; holo: C, *n.v.*

Leaf margin usually ciliate; abaxial surface usually densely hairy. Basal leaves usually distinctly circinate.

Mountains of west-central Spain and east-central Portugal. 12: POR, SPA. Open dry oak woodlands and clearings. Map 20.

12. PORTUGAL: Beira Baixa, Serra da Estrela, Facarão, 1500 m, *M.Ferreira* [*A.Kneucker, Cyper. Junc. Exs.*] 178 (PR, PRA, W); Serra da Estrela, Poio Negro, *Pimentel* [*Fl. Lusit. Exs.*] 1838 (LD, PR); Serra da Estrela, Penha Douradas, 1550 m, 13–25 Jun 1987, *A.Polatschek* (W); Beira Baixa, Serra de Gardunha, Valle de Prazeres, 900 m, 16 Jun 1938, *W.Rothmaler* (S); Ponte do Ratinho, between Murça and Palheiros, *A.Fernandes et al.* 5423 (UPS); Guarda, Videmonte, 16 Jun 1953, *A.Fernandes et al.* 4386 (LD, UPS); Alto Alentejo, Portalegre, 1000 m, *J.V.C.Malato-Beliz et al.* 16310 (LD).

5. *Luzula canariensis* Poir., *Encycl., Suppl.* 3: 532 (1813)

Juncoides canariensis (Poir.) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891). T: Canary Is., Tenerife, Laguna, *Broussonnet*; holo: P-DESF, *n.v.*

Map: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 87 (1965).

Perennials 35–90 cm tall, loosely caespitose, subglabrous; rhizome long, creeping to ascending; stolons present; plant base often purplish. Stem thick, c. 2–3 mm in diam. Basal leaves usually 18–30 cm long, 13–19 mm wide, evenly narrowing; cauline leaves usually 4–5, up to 18 cm long and 13 mm wide. All leaves acute; margins papillose-serrulate; sheaths \pm dissected, with mouth ciliate. Lower bract 2–3 cm long, herbaceous, shorter than inflorescence. Inflorescence decomposed, \pm dense, usually $1.5\text{--}8 \times 2.5 \times 6$ cm; main branches with anthelas of 3–8-flowered clusters. Bracteoles ovate-lanceolate, 2.0–2.5 mm long, membranous-dirty white, sparsely ciliate. Tepals \pm equal, glabrous, oblong-lanceolate, usually (3.0–) 3.5–4.2 mm long, dirty white (whitish-membranous with pale straw-brown base and 1–3 prominent veins). Stamens 6; anthers 1.1–1.3 mm long; filaments c. 1.0–1.1 mm long; style c. 1.0 mm long; stigmas 0.9–1.3 mm long. Capsule \pm ovoid, acuminate, mucronate, pale brown; capsule segments c. $2.5 \times 1.5\text{--}1.6$ mm long, including mucro c. 0.5 mm long. Seeds ellipsoidal, 1.1–1.3 mm long, 0.6–0.7 mm wide; appendage c. 0.1 mm long, probably not or indistinctly fibrillate. $2n=12$, *fide* L.Borgen, *Check-List Chromos. Macarones. Vasc. Pl.* 30 (1977).

JUNCACEAE (*Luzula*)

Restricted to Canary Is., islands of Gomera and Tenerife; formerly also reported from Gran Canaria but material not seen. 21: CNY. Found in broad-leaved woodlands. Map 21.

21. CANARY IS.: Tenerife, Las Mercedes, *E.Bourgeau [Pl. Canar.] 1553* (K, PR, UPS); Tenerife, Las Mercedes, *R.T.Lowe 245* (S); Tenerife, Las Mercedes, *J.F.N.Bornmüller [Pl. Exs. Canar.] 1273* (LD, PR); Tenerife, Las Mercedes, *F.Ehrendorfer et al. 096* (W); Tenerife, Las Mercedes, between Puerto del Bailadero and Los Inglés, 900 m, *B. de Retz 81442* (LD); Tenerife, Anaga, Las Hiedras, 1 Jun 1972, *Beltrán* (K, TFC); Mt Anaga, *O.Burchard [Pl. Canar. Exs.] 158* (S); Tenerife, Taganana, *E.H.Jørgensen 2968* (UPS); Gomera, Monte del Cedro, top of Barranco del Hermigua, 900 m, *C.E.Jarvis 602* (BM); Monte del Cedro, Garajonay, 1300 m, *E.Wängsjö & G.Wängsjö 4923* (LD)

6. *Luzula nivea* (Nathh.) DC., in J.B.A.P. de M. de Lamarck & A.P. de Candolle, *Fl. Franç.*, 3rd edn, 3: 158 (1805)

Juncus niveus Nathh., in C.Linnaeus, *Amoen. Acad.* 4: 481 (1756); *Juncoides nivea* (Nathh.) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891). T: Magnol, *Bot. Monspel.*, no 319.

Luzula nivea var. *livida* Desv., *J. Bot. (Desvaux)* 1: 151 (1809); *Luzula nivea* subvar. *livida* (Desv.) Rouy, *Fl. France* 13: 260 (1912). T: not designated.

Luzula nivea var. *rubella* Mert. & W.D.J.Koch, *Deutschl. Fl. (Röhling)* 2: 600 (1826); *Luzula nivea* var. *rubescens* Favrat, in A.Gremli, *Excursionsfl. Schweiz*, 5th edn, 419 (1885); *Luzula nivea* subvar. *rubella* (Mert. & W.D.J.Koch) Rouy, *Fl. France* 13: 261 (1912). T: Austria, 'Villacher Alpe', *L.C. von Vest*; holo: *n.v.*

Luzula nivea var. *minuta* Beyer, *Verh. Bot. Vereins. Prov. Brandenburg* 41: xvii (1900). T: Switzerland, Cadenazzo, Mte. Ceneri, 31 Jul 1883, *R.Beyer*; syn: W; Italy, Piemont, Val Pesio, Certosa, *R.Beyer*; syn: *n.v.*; Switzerland, Mt Generoso, *Scherer*; syn: B, destroyed; Switzerland, Salève, *Guillemin*; syn: B, destroyed.

Luzula nivea b. [unranked] *angustata* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 507 (1904); *Luzula nivea* var. *angustata* (Asch. & Graebn.) Rouy, *Fl. France* 13: 261 (1912). T: not designated.

Illustration: H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 1: 517 (1967).

Map: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 87 (1965).

Perennials usually 45–85 cm tall, loosely caespitose, ciliate; rhizome ascending, often with fibrous cover; stolons ascending, with base covered with brownish cataphylls. Basal leaves usually (15–) 20–30 cm long, usually 3–4 (–5) mm wide; cauline leaves 3–5, to 30 cm long, often exceeding inflorescence. All leaves acute, papillose-serrate (basal leaves often ±smooth). Lower bract herbaceous, usually up to 10–12 cm long, longer than inflorescence. Inflorescence decompound, typically 3–5 × 3–5 cm; main branches short, each with a ±dense anthelate 5–12 (–20)-flowered cluster. Bracteoles ovate to ovate-lanceolate, whitish-scarious, c. 1.5 mm long, subglabrous to sparsely ciliate. Tepals unequal (outer tepals shorter by c. 1.5 mm), glabrous, lanceolate, 4.2–5.2 (–5.5) mm long, snow-white, becoming slightly pale straw-white, or rarely suffused purplish. Stamens 6, longer than outer tepals; anthers 1.8–2.2 mm long, turning brownish after dehiscence; filaments 1.5–1.9 mm long; style 2.2–2.6 mm long; stigmas 1.0–1.3 mm long. Capsule brown, shining, acuminate and subtrigonus above, mucronate; capsule segments usually 2.0–2.4 mm long including a mucro c. 0.5 mm long and c. 1.5 mm wide. Seeds ellipsoidal, dark castaneous-brown, 1.2–1.4 mm long including a distinct apical protuberance 0.2–0.3 mm long and c. 0.7 mm wide; appendage yellowish, c. 0.1 mm long, fibrillate. $2n=12$, *fide* H.Nordenskiöld, *Hereditas* 37: 328–329 (1951); Druskovic, *Int. Organ. Pl. Biosyst. Newslett.* 24: 14 (1995).

Found in the Alps and Pyrenees, from Austria, Slovenia and Germany to NE Spain and S and C France. It is commonly cultivated and may escape from gardens. 11: AUT, GER, SWI. 12: FRA, SPA. 13: ITA, YUC-SL. Open patches in mountain woodlands and near the timberline, usually on calcareous soils. Map 22.

11. AUSTRIA: Tirol, Gschnitz, Trins, 1300 m, *F.Kerner [Fl. Exs. Austro-Hung.] 1870* (PR, WU). GERMANY: Oberbayern, Loisach-Auen, Scharnitz, *D.Podlech 34413* (LD, M); Oberbayern, Mittenwald, 930 m, *F.Vollmann [Fl. Exs. Bavar.] 1363* (M, PR). SWITZERLAND: Valais, Orcières, 1480 m, *J.Miège et al. [Exs. Genav.] 196* (W). 12. FRANCE: Puy-de-Dôme, Mont-Dore, Capucin, 1150 m, 4 Aug 1883, *P.Billiet [C.Magnier, Fl. Select. Exs.] 987* (W, LD). SPAIN: Huesca, Torla, Turieto Bajo, 1200 m, *P.Montserrat 4745/70* (JACA, LD); Aragón, Puerto de Búcaro, *Bordère* (BC, PR). 13. ITALY: Valle d'Aosta, Grand St. Bernard, 2000–2500 m, *R.K.Brummitt 5447* (K); Lombardia, Corno, Mt Grigna, 1800 m, 1895, *J.M.Norman* (S). SLOVENIA: Julijske Alpe, Bohinjsko jezero, 800 m, *F.Dolšak* (PR); Kranjska Gora, Veršec, 18 Jul 1909, *J.Paul 119* (PR).

7. *Luzula pedemontana* Boiss. & Reut., *Pugill. Pl. Afr. Bot. Hispan.* 115 (1852)

Juncoides pedemontana (Boiss. & Reut.) Kuntze, *Revis. Gen. Pl.* 2: 725 (1891); *Luzula nivea* subsp. *pedemontana* (Boiss. & Reut.) Bonnier & Layens, *Tabl. Syn. Pl. Vasc. France* 322 (1894). T: Italy, Piemonte, Col de Tende, *P.E.Boissier & G.F.Reuter*; syn: G, n.v.; Col de Tende, *H.G.Reichenbach [Fl. Germ. Exs.]* 2315; syn: K.

Luzula nemorosa var. *gracilis* E.Mey., *Linnaea* 22: 395 (1849). T: Italy, Piemonte, Col de Tende, *H.G.Reichenbach [Fl. Germ. Exs.]* 2315; syn: K; *O.W.Sonder*; syn: n.v.

Illustrations: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 52, fig. 41 (1906); H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 1: 517 (1967).

Map: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 87 (1965).

Perennials 25–50 cm tall, loosely caespitose, ciliate; rhizome thin, creeping to ascending; stolons ascending, with base covered with brown cataphylls. Basal leaves usually 8–10 (–12) cm long, flat to involute, up to 2.5 (–3.5) mm wide; leaves of young shoots very narrow, involute; cauline leaves 3–5, of variable length, up to 3.5–4.0 mm wide but often very narrow, c. 1 mm wide. All leaves distinctly acuminate; margins papillose-serrate. Lower bract subherbaceous, up to 4–5 cm long, shorter than inflorescence. Inflorescence decomposed, lax, erect to ±nodding, corymbiform; main branches often arcuate, each with loose anthela of 2–7-flowered clusters. Bracteoles whitish-membranous, ovate-lanceolate, c. 2.0–2.5 mm long, sparsely ciliate. Tepals ±equal, oblong-lanceolate, glabrous, 3.1–3.6 mm long, white or dirty white to whitish-membranous. Stamens 6; anthers 1.3–1.6 mm long, upper part (up to one third) bifurcate; filaments 0.4–0.6 mm long; style 1.4–1.9 mm long; stigmas 0.6–1.0 mm long. Capsule oblong-ovoid, long acuminate, mucronate, castaneous-brown, shining; capsule segments (2.3–) 2.4–2.7 (–2.9) mm long, including a mucro c. 0.2–0.4 mm long and 1.5–1.6 mm wide. Seeds ellipsoidal, dark brown, 1.3–1.4 mm long including a pale apex 0.1–0.2 mm long and c. 0.8 mm wide; basal appendage c. 0.1 mm long, fibrillate.

Restricted to SE France, N Italy and Corse. 12: COR, FRA. 13: ITA. Open woodlands and scrub in foothills and mountains. Map 23.

12. CORSE: Foret d'Aitone, *E.Reverchon [Pl. Corse]* 443 (PR, UPS, W); Vizzavona, 24 Jun 1914, *K.Ronniger* (W); Restonica, 1350 m, *H.Malicky* 9585 (W). FRANCE: Alpes Maritimes, Muntis sur Fontan, *E.Reverchon [Pl. Franc.]* 128 (K, LD, UPS); Alpes Maritimes, Col di Tenda, 31 Jul 1879, *J.Vetter* (K). 13. ITALY: Liguria, San Remo, Bajardo, *C.Bicknell [I.Dörfler, Herb. Norm.]* 3268 (PR, W); Toscana, Alpi Apuanae, Mt Procinto, 600 m, *S.Snogerup* 1603 (LD); Piemonte, Piossano, Prese di Gangano, 27 Jun 1926, *P.Fontana & F.Santi* (UPS); Piemonte, Cuneo, Monticello d'Alba, 300 m, *T.Ferraris & G.Ferro [Fl. Ital. Exs.]* 513 (K); Piemonte, Val Pesio, San Bartolomeo, 750 m, *C.Pollini [A.Kneucker, Cyper. Junc. Exs.]* 22 (PR).

8. *Luzula lutea* (All.) DC., in J.B.A.P. de M. de Lamarck & A.P. de Candolle, *Fl. Franç.*, 3rd edn, 3: 159 (1805)

Juncus luteus All., *Fl. Pedem.* 2: 216 (1785); *Juncoides lutea* (All.) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891); *Juncus multiflorus* Retz., *Fl. Scand. Prodr.*, 2nd edn, 82 (1795). T: *Haller* 1329 [V.A. von Haller, *Hist. Stirp. Helv.* 2: no. 1329 (1768)]; syn: P-Haller; A. von Haller, *Agrostographia*, no. 314 (1775) [Switzerland] in *montibus Rhaeticis, speciatim in Aviculae montis summis*; syn: n.v.; [authentic material: K].

Juncus spadiceus Vill., *Prosp. Hist. Pl. Dauphiné* 18 (1779). T: 'Hall. Enum. 257. n. 18'; syn: P-Haller, n.v. [*Luzula spadicea* [All.] DC. is not based on the same type.]

Juncus aureus Pourr., *Hist. & Mém. Acad. Roy. Sci. Toulouse* 1: 321 (1786), n.v.; *Luzula aurea* (Pourr.) Timb.-Lagr., *Bull. Soc. Sci. Phys. Nat. Toulouse* 2: 132 (1875), n.v. T: 'A. Llaurenti', *Pourret*; syn: UPS-Thunberg; *Haller* 1329 [Haller, *Hist. Stirp. Helv.* 2: no. 1329 (1768)]; syn: P-Haller.

Luzula lutea (All.) DC. subsp. *pyrenaica* P.Monts., *Anales Inst. Bot. Cavanilles* 21(2): 438 (1964). T: Spain, Pyrenees, Estany d'En Gaït, Circ d'En Gaït, 2500 m, Aug 1949, *P.Montserrat*; holo: BCF.

Illustration: H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 1: 516 (1967).

Map: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 87 (1965).

Perennials (10–) 12–15 (–25) cm tall, loosely caespitose, ±glaucous-green, subglabrous; rhizome creeping to ascending; stolons ascending, covered with purplish brown cataphylls or

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with sparse fibrous cover. Basal leaves usually (3-) 4-7 (-9) cm long, (3-) 4-5 (-6) mm wide; cauline leaves usually 3, usually 2-4 (-6) cm long. All leaves subacute to subobtuse; margins distinctly papillose-serrulate. Lower bract ±brownish-membranous, 1.0-1.5 (-2.0) cm long, shorter than inflorescence. Inflorescence decomposed, corymbiform; main branches thin, straight to arcuate; lower branches often patent, sometimes erect, each with dense glomeruliform (5) 10-15 (25)-flowered cluster, with one cluster often larger, sessile. Bracteoles ovate, c. 1.5 mm long, transparent-scarious, ±ciliate. Tepals unequal, ±oblong-lanceolate, glabrous, straw-yellow, becoming ±dirty yellow, with broad membranous margins; inner tepals 2.8-3.2 mm long; outer tepals shorter, c. 2.5-2.7 mm long. Stamens 6; anthers 1.1-1.8 mm long; filaments 0.3-1.1 mm long, distinctly elongating during flowering (anther/filament ratio thus changing); style (0.9-) 1.0-1.3 mm long; stigmas 0.5-0.8 mm long. Capsule oblong-ovoid, acuminate, mucronate, deep castaneous-brown, shining; capsule segments 2.4-2.8 × 1.4-1.5 mm long including a mucro 0.2-0.3 mm long. Seeds oblong-ovoid, paler brown, 1.0-1.3 mm long including a paler apex c. 0.2 mm long and 0.7-0.8 mm wide; appendage c. 0.1 mm, fibrillate. 2n=12, *fide* H.Nordenskiöld, *Hereditas* 37: 328-329 (1951).

Southwestern part of the Alps, E Pyrenees and N Italian mountains. 11: AUT, SWI. 12: FRA, SPA. 13: ITA. Growing in alpine grasslands and screes, usually on siliceous substrates, from c. 1700 m. Map 24.

11. AUSTRIA: Nordtirol, Gurgler Tal, 1900-2200 m, 13 Sep 1989, *A.Polatschek 17612* (W); Oetztal, Klebealpe, 2000 m, 11 Jun 1937, *Fischer* (K). SWITZERLAND: Valais, Saas-Fée, 2100 m, *L.Marret [Exs. Fl. Valais] 296* (S); Valais, Alpe de la Barma, 2200 m, *F.O.Wolf [A.Kneucker, Cyper. Junc. Exs.] 21* (PR); Graubünden, Ober Engadin, Bernina Pass, 2330 m, *O.Hedberg 4022* (UPS). 12. FRANCE: Haute-Savoie, Massif du Mont Buet, Val de Béran, 2000 m, *B. de Retz 40427* (W); Hautes-Alpes, Goudran, Montgenèvre, 2000-2200 m, *C.Magnier [Fl. Select. Exs.] 1823* (LD). ANDORRA: Tristaina Lakes, 2800 m, *Lewis 485* (K). SPAIN: Setcasas, Mt Morens, *E.Bourgeau [Pyren. Esp.] 277* (K). 13. ITALY: Levico, Pancrotto, Jul 1926, *Meebold* (K).

A species with limited variation. The westernmost populations were recognized as subsp. *pyrenaica* on the basis of the inflorescence habit, broader leaves, longer tepals and smaller seeds. However, despite the fact that eastern populations show a lower frequency of broad-leaved individuals, the other characters do not exhibit any geographical tendency, and the extremes are often found within populations throughout the geographical range of the species.

9. *Luzula luzuloides* (Lam.) Dandy & E.Willm., *J. Bot.* 76: 352 (1938)

Juncus luzuloides Lam., *Encycl.* 3: 272 (1789). T: France: 'Lorraine Allemande, près des rives de la Sarre', de l'Aumont; lecto: P-LAM, *fide* S.Snogerup, in P.H.Davis, *Fl. Turkey* 9: 28 (1986).

Luzula albida var. *macrantha* Beck, *Fl. Nieder-Österreich* 1: 159 (1890); *Luzula nemorosa* A.I. [unranked] *macrantha* (Beck) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 502 (1904); *Luzula albida* subvar. *macrantha* (Beck) Rouy, *Fl. France* 13: 261 (1912). T: Austria, Mt Schneeberg, *G.Beck*; *holo: n.v.*

Luzula albida var. *parviflora* Döll, *Fl. Baden* 1: 323 (1857); *Luzula nemorosa* var. *parviflora* (Döll) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 504 (1904); *Luzula luzuloides* var. *parviflora* (Döll) I.Grint., *Fl. Rep. Soc. Roman.* 11: 591 (1966). T: [Germany] Baden, Untergrombach, *Döll*; *syn: n.v.*

Luzula nemorosa B.II. [unranked] *hylogiton* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 504 (1904). T: Germany, Harz; *n.v.*

Maps: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 87 (1965); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 165 (1986).

Perennials usually 35-75 cm tall, loosely caespitose to caespitose, densely ciliate; rhizome horizontal to ascending, branched; stolons usually present, ascending. Basal leaves numerous, usually 12-18 (-30) cm long, width variable but ranging from (3-) 4-5 (-6) mm; cauline leaves usually 4-5, to c. 25 cm long, with the upper ones often overtopping inflorescence. All leaves with acute tip; margins papillose-serrulate. Lower bracts herbaceous, of variable length, usually overtopping inflorescence, less often shorter. Inflorescence rich, decomposed, ±antherlate; main branches usually numerous, with secondary branches each bearing ±dense or lax antherlate of (2-) 3-6 (-8)-flowered clusters. Bracteoles ±ovate, subglabrous to ciliate, usually 1.0-1.5 mm long. Tepals glabrous, subequal with inner longer by c. 0.5 mm, ±lanceolate, (2.0-) 2.3-3.8 (-4.2) mm long. Stamens 6; anthers 1.0-1.8 mm

long; filaments 0.3–0.6 mm long; style 0.8–1.2 mm long; stigmas 0.6–c. 1.1 mm long. Capsule oblong-ovoid, gradually acuminate, mucronate, ±castaneous-brown, ±shining; capsule segments 2.2–2.6 mm long including mucro 0.2–0.5 mm long and 1.1–1.3 mm wide. Seeds ellipsoidal, ±dark brown, usually 1.2–1.4 mm long including apical protuberance c. 0.2 mm long and 0.7–0.8 mm wide; appendage indistinct, c. 0.1 mm, fibrillate.

Europe, from the Netherlands, France and N Spain throughout C Europe to Greece, Turkey-in-Europe and W Russia. Introduced to N and E Europe and E North America, often naturalized. There are two variants, from lowland and mountain areas; the two extremes are locally linked by numerous intermediates.

Tepals ±white, dirty white or ±scarious, usually (2.0–) 2.3–3.2 mm long

9a. subsp. luzuloides

Tepals usually coppery-coloured, brownish-purplish or pale castaneous with reddish tinge, usually 3.0–3.5 (–4.2) mm long

9b. subsp. rubella

9a. *Luzula luzuloides* (Lam.) Dandy & E. Willm. subsp. *luzuloides*

Juncus nemorosus Pollich, *Hist. Pl. Palat.* 1: 352 (1776); *Juncus luzula* Krock., *Fl. Siles.* 5(1): 569 (1787), *nom. illeg.*; *Juncus maximus* var. *angustifolius* Roth, *Tent. Fl. Germ.* 1: 157 (1788); *Juncus angustifolius* Wulfen, in N.J. von Jacquin, *Collectanea* 3: 56 (1789), *nom. illeg.*; *Juncus leucophobus* Ehrh., *Beitr. Naturk.* 6: 141 (1791), *nom. illeg.*; *Luzula angustifolia* [Wulfen] Wender., *Beitr. Fl. Hess.* 36 (1823), *nom. illeg., non Poir.*; *Luzula nemorosa* (Pollich) E.Mey., *Linnaea* 22: 394 (1849), *nom. illeg., non Hornem.* (1815), *nec Baumg.* (1816); *Juncoides nemorosa* (Pollich) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891). T: Germany, 'circa Lauteren', Pollich.

Juncus albidus Hoffm., *Deutschl. Fl.* 126 (1791); *Luzula albida* (Hoffm.) DC., in J.B.A.P. de M. de Lamarck & A.P. de Candolle, *Fl. Franç.*, 3rd edn, 3: 159 (1805); *Luzula nivea* subsp. *albida* (Hoffm.) Bonnier & Layens, *Tabl. Syn. Pl. Vasc. France* 322 (1894). T: icon, in G.F. Hoffmann, *Deutschl. Fl.*, fig. 4 (1791); syn; icon, in J.D. Leers, *Fl. Herborn.*, Pl. 13, fig. 9 (1775) [ut *J. niveus*]; syn.

Luzula albida var. *leucanthema* Wallr., *Sched. Crit.* 1: 150 (1822); *Luzula nemorosa* A.II.a. [unranked] *leucanthema* (Wallr.) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 502 (1904). T: [Germany, Halle], C.F.W. Wallroth; syn: PR; C. Schkuhr, *Bot. Handb.* 1: plate 98 (1791); syn.

Luzula nemorosa A.II.a.2. [unranked] *laxa* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 503 (1904). T: not designated.

Illustrations: T. Szydal & J. Mađalski, *Atlas Fl. Polsk.* 2(2): 152a (1931); H.E. Hess, E. Landolt & R. Hirzel, *Fl. Schweiz* 1: 517 (1967).

Plants usually very loosely caespitose; stoloniferous. Bracteoles membranous-scarious. Tepals ±white, dirty white or ±scarious, usually (2.0–) 2.3–3.2 mm long. 2n=12, *fide* H. Nordenskiöld, *Hereditas* 37: 328–329 (1951). Fig. 6.

Most common in C Europe; otherwise throughout the range of the species. Introduced to and often naturalized in N and E Europe and E North America. 10: DEN, fin, grb, nor, SWE. 11: AUT, BGM, CZE, GER, HUN, NET, POL, SWI. 12: FRA, SPA. 13: ALB, BUL, GRC, ITA, ROM, TUE, YUC. 14: BLR, BLT, ruc, run, ruw, UKR. 72: nsc, ont. 74: min, wis. 75: cnt, mai, mas, nwy, pen. Found in broad-leaved woodlands, clearings, less often meadows, from lowlands to foothills. Map. 25 [only European introductions shown, not distinguished from the native occurrence].

10. FINLAND: Turku, Ruissalo, 13 Jul 1923, *V. Pesola* (PR 76409); Turku, Ruissalo, *S. Valle* [*Pl. Finl. Exs.*] 1862 (H, K, WU). 11. AUSTRIA: Karawanken, Freiberg, 28 Jul 1970, *Pull* (W); N Tirol, between Kössen and Klobenstein, 590 m, 16 Jun 1972, *A. Polatschek* (W); Wienerwald, Königstatten, *Gölles* 266 (W). GERMANY: Sachsen, Pappritz, 23 May 1904, *C. Marquardt* (PR); Baden, Karlsruhe, Durlacher Wald, 117 m, *A. Kneucker* [*Cyper. Junc. Exs.*] 23 (PR, W). 12. FRANCE: Ardennes, Bois de Chagny, Mézières, *E. Callay* [*Puel & Maille, Fl. Région. Fr.*] 79 (W); Vosges, between Igney and Nomexy, *Gérard* [*C. Magnier, Fl. Select. Exs.*] 2304bis (LD). 13. ALBANIA: Skutari, Mt Zukali, *A. Baldacci* [*It. Alban.*] 47 (WU). ITALY: Padova, Teolo, Mt Pendice, 200 m, *A. Fiori & A. Béguinot* [*Fl. Ital. Exs.*] 2015 (K, WU). 14. RUSSIA NORTHWEST: Vyborg, Monrepos, *K. Nilsson* 30/38 (H). RUSSIA NORTH: Sortavala, 24 Jun 1921, *K.H. Hällström* (H).

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Figure 6. *Luzula luzuloides* subsp. *luzuloides*. **A**, habit; **B**, terminal part of inflorescence; **C**, flower; **D**, capsule; **E**, **F**, tepals; **G**, open capsule; **H**, seed; **I**, stem T.S.; **J**, leaf T.S. (**A–C**, **E–G**, **I**, **J**, *Stelzer s.n.*, 1883, KRA; **D**, **H**, *J.M. qdalski s.n.*, 13 Aug 1928, KRA). Scale bars: **A** = 5 cm; **B** = 2 mm; **C–H** = 2 mm; **I**, **H** = 1 mm. Drawn by T.Szynal. Reproduced with permission, from T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2/2: 152a (1931).

9b. *Luzula luzuloides* subsp. *rubella* (Hoppe ex Mert. & W.D.J.Koch) Holub, *Folia Geobot. Phytotax.* 18: 205 (1983)

Luzula albida var. *versicolor* Bluff & Fingerh., *Comp. Fl. German.* 1: 443 (1825); *Luzula albida* var. *rubella* Hoppe ex Mert. & W.D.J.Koch, in *Deutschl. Fl. (Röhling)* 2: 599 (1826); *Luzula nemorosa* var. *rubella* (Hoppe ex Mert. & W.D.J.Koch) Garcke, *Fl. N. Mitt.-Deutschland*, 2nd edn, 340 (1851); *Luzula angustifolia* var. *rubella* (Hoppe ex Mert. & W.D.J.Koch) Garcke, *Fl. N. Mitt.-Deutschland*, 3rd edn, 348 (1853); *Luzula nemorosa* f. *rubella* (Hoppe ex Mert. & W.D.J.Koch) Racib., *Consp. Juncac. Polon.* 25 [p. separ.] (1888); *Luzula angustifolia* subsp. *rubella* (Hoppe ex Mert. & W.D.J.Koch) K.Richt., *Pl. Eur.* 1: 184 (1890); *Luzula albida* subvar. *rubella* (Hoppe ex Mert. & W.D.J.Koch) Rouy, *Fl. France* 13: 261 (1912). T: Austria, Heiligenblut, *D.H.Hoppe [Herb. Viv. Pl. Gram.]* 68; syn: LI, BRNM etc. (further authentic material: K, LD, PR).

Luzula albida var. *cuprina* Rochel, *Pl. Banat. Rar.* 3: 27 (1828), *nom. inval.*; *Luzula nemorosa* A.II.b. [unranked] *cuprina* [Rochel ex] Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 503 (1904); *Luzula luzuloides* subsp. *cuprina* [Rochel ex] Chrtek & Křisa, *Preslia* 46: 212 (1974). T: Slovakia, 'ad pedes Kralowahora', *A.Rochel*; authentic material: W, PR [as *Juncus albidus* var. *cuprinus*].

Luzula nemorosa var. *colorata* E.Mey., *Linnaea* 22: 395 (1849). T: in Alpibus. *D.H.Hoppe*; syn: LI; in Carpathis, *Baumgarten*; syn: *n.v.*

Luzula alpigena Schur, *Enum. Pl. Transsilv.* 681 (1866). T: *n.v.* [numerous syntypes from Romanian South Carpathians, most probably in LW].

Luzula albida var. *erythranthema* Wallr., *Sched. Crit.* 1: 150. (1822); *Luzula nemorosa* var. *erythranthema* (Wallr.) Hayek, *Fl. Stir. Exs.*, no. 409 (c. 1930) [printed exsiccatum label]; *Luzula luzuloides* var. *erythranthema* (Wallr.) I.Grint., *Fl. Rep. Soc. Roman.* 11: 592 (1966). T: Austria, Heiligenblut, *D.H.Hoppe*; syn: PR [specimen annotated by C.F.W. Wallroth]; Heiligenblut, *D.H.Hoppe [Herb. Viv. Pl. Gram.]* 68; syn: LI, BRNM.

Luzula fuscata Schur, *Verh. Mitth. Siebenbürg. Vereins Naturwiss. Hermannstadt* 10: 200 (1859). T: [Romania], 'Am Büdöskegel', *F.Schur*; holo, *n.v.* [doubtfully valid].

Luzula nemorosa [unranked] *fuliginosa* Asch., *Fl. Brandenburg* 1: 740 (1864); *Luzula albida* var. *fuliginosa* (Asch.) Beck, *Fl. Nieder-Österreich* 1: 159 (1890). T: [Czech Republic, the Krkonoše, Labský vodopád], am Elbfall des Riesengebirges, Jul 1862, *C.Lucas*; holo: *n.v.*

Luzula nemorosa f. *rosea* Kožuharov, *Izv. Bot. Inst. (Sofia)* 11: 127 (1963), *nom. inval.*

Luzula nemorosa f. *grandiflora* Kožuharov, *Izv. Bot. Inst. (Sofia)* 11: 127 (1963), *nom. inval.*, & in D.Jordanov, *Fl. N. R. B'lgar.* 2: 401 (1964), *nom. inval.* T: Bulgaria, Mt Balkan centralis [collector not given]; holo: *n.v.*

Luzula nemorosa f. *aggregata* Kožuharov, *Izv. Bot. Inst. (Sofia)* 11: 127 (1963). T: Bulgaria, Vitoshka, *A.Yavashev*; holo: SOM.

Luzula luzuloides subsp. *tenacissima* Vivant, *Bull. Soc. Bot. France* 126: 259 (1979). T: France, W Pyrenees, Haute-Soule, Pic Lackhoura, 1700–1800 m, 5 Sep 1973, *J.Vivant s.n.*; holo: P; iso: JACA.

Illustration: T.Szynal & J.Mądalski, *Atlas Fl. Polsk.* 2(2): 152 (1931).

Plants loosely to ±densely caespitose; stolons short, ascending. Bracteoles usually pale castaneous or coppery-coloured. Tepals usually coppery-coloured, brownish-purplish or pale castaneous with reddish tinge, usually 3.0–3.5 (–4.2) mm. $2n=12$, *fide* C.Garcia-Herran, *in litt.* (material from Polish Tatra Mtns and Bieszczady, Poland, vouchers in NEU). Fig. 7.

Mountains of C and S Europe, the Pyrenees, introduced to Great Britain. 10: grb. 11: AUT, CZE, GER, POL, SWI. 12: FRA, SPA. 13: ALB, BUL, GRC, ITA, ROM, YUC. 14: UKR. Mountain to subalpine tall-grass meadows, open mountain woodlands; in mountain regions where it is common, it is also found in valley situations. Map 26.

11. AUSTRIA: Oetztales Alpen, Landeck, Venetberg, 2300 m, Aug 1968, *A.Polatschek* (W); Steiermark, Pretulalpe, Fischbacher Alm, 16 Jul 1911, *K.Ronniger* (W). CZECH REPUBLIC: Hrubý Jeseník, Petrovy kameny, 27 Jul 1889, *V.Spitzner* (PR 49587). POLAND: Babia Góra, 1480 m, *Walas [Pl. Polon. Exs.]* 81 (K). 13. BULGARIA: Vitoša, *J.Velenovský* (PR 49584). CRNA GORA: Sekirica Planina, Jul 1903, *J.Rohlena* (PR). ITALY: South Tyrol, Dolomiti, Villnoss, Zamseralpe, 1912, *K.Ronniger* (W). F.Y.R. MACEDONIA: Skopje, Šar Planina, Ljuboten, 12 Jul 1959, *J.D.A.Stainton* 7988 (K).

Variable in leaf width, size of inflorescence and perianth colour. Intermediates between subspecies are not rare, e.g., 11. POLAND: Nowy Targ, Pieniny, Stolarzówka, 620–640 m, *H.Piękoś [Fl. Polon. Exs.]* 389 (KRA, KRAM, W). Maybe better treated as a variety.

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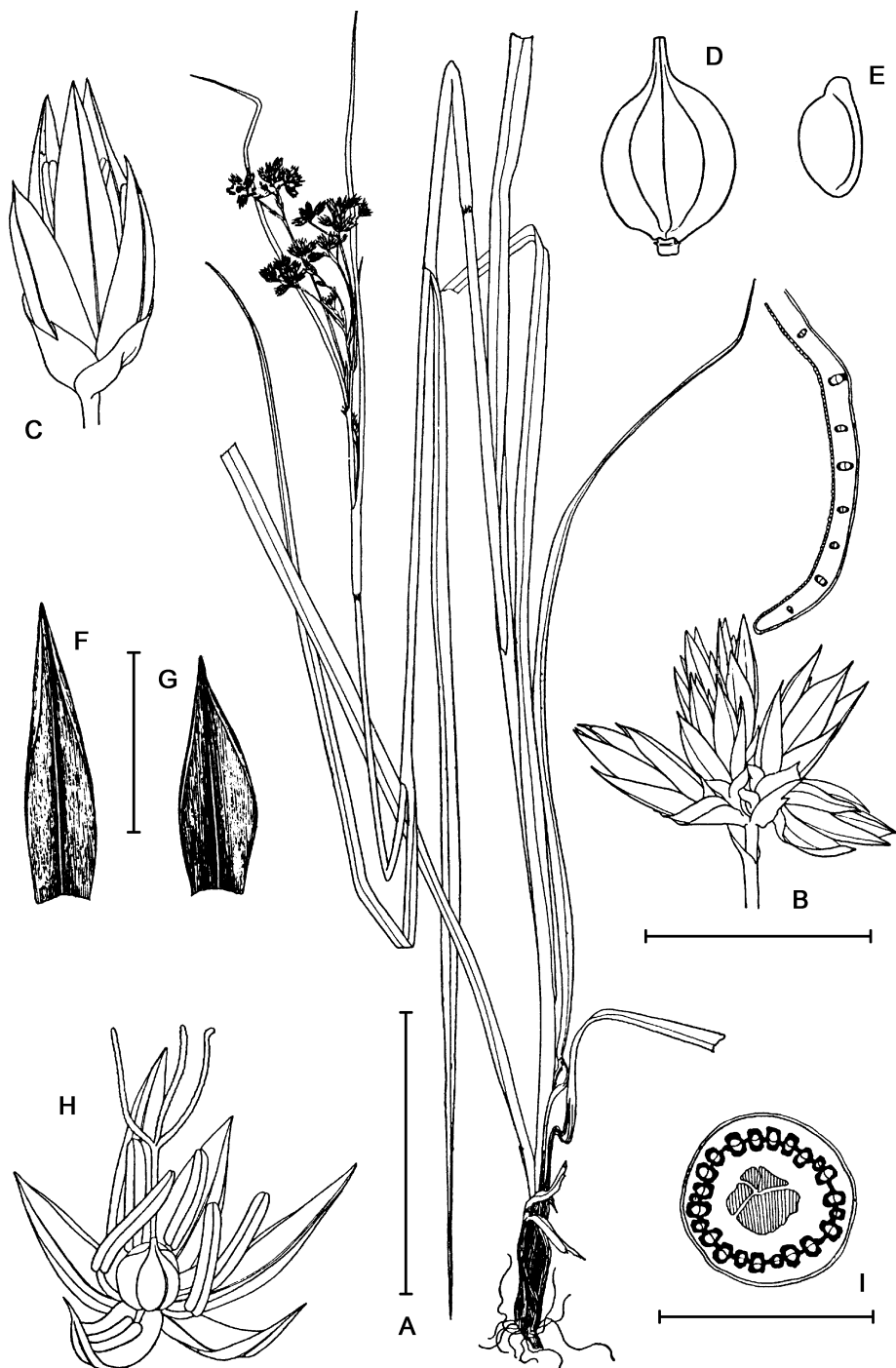


Figure 7. *Luzula luzuloides* subsp. *rubella*. A, habit; B, terminal part of inflorescence; C, H, flowers; D, capsule; E, seed; F, G, tepals; I, stem T.S.; J, leaf T.S. (A–C, F–I, *A. Wołoszczak*, Aug 1887, KRA; D, E, *J. M. ądalski s.n.*, 10 Aug 1927, KRA). Scale bars: A = 5 cm; B = 5 mm; C–H = 2 mm; I, J = 1 mm. Drawn by T. Szynal. Reproduced with permission, from T. Szynal & J. Mądalski, *Atlas Fl. Pol.* 2/2: 152 (1931).

10. *Luzula sylvatica* (Huds.) Gaudin, *Agrost. Helv.* 2: 240 (1811)

Juncus sylvaticus Huds., *Fl. Angl.* 32 (1762); *Juncoides sylvatica* (Huds.) Druce, *Fl. Oxfordshire* 434 (1927). T: England, Hamstead, *Hudson*; syn: not extant; *Juncus foliis planis latissimis...* Hall. *helv.* 257 [A. von Haller, *Enum. Meth. Stirp. Helv. Ind.* 1: 257 (1742)]; [Switzerland; citation from Haller (1742): in sylvis opacis: v.g. montis Falconarii, circa Tigurum Scheuchzer]; syn: P-Haller.

Luzula haussknechtiana Freyn & Sint., *Bull. Herb. Boissier*, ser. 1, 4: 200, 1896. T: Turkey, Darsos Dag, *P.E.E.Sintenis 5775*; syn: BM, BRNM, PR, WU.

Luzula sylvatica subsp. *croatica* Beyer, *Verh. Bot. Vereins Prov. Brandenburg* 41: xix (1900); *Luzula sylvatica* var. *croatica* (Beyer) Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 55 (1906). T: Croatia, 'Klek bei Ogulin', Musulinski Potok, *R.Beyer*; syn: *n.v.*; Croatia, 'Turcovic Sello', *R.Beyer*; syn: *n.v.*

Luzula sylvatica var. *dertosisensis* P. Monts., *Anales Inst. Bot. Cavanilles* 21(2) [1963]: 441 (1964). T: Spain, Ports de Tortosa, Font dels Bassis, 750 m, 25 May 1917, *P.Font Quer*; holotype: BC; iso: BC.

Luzula sylvatica A.I.a.b.[unranked] *pulchra* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 499 (1904). T: SW Alps [otherwise not indicated].

Luzula sylvatica f. *altissima* Kožuharov, *Izv. Bot. Inst. (Sofia)* 11: 126 (1963), *nom. inval.*

Maps: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 87 (1965); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 164 (1986).

Perennials, usually up to 100 cm tall, caespitose to loosely caespitose; rhizome stout, long, branched, horizontal to ascending; stolons ±absent. Basal leaves up to 40 cm long, usually 4–12 mm wide; cauline leaves 3–5 (–7); leaf tip ±acute; margins ±smooth. Lower bract (1.2–) 2.0–3.0 (–5.0) cm long, shorter than inflorescence. Inflorescence decoupled, usually lax, up to 20 cm long; secondary anthelas with 5–45 flowers; terminal clusters (1–) 2–3 (–5)-flowered. Bracteoles whitish-membranous, ovate, up to c. 2 mm long, sparsely ciliate. Tepals subequal; outer tepals usually 2–4 (–5) mm long, oblong-lanceolate, pale castaneous-brown to deep brown; margins usually hyaline. Stamens 6; anthers 1.0–3.7 mm long; filaments usually 0.3–0.7 mm long; style 1.6–2.2 mm long; stigmas 2.2–2.8 mm long. Capsule castaneous-brown to dark brown, ±oblong-ovoid, ±gradually narrowed, usually 2.0–4.0 mm long including mucro 0.2–0.8 mm long. Seeds brown to dark brown, oblong-ovoid, 1.2–1.9 mm long, usually 0.7–1.2 mm wide; appendage 0.1–0.2 mm, fibrillate.

Found in Europe, except for most of Scandinavia and Russia; outside Europe only marginally in the W Caucasus, Transcaucasia and N Turkey. A very variable species, particularly in the southern part of its range. Several subspecies have been described; some other aberrant populations remain to be studied, all in the S European peninsulas. Four subspecies are recognized here. In addition, some (not all) plants and populations from the Balkan peninsula, most typically from Greece, differ from the typical *L. sylvatica* in a number of characters, e.g., in having basal leaves (6–) 8–10 (–11) mm wide, inflorescence lax, few-flowered, secondary anthelas usually with 8–14 (–16) flowers, terminal clusters (1–) 2–4 (–5)-flowered, tepals up to 4 (–5) mm long, capsule 3.1–3.9 mm long and seeds up to 1.2 mm wide (representative material at LD). They may represent another intraspecific taxon of *L. sylvatica*; many intermediates between these aberrants and more common forms of subsp. *sylvatica* are known from other parts of the Balkans and from Turkey. The type subspecies is often cultivated as an ornamental plant.

- | | | |
|----|---|--------------------------------|
| 1 | Tepals usually up to 2.7 mm long; primary branches of inflorescence usually elongated; secondary anthelas usually ±contracted, rarely ±lax | 10b. subsp. henriquesii |
| 1: | Tepals usually more than 2.7 mm long; primary branches of inflorescence usually not distinctly elongated, ±evenly branched to form ±lax secondary anthelas | |
| 2 | Basal leaves with margins and base very densely long ciliate; tepals longer than 4 mm; secondary anthelas usually with up to 15 flowers; anthers (1.7–) 2.2–2.5 (–3.0) mm long; leaf tip elongated, acuminate; seeds 1.1 mm wide or wider | 10c. subsp. sicula |
| 2: | Basal leaves with margins ciliate but not conspicuously densely or long; tepals up to 3.7 mm long; anthers up to 1.9 mm long; leaf tip acute to subobtuse-mucronate; seeds up to 0.8 mm wide | |

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- 3 Plants usually 50–100 cm tall; basal leaves (7–) 9–12 mm wide; capsule usually equalling perianth **10a. subsp. sylvatica**
- 3: Plants usually up to 55 (–70) cm; basal leaves usually 5–8 mm wide; capsule equalling or shorter than perianth **10d. subsp. sieberi**

10a. *Luzula sylvatica* (Huds.) Gaudin subsp. *sylvatica*

Juncus maximus Reichard, *Fl. Moeno-Francof.* 182 (1772); *Juncus pilosus* subsp. *maximus* (Reichard) Ehrh., *Hannover. Mag.* 1782(23): 363 (1782); *Luzula maxima* (Reichard) DC., in J.B.A.P. de M. de Lamarck & A.P. de Candolle, *Fl. Franç.*, 3rd edn, 3: 161 (1805). T: Haller 1324 [A. von Haller, *Hist. Stirp. Helv.* 2: no. 1324 (1768)]; syn: P-Haller; 'ad rivulum an der Reichenbach'; syn: *n.v.*; 'bey den drey Born nicht weit von Falckenstein'; syn: *n.v.*

Juncus latifolius Wulfen, in N.J. von Jacquin, *Collectanea* 3: 59 (1789); *Luzula maxima* var. *latifolia* (Wulfen) Čelak., *Prodr. Fl. Böhmen* 1: 84 (1867), *nom. inval.*; *Luzula sylvatica* var. *latifolia* (Wulfen) Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 55 (1906). T: 'in superioribus umbrosis sylvis alpium Lithopolitanarum', *F.X.Wulfen*; syn: probably destroyed; Haller 1324 [A. von Haller, *Hist. Stirp. Helv.* 2: no. 1324 (1768)]; syn: P-Haller.

Juncus montanus Lam., *Encycl.* 3: 273 (1789). T: France, Mont d'Or, *J.B.A.P.Lamarck*; syn: P-LAM; Haller 1324 [A. von Haller, *Hist. Stirp. Helv.* 2: no. 1324 (1768)]; syn: P-Haller.

Juncus pilosus L. A. [unranked] *fascicularis* Schrank, *Baier. Fl.* 1: 621 (1789). T: [Germany] Bayern [otherwise not indicated]; Haller 1324 [A. von Haller, *Hist. Stirp. Helv.* 2: no. 1324 (1768)]; syn: P-Haller.

Luzula sylvatica var. *gracilis* Rostr. ex Beeby, *Scott. Nat.* 1887: 29 (1887), *n.v.* [Also in Buchenau, *Bot. Jahrb. Syst.* 12: 92. 1890]; *Luzula maxima* var. *gracilis* (Rostr. ex Beeby) Husn., *Joncées* 22 (1908). T: Faeroes, on the top of Hestoe, *E.Rostrup*; syn: C, *n.v.*

Luzula sylvatica A.I.a.2. [unranked] *pallida* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 499 (1904). T: [not indicated].

Illustrations: T.Szynal & J.Mądalski, *Atlas Fl. Polsk.* 2(2): 153 (1931); H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 1: 519 (1967).

Plants usually 45–100 cm tall. Basal leaves usually (7–) 9–12 (–18) mm wide, gradually to abruptly narrowed into acute tip; margins ciliate. Inflorescence usually lax; secondary anthers usually with 15–35 flowers; terminal clusters (1–) 2–3 (–4)-flowered. Outer tepals usually (2.1–) 2.7–3.0 (–3.7) mm long. Anthers usually 1.0–1.9 mm long; filaments (0.2–) 0.3–0.5 (–0.7) mm long; style 1.6–2.0 mm long; stigmas 2.5–2.8 mm long. Capsule usually ±equalling perianth, oblong-ovoid, (1.8–) 2.5–2.8 (–3.4) mm long, slightly narrowing to a mucro usually 0.2–0.5 mm long. Seeds (1.0–) 1.3–1.5 (–1.8) mm long, up to 0.8 mm wide; appendage c. 0.1 mm long. 2n=12, *fide* C.Garcia-Herran (see list of specimens); H.Nordenskiöld, *Hereditas* 37: 328–329 (1951). Fig. 8.

West and C Europe, from Lofoten, Faeroes, SW Norway, Great Britain and most of S Europe to the Carpathians, N Turkey and the Caucasus. 10: DEN, FOR, GRB, IRE, NOR, swe. 11: AUT, BGM, CZE, GER, NET, POL, SWI. 12: COR, FRA. 13: ALB, BUL, GRC, ITA, ROM, YUC. 14: RUS?, UKR. 33: NCS, TCS. 34: TUR. Woodlands from lowlands to the mountains, or damp grasslands, open moorland and along streams. Map 27.

10. DENMARK: Vejle, Munkebjerg, *K.Larsen & P.Pedersen [Fl. Jutl. Exs.] 4* (AAU, PR). GREAT BRITAIN: Scotland, Galloway, Laurieston, *S.Snogerup & B.Snogerup 2272* (LD). NORWAY: Lofoten, *C.Garcia-Herran 95-99* (NEU). 11. GERMANY: Baden, between Grötzingen and Weingarten, *A.Kneucker [Cyper. Junc. Exs.] 57* (PR). POLAND: Babia Gora, 986 m, *C.Garcia-Herran 92-781* (NEU; 2n=12). SLOVAKIA: Vysoké Tatry, Štrbské Pleso, 1370 m, *V.Krajina [K.Domin & V.Krajina, Fl. Českoslov. Exs.] 335* (LD, PR, PRC). 12. FRANCE: Puy-de-Dôme, Giroux, *Jalicon [Soc. Franc.] 7328* (PR). 13. BOSNIA: Glamoc, Mlinišće, Jul 1911, *K.Vandas* (PR). CROATIA: Plitvice Nat. Park, Sastavci, 500 m, *N.Lundquist 7729* (UPS). 34. TURKEY: Kastamonu, Ilgaz Dag, 2080 m, *P.H.Davis 21564* (BM).

10b. *Luzula sylvatica* subsp. *henriquesii* (Degen) Pirajá, *Agron. Lusit.* 12: 359 (1951)

Luzula henriquesii Degen, *Magyar Bot. Lapok* 5: 9 (1906); *Luzula sylvatica* var. *henriquesii* (Degen) Pau, *Bol. Soc. Aragonesa Ci. Nat.* 1916: 159 (1916). T: Portugal, Serra do Gerês, Ponte de Maceria, *Moller [Fl. Lusit. Exs.] 850*; holotype: BP; iso: WU.

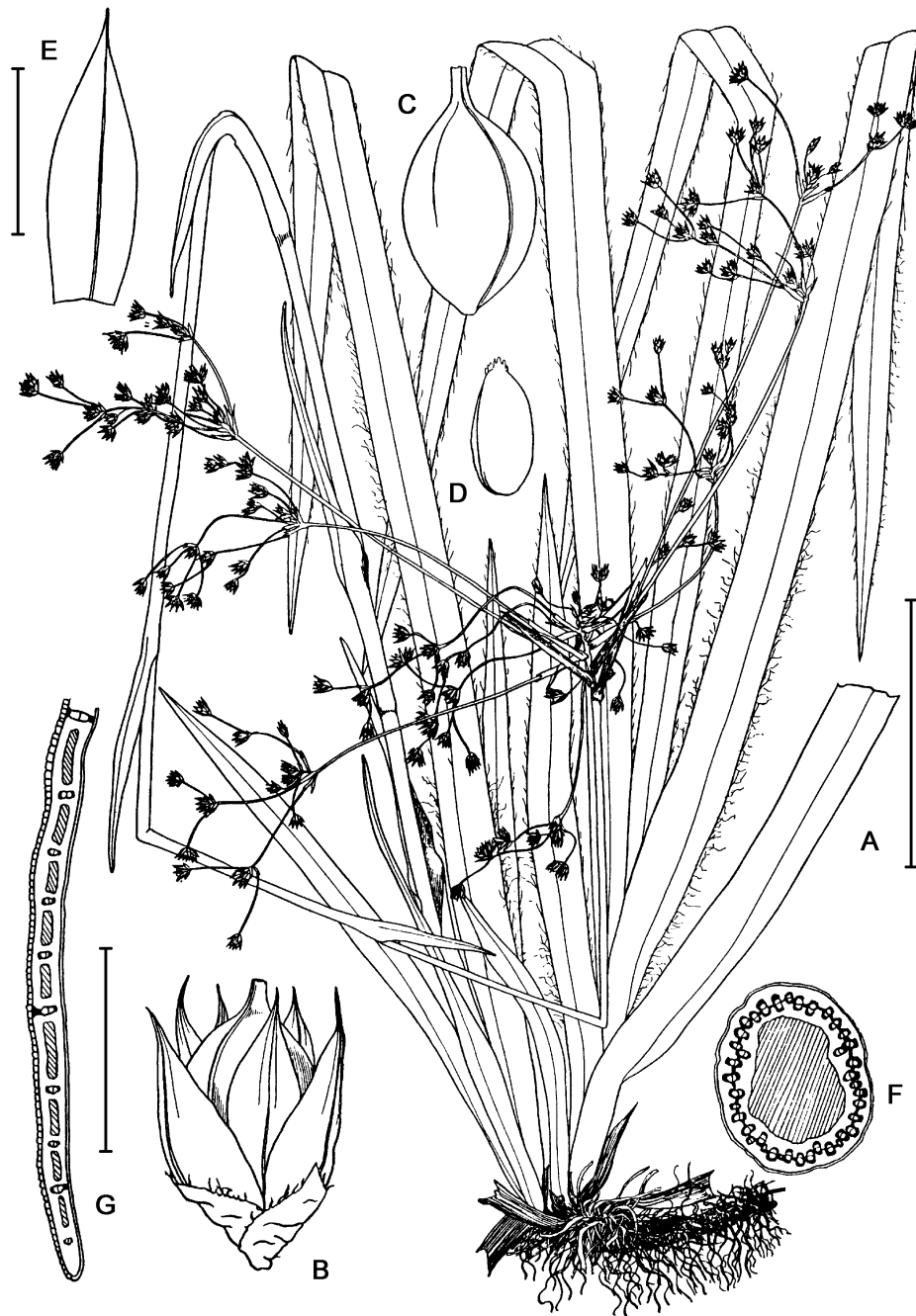


Figure 8. *Luzula sylvatica* subsp. *sylvatica*. **A**, habit; **B**, flower with unripe capsule; **C**, capsule; **D**, seed; **E**, tepal; **F**, stem T.S.; **G**, leaf T.S. (A–G, *B. Blocki*, Jul 1882, KRA). Scale bars: **A** = 5 cm; **B–F** = 2 mm; **G** = 1 mm. Drawn by T. Szynal. Reproduced with permission, from T. Szynal & J. Mađalski, *Atlas Fl. Pol.* 2/2: 153 (1931).

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Luzula sylvatica var. *paularensis* Pau, *Bol. Soc. Aragonesa Ci. Nat.* 1916: 158 (1916). T: Spain, Madrid, Sierra de Guadarrama, El Paular, *C.Vicioso*; syn: MA 19634; 25 Aug 1912; *C.Vicioso & Beltrán*; syn: MA 19641.

Luzula sylvatica subsp. *cantabrica* P. Monts., *Anales Inst. Bot. Cavanilles* 21(2) [1963]: 441 (1964). T: Spain, Puerto Palombera, Reinosa, 1350 m, 26 Jun 1926, *P.Font Quer*; holo: BC.

Plants usually (20–) 60–80 cm tall. Basal leaves (5–) 8–15 (–19) mm wide, gradually narrowed into long acute apex; margins ciliate. Inflorescence very lax; primary branches often elongated; secondary anthelas usually ±contracted, with 30–45 flowers; terminal clusters (1–) 2–3-flowered. Outer tepals usually (1.7–) 2.3–2.7 (–3.3) mm long. Anthers (0.7–) 0.9–1.8 (–2.1) mm long; filaments usually 0.3–0.6 mm long; style 1.9–2.2 mm long; stigmas 2.2–2.6 mm long. Capsule usually ±longer than perianth, ±ovoid, usually 1.6–2.6 mm long, mucro (0.2–) 0.4–0.7 mm long. Seeds usually 1.1–1.6 mm long, c. 0.6–0.7 mm wide; appendage c. 0.1–0.2 mm long. $2n=12$, *fide* C.Garcia-Herran (see list of specimens); H.Nordenskiöld, *Hereditas* 37: 328–329 (1951).

Confined to the northern part of the Iberian Peninsula. 12: POR, SPA. Found in woodlands, particularly along rivers, on damp soils. Map 28.

12. PORTUGAL: Serra do Gerês, Albergaria, 700 m, *C.Garcia-Herran 91-1134* (NEU; $2n=12$); Serra da Estrela, Poço do Inferno, *J.Matos, Cardoso & A.Marques 7905* (PR); Serra da Estrela: Lagoa do Covao do Curral, *A.Fernandes, R.Fernandes & F.Sousa 4521* (LD); Alto Douro, Bragança, Pena de Águia, 750 m, *P.Silva, B.Rainha & J.Martins 7788* (LD); Cinfaes, Fonte Nova, *J.Paiva, J.Matos & A.Marques 8481* (PR). SPAIN: Asturias, Grado, San Pelayo, 2 May 1978, *J.J.Lastra* (FCO 24033); Asturias Lueca, along Esva R., near Pontigón, 24 Mar 1974, *T.E.Díaz* (FCO 23640); Salamanca, Miranda del Castañar, 690 m, 4 Apr 1985, *D.Sánchez-Mata & V. de la Fuente* (FCO 17362).

A variable subspecies with several local variants. The eastern populations approach the type subspecies.

10c. *Luzula sylvatica* subsp. *sicula* (Parl.) K.Richt., *Pl. Eur.* 1: 183 (1890)

Luzula sicula Parl., *Nuov. Gen. Sp. Monocot.* 59 (1854); *Luzula maxima* subsp. *sicula* (Parl.) Nym., *Consp. Fl. Eur.* 751 (1882); *Luzula sieberi* subsp. *sicula* (Parl.) Pignatti, *Fl. Ital.* 3: 444 (1982), *nom. inval.* T: Sicily: 'monti di Sicilia nelle Madonie, in Montesoro, nei boschi di Caronia, di Mistretta, di Cannata, di Francavilla'; syn: *n.v.*

Plants usually 30–45 (–65) cm tall. Basal leaves usually 3–4 (–6) mm wide, with elongated acuminate tip; margins and base very densely ciliate. Inflorescence lax, few-flowered; secondary anthela usually with (5–) 8–13 (–16) flowers; terminal clusters (1–) 2–3 (–4)-flowered. Outer tepals usually 4.3–4.8 (–5.2) mm long. Anthers (1.7–) 2.2–2.5 (–3.0) mm long; filaments 0.2–0.6 mm long; style 1.7–1.9 mm long; stigmas on average 2.4–2.6 mm long. Capsule usually ±equalling perianth or shorter, ±ovoid, 3.5–4.1 (–4.4) mm long; mucro (0.2–) 0.4–0.8 mm long. Seeds (1.5–) 1.7–2.0 (–2.2) mm long, 1.1–1.3 mm wide; appendage c. 0.2 mm long. $2n=12$, *fide* C.Garcia-Herran (see list of specimens).

Southernmost Italy and Sicily. 13: ITA, SIC. In mountains, on volcanic slopes with sparse vegetation or broad-leaved (mostly *Fagus sylvatica*) woodlands. Map 29.

13. ITALY: Calabria, E ridge of Montenero, 1400–1600 m, *S.Snogerup & B.Snogerup 2081* (LD). SICILY: Messina, Floresta, 1350 m, *Kraehembuhl 91-684* (NEU; $2n=12$); Madonie, 600–1000 m, 18 Jul 1874, *G.Strobl* (K); Messina, Floresta, Mt Pojummoru, 1300 m, *R.K.Brummitt, Hunt & Leistner 5104* (K); Valdemone, *A.Todaro [Fl. Sic. Exs.] 649* (K, W); E and NE slopes of Mt Etna, 2250 m, 19–20 Aug 1873, *G.Strobl* (WU).

10d. *Luzula sylvatica* subsp. *sieberi* (Tausch) K.Richt., *Pl. Eur.* 1: 183 (1890)

Luzula sieberi Tausch, *Flora* 19: 423 (1836); *Luzula maxima* β [unranked] *angustifolia* Čelak., *Prodr. Fl. Böhmen* 1: 84 (1867), *nom. illeg., non Roth* (1788); *Luzula sylvatica* var. *sieberi* (Tausch) Buchenau, *Bot. Jahrb. Syst.* 12: 92 (1890); *Luzula maxima* subsp. *sieberii* (Tausch) P.Fourn., *Fl. Compl. Plaine Franç.* 527 (1928). T: [Austrian Alps] *F.W.Sieber [Herb. Fl. Austr.] 104*, ut *Juncus maximus* β *angustifolius*; lecto: PRC, *designated here*; isolecto: BRNM.

Illustration: S.Pignatti, *Fl. Ital.* 3: 444 (1982).

Plants usually up to 55 (–70) cm tall. Basal leaves usually 4–8 (–9) mm wide; apex subobtusate, sharply mucronate; margins ciliate. Inflorescence lax, ±few-flowered; secondary anthelas usually with 15–20 flowers; terminal clusters 1–3-flowered. Outer tepals usually 2.7–3.9 mm long. Anthers usually 1.7–1.9 (–2.3) mm long; filaments 0.2–0.5 mm long; style c. 1.9–2.2 mm long; stigmas 2.2–2.6 mm long. Capsule usually ±equalling or shorter than perianth, oblong-ovoid, usually (2.3–) 2.8–3.0 (–3.3) mm long; mucro (0.2–) 0.7–0.8 mm long. Seeds 1.2–1.9 mm long, c. 0.7 mm wide; appendage c. 0.2 mm long. $2n=12$, *vide* Druskovic, *Int. Organ. Pl. Biosyst. Newslett.* 24: 14 (1995).

South-Central Europe, most frequently in the Alps and N Italy. 11: AUT, GER, SWI. 12: FRA, SPA. 13: ITA, YUC. Found in mountain coniferous woodlands, in tall-grass vegetation near timberline. Map 30.

11. AUSTRIA: Karnische Alpen, Kleiner Pal, c. 1800 m, *L.Kirschnerová* 4-989 (PRA); Tyrol, Luttach, Schönberg, 1 Jul 1896, *Treffler* (PR); Tyrol, Brenner, 1500–1600 m, *R.Huter* (PR, WU). SWITZERLAND: Graubünden, Versam, Maiensäss Fahn, 1200 m, *L.Meisser* [*J.Braun-Blanquet, Fl. Raet. Exs.*] 421 (PR). 13. ITALY: Etruria, Grosseto, Mt Amiata, 800–1200 m, *A.Fiori & A.Béguinot* [*Fl. Ital. Exs.*] 2629 (WU).

Occasional intermediates exist in regions of contact with subsp. *sylvatica* and in marginal parts of the range, (for instance in the E Pyrenees).

Presumed Hybrids

Luzula × *hermannii-muelleri* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 507 (1904) = *Luzula luzuloides* (Lam.) Dandy & E.Willm. × *L. sylvatica* (Huds.) Gaudin

T: [Germany] Westfalen, Arnsberger Wald südlich von Drüggelte, *H.Mueller*; syn: *n.v.*

A rather doubtful hybrid requiring further study.

Luzula × *favratii* K.Richt., *Pl. Eur.* 1: 185 (1890) = *Luzula luzuloides* (Lam.) Dandy & E.Willm × *L. nivea* (Nathh.) DC.

T: [Switzerland] Bois de Sauvabelin, Lausanne, *L.Favrat*; syn: *W.*

Luzula × *schultorum* Dalla Torre & Sarnth., *Farn- u. Blütenpfl. Tirol.* 1: 434 (1906).

T: [Austria] 'B, Ratzes'; syn: *n.v.*

A rare hybrid ±intermediate between the parents; known from Austria and Switzerland. It requires further study.

Luzula × *levieri* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 509 (1904) = *L. nivea* (Nathh.) DC. × *Luzula pedemontana* Boiss. & Reut.

T: [Italy] in den Etrurischen Apenninen, im Walde Della Fornace bei Boscolungo, *E.Levier*; syn: *n.v.*

A rather doubtful hybrid requiring a field investigation.

Luzula × *lepetitiana* Beyer, *Verh. Bot. Vereins Prov. Brandenburg* 41: xiv (1900) = *Luzula pedemontana* Boiss. & Reut. × *L. sylvatica* (Huds.) Gaudin

T: [N Italy] Borgone, Sangone, am nordöstlichen Abhange des Mte. Salancia, *R.Beyer*; holo: *n.v.*

Luzula × *hasleri* Murr, *Magyar Bot. Lapok* 28: 68 (1930) = *Luzula alpinopilosa* (Chaix) Breistr. × *L. sylvatica* subsp. *sieberi* (Tausch) K.Richt.

T: Liechtenstein, Heupiel (Heubühl), 1867 m, 2 Aug 1921, *J.Murr*; syn: *n.v.*

Material not seen. The existence of the hybrid is rather doubtful.

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Luzula × *johannis-principis* Murr, *Liechtenst. Volksblatt*, 1921, no 49 [21 Jun 1921] = *Luzula sylvatica* subsp. *sieberi* (Tausch) K.Richt. × *L. alpina* Hoppe

T: Liechtenstein, Rojaberger, 1630 m, *J.Murr*; syn: K, S, W.

Numerous specimens from the type locality represent ±sterile plants, partly referable to *L. multiflora*, partly of an appearance intermediate between the presumed parents. Further study is needed.

Luzula × *pfaffii* Murr, *Allg. Bot. Z. Syst.* 1910: 118 (1910) = *Luzula lutea* (All.) DC. × *L. luzuloides* subsp. *rubella* (Mert. & W.D.J.Koch) Holub

T: [Italy] Bozen, Ritterhorn, 2260 m, 4 Sep 1909, *W.Pfaff*; syn: *n.v.*

A rather doubtful hybrid; further study is needed.

Luzula × *bornmuelleriana* Kük., *Mitth. Thüring. Bot. Vereins* 23: 90 (1908) = *Luzula alpinopilosa* × *L. lutea*

T: [Austria] Tirol, Pitztal, Mittelberg, Taschachbach, 2000 m, *G.Kükenthal*; syn: *n.v.*

Another very improbable hybrid, *Luzula pilosa* (L.) Willd. × *L. sylvatica* (Huds.) Gaudin, has been reported under an invalid name, *L. × buchenau* P.Fourn., *Quatre Fl. France* 154 (1935).

Sect. 2. ATLANTICAE

Luzula sect. **Atlanticae** Kirschner, *Taxon* 50: 1107 (2001)

T: *Luzula atlantica* Braun.-Blanq.

Perennials with short ascending rhizomes. Leaf tip acute. Lower bract subherbaceous, usually ±membranous, shorter than inflorescence. Inflorescence racemose, decomposed, with 3–8 thin primary branches; secondary branches rare; flower heads subglobose, (1–) 2–7-flowered. Tepals membranous, mucronate, with a castaneous midrib. Style very short. Seeds subglobular, smooth; appendage indistinct. $2n=12$.

A monotypic section restricted to the mountains of Morocco.

11. *Luzula atlantica* Braun-Blanq., *Vierteljahrsschr. Naturf. Ges. Zürich* 73, Suppl. 15: 347 (1928)

T: Morocco, Great Atlas, Zerekten, 1500–2000 m, *J.Braun-Blanquet*; holo: MPU, *n.v.* [In the Braun-Blanquet herbarium, MPU, no specimen with the above locality was located. The plant photographed in the protologue, deposited in MPU and labeled 'Gourdouze, 2000 m' thus may be a good candidate for a lectotype.]

Illustrations: J.Braun-Blanquet, *Vierteljahrsschr. Naturf. Ges. Zürich* 73, Suppl. 15: fig. 7, 356 (1928); R.Maire & Weiller, *Fl. Afr. Nord* 4: 308, fig. 729 (1957).

Map: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 87 (1965).

Perennials 10–30 (–35) cm tall, caespitose, ciliate; rhizome short, vertical to oblique, sometimes many-headed; stolons absent. Basal leaves usually 4–10 (–14) cm long, 2–4 (–5) mm wide; cauline leaves 1 (–2), usually 2–5 cm long. All leaves with long acuminate tip; margins papillose-serrulate. Lower bract ±herbaceous, sometimes ±membranous, shorter than inflorescence. Inflorescence decomposed; main branches 3–8, smooth or sparsely papillose below clusters, thin, c. 0.2 mm in diam., often flexuose, patent to erect; secondary branches rare, with each branch bearing loose terminal (1–) 2–7-flowered glomeruliform clusters 4–5 mm in diam. Bracteoles ovate-lanceolate, subaristate, glabrous to sparsely ciliate, 1.5–2.0 mm long, membranous-scarious; midrib often castaneous-brown. Tepals ±equal, glabrous, entire or the inner ones minutely denticulate below apex, lanceolate to ovate-lanceolate, often almost entirely membranous with dark castaneous-brown midrib and short mucro, sometimes castaneous-brown with broad membranous margins, 1.9–2.6 mm long. Stamens 6; anthers c. 0.4 mm long, much shorter than filaments; filaments 0.8–0.9 mm long; style c. 0.2 mm

long; stigmas 1.0–1.2 mm long. Capsule subglobular, ±obtuse, mucronate, castaneous-brown; capsule segments 1.7–2.0 mm long, including mucro 0.1–0.2 mm long and 1.4–1.5 mm wide. Seeds subglobular, pale castaneous-brown, smooth, shining, 0.8–0.9 (–1.0) mm long, 0.7–0.8 mm wide; apex pale; basal appendage indistinct, to 0.1 mm long, very sparsely fibrillate. $2n=12$, *vide* N.Galland, *Trav. Inst. Sci. Univ. Mohammed V, Sér. Bot.*, 35 (22): 106–121 (1988).

Endemic to the Great Atlas and Anti-Atlas in Morocco. 20: MOR. Amongst shady mountain rocks in open oak woodlands. Map 31.

20. MOROCCO: Great Atlas, Oukaimeden, 2500–2600 m, *P.H.Davis 67595* (E); Reraya, Sidi-Chamarouch, 2350–2500 m, 1923, *R.V.Litardière* (MPU); Great Atlas, Reraya Valley, Sidi-Chamarouch, 2400–2500 m, 21 Jul 1924, *R.Maire* (P); Great Atlas, Gourdouze, 1800 m, Apr 1928, *J.Braun-Blanquet & I.Braun-Blanquet* (MPU).

A species in many respects intermediate between sections *Anthelaea* and *Diprophyllatae*. The seed characters clearly point to *Luzula (Marlenia) elegans* Lowe.

Sect. 3. NODULOSAE

Luzula sect. **Nodulosae** Chrtek & Křisa, *Preslia* 46: 211 (1974)

Luzula subsect. *Nodulosae* (Chrtek & Křisa) Novikov, *Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol.* 95(6): 66 (1990). T: *Luzula nodulosa* E.Mey.

Perennials with thick nodulose horizontal rhizomes. Leaf tips acuminate, subulate. Lower bract ±membranous to subherbaceous. Inflorescence umbelloid or anthelate, composed of capituliform dense large clusters, on ±suberect peduncles. Seeds broadly ovoid, large, 1.7–1.9 × 1.3–1.4 mm, with apical and basal patches of looser outer seed-coat; appendages absent; base distinctly fibrillate.

A monotypic section confined to the Mediterranean region, disjunctly in NW Africa and from Greece to W Anatolia.

12. *Luzula nodulosa* [Bory & Chaub.] E.Mey., *Linnaea* 22: 410 (1849), *nom. cons. propos.*

Juncus nodulosus Bory & Chaub., *Exp. Sci. Morée Bot.* 3: 105, t. 11, f. 1 (1832), *nom. illeg.*, non Wahlenb.; *Juncus graecus* Chaub. & Bory, *Nouv. Fl. Pélop.* 23, Plate 12, fig. 1 (1838); *Luzula graeca* (Chaub. & Bory) Kunth, *Enum. Pl.* 3: 310 (1841); *Juncoides nodulosa* (E.Mey.) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891); *Luzula nodulosa* var. *graeca* (Chaub. & Bory) R.Maire, *Bull. Soc. Hist. Nat. Afrique N.* 22: 319 (1931). T: [Greece, Pylos, Arcadia] *L.A. Chaubard*; holo: P.

Luzula nodulosa var. *mauretanica* R.Maire & Trab., in R.C.J.E.Maire, *Bull. Soc. Hist. Nat. Afrique N.* 22: 319 (1931). T: Algeria, Monts Tlemcen, entre Terni & Sebdou, *L.Trabut*; holo: P.

Illustration: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 65, fig. 46a, 66, fig. 46b (1906).

Perennials c. (15–) 30–55 (–70) cm tall, loosely caespitose or one-stemmed; rhizome thick, c. 3–5 mm in diam., creeping to ascending, often with fibrous cover, nodulose, with internodes usually 0.5–2.0 cm long; stolons short, ascending. Lowermost leaves cataphyllous, c. 1–3 cm long, brownish; basal leaves flat, 7–16 (–20) cm long, 3.5–5.0 (–7.5) mm wide; cauline leaves 3–4 (–5), (1.5–) 2.5–5.0 (–15) cm long; margins densely ciliate, later sometimes glabrescent, densely papillose-serrulate; apex subulate. Lower bract brownish-membranous to subherbaceous, c. 1.0–3.5 (–5.0) cm long, shorter than inflorescence. Inflorescence of (1–) 2–5 (–15) large hemispherical to cup-shaped clusters; clusters (2–) 3–5 (–11)-flowered, 0.7–1.0 cm long, c. 1.0–1.5 cm wide; peduncles suberect, c. 2–10 cm long, smooth; secondary branches absent or frequent, distally inserted, short. Bracteoles scarious, often brownish at base, ovate, acuminate, c. 3.0–3.5 mm long; midrib distinct. Tepals ±equal, ovate-lanceolate or broadly lanceolate, c. 5.0–6.5 mm long, acute to acuminate; central band deep castaneous-brown; margins distinct, broad, membranous. Stamens 6; anthers 1.7–3.5 mm long, 2–10 times as long as filaments; filaments 0.3–0.9 mm long; style 1.8–2.7 mm long; stigmas c. 2.5–4.0 mm long. Capsule ovoid to broadly ovoid, acuminate, shorter than perianth, dark castaneous to pale castaneous-brown; capsule segments 3.3–4.0 × 2.3–2.8 mm

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long; mucro to 0.5 mm long. Seeds broadly ovoid, deep brown, 1.7–1.9 mm long, 1.3–1.4 mm wide, with apical and basal whitish patches of loose outer seed-coat, distinctly fibrillate.

Disjunctly in two areas: the E Mediterranean (from Greece to W Anatolia) and NW Africa (Algeria and Morocco). 13: GRC, KRI. 20: ALG, MOR. 34: EAI, TUR. Rocky slopes, open woodlands. Map 32.

13. GREECE: Attica, 650–1300 m, *T.H.Heldreich* [*Herb. Graecum Norm.*] 148 (P); Attica, Mt Pentelica, *T.G.Orphanides* 1105 (WU). KRITI: Askoyplicus, 1846, *T.H.Heldreich* (W); Hag. Vasilis, Kedros, *K.H.Rechinger* 849 (WU); Karpathos, Mt Kolla, *W.Greuter* 5314 (W). 20. ALGERIA: Kabylie, Mt Magris, 1700 m, *E.Reverchon* [*Pl. Alger.*] 364 (P, WU); Djurdjura, Ras Timedouine, 6 km E of Tikdja, 1860–1900 m, *P.H.Davis* 59408 (E). MOROCCO: Bab-Bou-Idir, *C.G. van Steenis* 19181 (L). 34. EAST AEGEAN IS.: Samos, Mt Ambelos, 800 m, *K.H.Rechinger* & *F.Rechinger* 3905 (K). TURKEY: Çanakkale, Erenköy, Renkoei Scala, 16 Apr 1883, *P.E.E.Sintenis* [*It. Trojan.*] 297 (W, UPS).

Variable in stamen and pistil characters. There are two main forms, one with anthers 1.7–2.5 mm long, about 2–3 times as long as filaments, and style c. 2 mm long, the other with anthers 2.0–3.5 mm long, usually 4–8 times as long as filaments, and style c. 2.2–2.7 mm long. In N Africa, and in Morocco in particular, plants with longer anthers and styles predominate, mostly on limestone. Many African plants, however, are indistinguishable from the E Mediterranean ones, and intermediates are not rare.

Sect. 4. DIPROPHYLLATAE

Luzula* sect. *Diprophyllatae Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 25 (1938)

T: *Luzula wahlenbergii* Rupr.; lecto, designated here.

Luzula ser. *Effusae* Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 25 (1938); *Luzula* sect. *Effusae* [Satake] K.F.Wu, *J. E. China Norm. Univ., Nat. Sci. Ed.*, 1992(3): 91 (1992). T: *Luzula effusa* Buchenau.

Luzula ser. *Spadiceae* Satake in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 26 (1938). T: *Luzula wahlenbergii* Rupr.

Luzula sect. *Glabratae* Chrték & Křisa, *Preslia* 46: 211 (1974). T: *Luzula glabrata* (Hoppe) Desv.

Luzula subsect. *Parviflorae* Kovt., *Bot. Žurn. (Moscow & Leningrad)* 72: 1398 (1987); *Luzula* sect. *Parviflorae* [Kovt.] K.F.Wu, *J. E. China Norm. Univ., Nat. Sci. Ed.*, 1992(3): 92 (1992). T: *Luzula parviflora* (Ehrh.) Desv.

Perennials, subglabrous to sparsely ciliate; rhizome branched, ascending. Leaves with acute tips. Lower bract herbaceous to subherbaceous. Inflorescence decompose, a ±nodding to suberect panicle. Flowers usually borne singly, some in 2–5-flowered clusters. Tepals usually 2.0–2.5 (–3.5) mm long. Seeds usually ellipsoid to oblong-ellipsoid; appendage absent or, when visible, basal, fibrillate.

A section with 12 species of mostly subarctic and oro-boreal, or alpine distribution. Main centres of diversity are in W North America and Europe; two species reach the southern hemisphere. Almost exclusively, diploids (2n=12 AL) and agmatoploids with 2n=24 BL are known in the section. The species are very close to one another in their general habit.

- 1 Upper part of capsule and mucro densely papillose; inflorescence usually storied (inflorescence subdivided in several subequal panicles separated by long rhachis segments; inflorescence usually constitutes $\frac{1}{3}$ of plant height or more) 23. *L. effusa*
- 1: Capsule smooth; inflorescence storied or not so
- 2 Inflorescence storied 13. *L. gigantea*
- 2: Inflorescence not storied
- 3 Panicle branches abbreviated, and inflorescence therefore subcongested 16. *L. subcapitata*
- 3: Panicle branches (at least the main ones) long; panicle loose or subdense, never subcongested

- 4 Tepals stramineous to pale brownish, with apex often ±reflexed; inflorescence very lax, with rigidly divaricate branches **17. L. divaricata**
- 4: Tepals blackish brown to dark castaneous-brown, with apex not reflexed; inflorescence lax to subdense, ±nodding to suberect, with branches not rigidly divaricate
- 5 Basal leaves densely to sparsely ciliate. [Mexico to Panama] **14. L. denticulata**
- 5: Basal leaves subglabrous. [Outside C America]
- 6 Capsule segments usually 3.0–3.5 × 1.8–2.0 mm **19. L. hitchcockii**
- 6: Capsule segments to 2.9 mm long and to 1.6 mm wide
- 7 Anthers ±equalling filaments or shorter; style up to 0.5 mm long
- 8 Plants usually more than 30 cm tall; cauline leaves (3–) 4–5, usually 5–10 mm wide **22. L. parviflora**
- 8: Plants usually up to 30 cm tall; cauline leaves 1–3, usually less than 5 mm wide
- 9 Cauline leaves bluish green to greyish green, (2–) 3; lower bract 1.5–2.5 cm long **18. L. piperi**
- 9: Cauline leaves mid-green, 1–2; lower bract to 1 cm long **15. L. wahlenbergii**
- 7: Anthers (2–) 3–5 (–9) times longer than filaments; style usually longer than 0.5 mm
- 10 Capsule segments to 2.4 mm long; seeds stramineous to pale brown **24. L. alpinopilosa**
- 10: Capsule segments 2.4–3.0 mm long; seeds brown to dark brown
- 11 Cauline leaves 10–20 cm long, usually 3–6 mm wide; anthers usually 3–4 times longer than filaments **21. L. desvauxii**
- 11: Cauline leaves up to 6 cm long, usually 4.5–8.0 mm wide; anthers usually 5–7 times longer than filaments **20. L. glabrata**

13. *Luzula gigantea* Desv., *J. Bot. (Desvaux)* 1: 145 (1808)

Juncooides spadicea Kuntze var. *gigantea* (Desv.) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891); *Juncooides gigantea* (Desv.) E. Sheld., *Minnesota Bot. Stud.* 1: 62 (1894). T: Colombia, in montibus humidis Quindio in regno Santa-fe de Bogota, *A. Humboldt & A. J. Bonpland*; holo: P.

Luzula paniculata Desv., *J. Bot. (Desvaux)* 1: 147 (1808). T: 'In America calidiore'; holo: P.

Illustrations: M. Barros, *Darwiniana* 10: 318, fig. 10 (1953); H. Balslev, *Fl. Neotrop. Monogr.* 68: 53, fig. 26 (1996).

Map: H. Balslev, *Fl. Neotrop. Monogr.* 68: 54, fig. 27 (1996).

Perennials 20–90 cm tall; rhizome ascending, 1.5–3.0 mm in diam.; stolons long, ascending. Basal leaves 10–30 cm long, (5–) 10–20 mm wide, flat; margin densely papillose-serrulate, ciliate in young leaves; cauline leaves usually 2–4, with upper ones usually up to 10–13 mm wide; sheaths to 6 cm long; leaf tip acute. Inflorescence a rich loose compound panicle constituting more than one third of plant height, storied and subdivided by 5–15 cm long rhachis segments into 4–5 subequal nodding anthelate parts; flowers borne singly (rarely in clusters of 2–3). Bracts of primary inflorescence branches resembling cauline leaves, with proximal ones to 20 cm long and distal ones gradually shorter; bracts on distal branches brownish-membranous, linear-lanceolate, c. 1.0–1.5 cm long. Bracteoles ovate to ovate-lanceolate, brownish-membranous, 1.6–2.0 mm long, usually entire, glabrous or sparsely ciliate, inserted 0.2–0.5 mm below flowers. Tepals ±unequal, glabrous, acuminate, usually dark castaneous brown, margins paler; outer tepals usually 2.2–2.7 mm long; inner tepals usually 2.0–2.5 mm long. Stamens 6, 1.0–1.5 mm long; anthers 0.3–0.6 mm long; filaments 0.7–0.9 mm long; style 0.2–0.3 mm long; stigmas ±patent, 0.6–0.8 mm long. Capsule broadly ellipsoidal, apiculate, shorter than perianth, castaneous, shining; capsule segments often slightly

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mucronate, 1.6–1.9 × c. 1.1 mm long. Seeds ±ellipsoidal, (0.9–) 1.0–1.1 × 0.5–0.6 mm; outer seed-coat white to light brown; appendage almost not visible, c. 0.1 mm long; base fibrillate. Fig. 9.

South America, in the Andes from Venezuela and Colombia to Bolivia and N Argentina. 82: VEN. 83: BOL, CLM, ECU, PER. 85: AGW. Open mountain slopes, páramo, along streams, usually between 3000 and 4000 m. Map 33.

82. VENEZUELA: Mérida, Trujillo, *J.Linden 412* (BM, BR, G, P, US). 83. BOLIVIA: Cochabamba, Chapare road at km 110, 3000 m, *R.F.Steinbach 611* (LPB, NY, S, US, WIS); La Paz, Larecaja, near Sorata and Mt Sanquiari, 3200 m, *G.Mandon 1423* (BM, K, NY, P, S, US). COLOMBIA: Cauca, Cordillera Central, Puracé, 3450 m, *K.Sneidern 1740* (S); Boyaca, Sierra Nevada de Cocuy, Quebrada de las Playas, 4100 m, *P.J.Grubb et al. 321* (K, US). ECUADOR: Imbabura, Lago San Marcos Cayambe, *Wash et al. 5460* (K); Imbabura, Mojanda, 10 km SSW Otavalo, 2900–3150 m, *B.Sparre 13476* (S); Pichincha, Mt Corazón, *E.Asplund 9684* (S). PERU: Huacás, Santiago de Chuco, 2800 m, *A.Sagástegui, J.Mostacero & Diestra 11913* (AAU, MO, K, NY, F); Mito, c. 3000 m, *J.F.Macbride 3367* (S).

At first sight very similar to SE Asian *Luzula effusa* (the only other taxon having storied inflorescence) but differs from it in having smooth capsules, longer outer tepals, anthers substantially shorter than filaments, narrower seeds and longer bracteoles.

14. *Luzula denticulata* Liebm., *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 2: 46 (1850)

Luzula parviflora var. *denticulata* (Liebm.) Buchenau, *Bot. Jahrb. Syst.* 7: 171 (1885). T: Mexico, Orizaba, Vaqueria del Jacal, 3050 m, *F.Liebmann*; lecto: C, *fide* L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 370 (1971); isolecto: C, G, HAL, K, P, S, UPS.

Luzula laetevirens Liebm., *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 2: 46 (1850). T: Mexico, Orizaba, 2750–3050 m, *F.Liebmann*; lecto: C, *fide* L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 370 (1971); isolecto: C, P.

Luzula latifolia Liebm., *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 2: 47 (1850). T: Mexico, Oaxaca, Cumbre de Ixtepec, 3050 m, *F.Liebmann*; lecto: C, *fide* L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 370 (1971); isolecto: C.

Luzula gigantea var. *vulcanica* Woodson, in R.E.Woodson & R.J.Seibert, *Ann. Missouri Bot. Gard.* 26: 278 (1939). T: Panama, Chiriquí, Loma Larga, Volcán Chiriquí, 2500–3380 m, *R.E.Woodson jr., P.H.Allen & R.J.Seibert 1094*; holo: MO; iso: GH, NY, US, photo AAU.

Illustration: H.Balslev, *Fl. Neotrop. Monogr.* 68: 56, fig. 28 (1996).

Map: H.Balslev, *Fl. Neotrop. Monogr.* 68: 54, fig. 27 (1996).

Perennials 15–80 cm tall; rhizome ascending, long, often with long ascending stolons. Basal leaves 5–25 cm long, 8–12 mm wide; cauline leaves usually 3–5 (–8), usually 6–8 cm long, 4–5 mm wide. All leaves usually densely ciliate, less often subglabrous, acute, with ±papillose-serrulate margins. Lower bract herbaceous, up to 6 cm long; next upper bract linear, brownish membranous, ciliate, c. 1 cm long. Inflorescence terminal, a loose nodding anthelately arranged panicle 5–20 × 3–10 cm; flowers borne singly. Bracteoles brownish-membranous, ±ovate, acute, 1.2–1.6 mm long, ciliate, inserted c. 0.1–0.2 mm below flower. Tepals subequal, glabrous, narrowly-lanceolate, acuminate, pale to dark brown, 1.7–2.4 mm long. Stamens 6; anthers 0.4–0.7 mm long, equalling or longer than filaments; filaments 0.3–0.5 mm long; style 0.1–0.2 mm long; stigmas 0.8–1.0 mm long. Capsule dark brown, shining, ovoid, acute, often equalling or exceeding perianth; capsule segments 1.5–1.7 × 1.0–1.3 mm. Seeds oblong-ellipsoidal, brown, 1.0–1.1 mm long, 0.6–0.7 mm wide; appendage indistinct, to c. 0.1 mm, fibrillate. Fig. 10.

Confined to Central America, from C Mexico to Panama. 79: MXC, MXE, MXG, MXS, MXT. 80: COS, GUA, PAN. Grasslands, pastures and open woodlands, between 200–3900 m. Map 34.

79. MEXICO CENTRAL: Distrito Federal, Contreras, Los Dinamos, 2800 m, *A.Ventura 3580* (AAU); Distrito Federal, Mt Ajusco, 3840 m, *J.H.Beaman 2806* (DS, MICH, US); México State, La Ciénega, Iztaccíhuatl, *R.Galván 735* (AAU); Puebla, Sierra Negra, Mt Orizaba, 3200 m, *E.K.Balls et al. 4475* (K, UC, US). MEXICO NORTHEAST: Hidalgo, Epazoyucan, Nopalillo, 2850 m, *R.Galván 580* (AAU); Hidalgo, El Chico, *E.Lyonnet 265* (CAS, GH, MEXU, MO, NY, K, US). 80. COSTA RICA: Cartago, Volcán Irazú, 3000 m, *K.Barringer, Christenson & L.D.Gomez 3273* (AAU); Cartago, Cerro de la Muerte, 3000–3500 m,



Figure 9. *Luzula gigantea*. Note wide leaves, storied inflorescence, single inserted flowers. (Fagerlind & Wibom 1405^{bis}, S). Scale bar: 5 cm. Drawn by K.Tind. Originally published in G.Harling & B.Sparre (eds.), *Fl. Ecuador* 11: 10, fig. 2 (1979), reproduced with permission, from H.Balslev, *Fl. Neotrop. Monogr.* 68: 53, fig. 26 (1996), © Lunds Botaniska Förening, © 1996, The New York Botanical Garden.

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Figure 10. *Luzula denticulata*. **A**, habit; **B**, flowers with fruits. (**A**, **B**, Nelson 645, US). Scale bars: **A** = 5 cm; **B** = 2 mm. Drawn by K.Tind. Reproduced with permission, from H.Balslev, *Fl. Neotrop. Monogr.* 68: 56, fig. 28 (1996), © 1996, The New York Botanical Garden.

R.W.Holm & H.H.Iltis 485 (A, MO, P); Irazú, La Playita, 3300 m, *Pettier 14125* (AAU). GUATEMALA: Huehuetenango, San Mateo Ixtatán, Sierra de los Cuchumatanes, 2900 m, *D.E.Breedlove 11555* (DS, LL, MICH, US).

In Panama and S Mexico, plants intermediate between *L. denticulata* and *L. gigantea* occur, but are rare. They are almost glabrous and have ±storied inflorescence (vouchers in AAU). Further study is necessary.

15. *Luzula wahlenbergii* Rupr., *Fl. Samojed. Cisural.* 58 (1845)

T: North Russia, 'Litt. austr. ins. Kolguev', *F.J.Ruprecht*; syn: LE, UPS, W; Norway, Finnmark, Kaafjord, *M.Blytt in E.Fries [Herb. Norm. fasc. VIII] 70*; syn: UPS, S.

Luzula spadicea var. *kunthii* E.Mey., *Linnaea* 22: 403 (1849). T: Sweden, Lapponia Pitensis, *G.Wahlenberg*; syn: W; Norway, Finnmark, Kaafjord, *M.Blytt in E.Fries [Herb. Norm. fasc. VIII] 70*; syn: UPS, S.

Luzula borealis Fr., *Summa Veg. Scand.* 219 (1846). T: 'Per alpes Scandinaviae altioris totius'. Norway, Finnmark, Kaafjord, *M.Blytt in E.Fries [Herb. Norm. VIII] 70*; syn: UPS, S.

Illustration: J. Lid, *Norsk & Svensk Fl.* 202, fig. 99a (1963).

Maps: L.Hämet-Ahti, *Aquilo, Ser. Bot.*, 3: 18, fig. 5 (1965); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 167 (1986).

Perennials c. 20–30 cm tall, subglabrous, caespitose, sometimes with short ascending vegetative shoots. Stem with several basal and 1–2 cauline flat leaves; basal leaves 5–10 cm × 3–5 mm; upper leaves up to 3–5 cm × 2–4 mm; leaf margins papillose-serrulate; leaf tip acute. Inflorescence a lax nodding 'panicle' of 10–30 flowers, c. 4 cm long and 3 cm wide; flowers borne singly, pedunculate, or in 2(–3)-flowered clusters. Lower bract 4–10 mm long. Bracteoles up to 2.0 mm long, fimbriate-ciliate near apex. Tepals equal, 2.0–2.8 mm long, ±acuminate, entire, ±brown. Stamens 6; anthers 0.4–0.6 mm long, ±equalling filaments; style up to 0.5 mm long; stigmas c. 1 mm long. Capsule ellipsoidal, ±subacuminate, ±exceeding tepals; capsule segments brown, 2.0–2.4 × 1.1–1.5 mm. Seeds narrowly ellipsoidal, 1.2–1.4 × c. 0.7 mm, dark castaneous brown, without appendage; base fibrillate. 2n=24 [BL], H.Nordenskiöld, *Hereditas* 37: 330–331 (1951).

Arctic Eurasia and mountains of Scandinavia, Russian Far East and Transbaicalia, Alaska and Arctic Canada and Greenland. 10: FIN, NOR, SVA, SWE. 14: RUN. 30: BRY, CTA, KRA, WSB, YAK. 31: KAM, KHA, KUR, MAG, PRM. 70: ASK, GNL, NWT, YUK. 72: QUE. Arctic and alpine mossy tundra, wet grasslands. Map 35.

10. FINLAND: Lapponia enontekiensis, 69°N, Aug 1912, *J.Montell s.n.* (PR). NORWAY: Finnmark, Nord-Varanger, Fossefjellet, *N.Lundquist 4944* (UPS). SWEDEN: Torne Lappmark, Jukkasjärvi, 24 Jul 1904, *Ringselle s.n.* (PR). 14. RUSSIA NORTH: Murmansk, Imandra Lake, *R.R.Pohle 6980* (MW). 30. WEST SIBERIA: Tyumen, Distr. Priuralskiy, 2.5 km N of Shuchye. 31. RUSSIAN FAR EAST: Magadan Distr., Pitlekaj, 1879 *F.Kjellman s.n.* (S); Chukotka, Nedle, *A.A.Krause 175* (UPS). Kamchatka, Pal'matkina R., 1932 *B.N.Gorodkov & B.A.Tikhomirov s.n.* (S). 70. ALASKA: Nunivak Is., Nash Harbour, 1938 *J.P.Anderson 3878, 3875* (S); Brooks Range, De Long Mtns, Feniak Lake, 600 m, *K.Holmen & O.Mårtensson 61-1130* (UPS). CANADA, NORTHWEST TERRITORIES [Nunavut]: Franklin Distr., Frobisher Bay, 1959, *E.Hultén s.n.* (S).

Close to *L. parviflora* and *L. piperi*. From the former it can be distinguished by lower growth, narrower leaves, 1–2 cauline leaves; from the latter by linear-lanceolate cauline leaves and dark brown seeds (L.Hämet-Ahti, *Aquilo, Ser. Bot.*, 3: 11–21, 1965).

16. *Luzula subcapitata* (Rydb.) H.D.Harr., *Man. Pl. Colorado* 151 (1954)

Juncooides subcapitata Rydb., *Bull. Torrey Bot. Club* 1904: 401 (1904). T: USA, Colorado, Silver Plume, 1895, *C.L.Shear 4611*; holo: NY.

Illustration: J.Coffey Swab, *Fl. North Amer.* 22: 262 (2000).

Map: J.Coffey Swab, *Fl. North Amer.* 22: 261 (2000).

Perennials 15–30 cm tall, loosely caespitose; rhizome ascending, with numerous short ascending vegetative shoots. Stem ±green. Basal leaves 1–4, 3.5–6.0 cm long, 4–5 mm wide; cauline leaves 3 (–4), with lower ones broader, 3–6 cm long, 2.0–5.5 mm wide. All leaves

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apiculate, glabrous or with sparse hairs at sheath mouth. Lower bract up to 1.5 cm long, rarely 3 cm long, sometimes overtopping inflorescence. Inflorescence a single congested dark head composed of indistinct clusters; each flower usually with a short visible peduncle to 1 mm. Bracteoles 1.0 (–1.5) mm long, brown; apex obtuse, ciliate. Tepals equal, glabrous, ovate-lanceolate, 1.8–2.2 mm long, ±dark castaneous-brown; margins not visible. Stamens 6; anthers (0.3–) 0.4 mm long, slightly shorter than or equal to filaments; filaments c. 0.4 mm long; style 0.2–0.3 mm long; stigmas 0.8–1.0 mm long. Capsule subglobular-ovoid, equalling or slightly exceeding perianth, almost rounded above, with a short apiculate mucro; capsule segments 1.7–1.8 × 1.2–1.3 mm long. Seeds paler castaneous-brown, c. 1.0 mm long, c. 0.6 mm wide; appendage absent; base fibrillate.

A restricted endemic of mountains in Colorado, USA. 73: COL. Damp, boggy areas near alpine lakes and streams, usually above 3000 m. Map 36.

73. USA, COLORADO: San Juan Co., Tenmile Basin, Animas R. drainage, SE of Silverton, Needle Mtn Quadrangle, *J.Michener* 789 (S); Willow Lake, *W.W.Robbins* 7933 (H).

Luzula subcapitata occupies an isolated position in the section; it is the only species with abbreviated inflorescence branches and peduncles, i.e., with a ±congested inflorescence.

17. *Luzula divaricata* S.Watson, *Proc. Amer. Acad. Arts (n.s.)* 6: 302 (1879)

Juncoides divaricata (S.Watson) Coville, *Contr. U. S. Natl. Herb.* 4: 209 (1893); *Luzula spadicea* var. *divaricata* (S.Watson) Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 63 (1906); *Luzula parviflora* subsp. *divaricata* (S.Watson) Hultén, *Acta Univ. Lund. (n.s.)* sect. 2, 39(2): 441 (1943); *Luzula parviflora* var. *divaricata* (S.Watson) Boivin, *Naturaliste Canad.* 94: 526 (1967). T: California, Sierras, 1863, *W.H.Brewer* 1794; syn: UC, *fide* L.Hämet-Ahti, *Ann Bot. Fenn.* 8: 369 (1971); *W.H.Brewer* 2069, 2334; syn: n.v.; Sierra Co., Summit Station, *E.L.Greene*; syn: n.v.; Sierra Co., near Castle Peak, *J.G.Lemmon*; syn: GH, n.v.

Illustrations: W.L.Jepson, *Fl. Calif.* 1: 259, fig. 45c, d, e (1921); C.L.Hitchcock *et al.*, *Vasc. Pl. Pacif. Northw.* 1: 216 (1969).

Maps: L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 369, fig. 1 (1971); J.Coffey Swab, *Fl. North Amer.* 22: 258 (2000).

Perennials (10–) 15–25 (30) cm tall, densely caespitose, pale green, subglabrous; rhizome short, ±ascending, subnodulose; stolons absent. Basal leaves to 20 cm long, 4–6 mm wide; cauline leaves 2–3, 3–5 mm wide. All leaves with papillose-serrulate margins; tip acute. Lower bract c. 1.0–2.5 cm long, purplish-stramineous to subherbaceous, much shorter than inflorescence. Inflorescence many-flowered, lax, c. 7–10 cm in diam., with rigidly divaricate branches (often at ±right angles); flowers borne singly; distal peduncles usually more than 1.0–1.5 cm long. Bracteoles ovate-lanceolate, membranous; base often pale brownish, c. 1.1–1.4 mm long, subglabrous. Tepals equal, glabrous, stramineous to pale brown, often with reddish tinge, ±lanceolate, long-acuminate, (1.8–) 2.0–2.2 (–2.4) mm long; apex often ±reflexed. Stamens 6; anthers 0.4–0.6 mm long; filaments c. 0.4–0.5 mm long; style 0.2–0.4 mm long; stigmas 0.7–1.5 mm long. Capsule ±oblong, usually pale brown, acute, exceeding perianth; capsule segments 1.9–2.2 × 1.0–1.2 mm long. Seeds brown, 1.0–1.2 mm long, c. 0.6 mm wide; appendage indistinct, to 0.1 mm, fibrillate.

An endemic of the SW United States, only found in the Sierra Nevada in California and westernmost Nevada. 76: CAL, NEV. Reported to occur in Oregon but material supporting the literature records not seen. Subalpine forest to alpine granitic slopes; 2100–3700 m. Map 37.

76. USA, CALIFORNIA: Sierra Nevada, Mineral King, *F.V.Coville & F.Funston* 1542 (K); Butte Co., Lassen National Forest, Jonesville, Butte Ck, c. 1700 m, 19 Aug 1932, *H.F.Copeland* (H, PR); Fresno Co., Cirque Lake, *C.H.Quibell & E.M.Quibell* 7714 (W). NEVADA: Washoe Co., Mt Rose, 3100 m, *A.A.Heller* 10213 (K).

18. *Luzula piperi* (Coville) M.E.Jones, *Bull. Montana State Univ., Biol. Ser.* 15: 22 (1910)

Juncoides piperi Coville, in C.V.Piper, *Contr. U. S. Natl. Herb.* 11: 185 (1906); *Luzula wahlenbergii* subsp. *piperi* (Coville) Hultén, *Ark. Bot.* 7(1): 33 (1968). T: USA, Washington, Okanogan Co., the Cascade Mtns, 1897, *A.D.E.Elmer* 678; holo: US.

Juncoides major (Hook.) Piper, in C.V.Piper & R.K.Beattie, *Fl. N.W. Coast* 92 (1915); *Luzula arcuata* β [unranked] *major* Hook., *Fl. Bor.-Amer.* 2: 189 (1838). T: USA, Washington, Pierce Co., Mt Rainier, *F.W.Tolmie*; holo: K.

Luzula wahlenbergii f. *americana* Kurz, *Bot. Jahrb. Syst.* 19: 411 (1894). T: USA, Alaska, Lynn Canal, 'Dejäh', 1882, *A.Krause & A.Krause*; lecto: S, *fide* L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 377 (1971); isolecto: UPS.

Luzula parviflora var. *yezoensis* Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 27 (1938); *Luzula parviflora* subsp. *yezoensis* (Satake) Hultén, *Fl. Alaska* 297 (1968), *nom. inval.* T: Japan, Hokkaido, Prov. Ishikari, Mt Daisetsu, Jul 1931, *Y.Satake*; holo: TI; iso (fragment): KYO.

Illustrations: L.Hämet-Ahti, *Aquilo, Ser. Bot.*, 3: 18, fig. 2, 3, 4 (1965).

Maps: L.Hämet-Ahti, *Aquilo, Ser. Bot.*, 3: 18, fig. 5 (1965); L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 378, fig. 6 (1971); J.Coffey Swab, *Fl. North Amer.* 22: 259 (2000).

Perennials 20–30 (–35) cm tall, caespitose, bluish green, subglabrous; rhizome short or ascending; stolons absent. Basal leaves 5–10 cm long, 3–4 mm wide; cauline leaves 3, linear, to 3–7 cm long, 3–5 mm wide. All leaves with papillose-serrulate margins; tip acute. Lower bract brownish, ciliate, to c. 1 cm long. Inflorescence conspicuously nodding, usually c. 5 × 3 cm, usually 30–60-flowered; flowers borne singly. Bracteoles \pm ovate, membranous, often \pm pale brownish, to c. 1.5 mm long, ciliate. Tepals equal, glabrous, \pm lanceolate, acute, (1.8–) 2.0–2.3 (–2.5) mm long, dark brown. Stamens 6; anthers (0.3–) 0.4–0.6 (–0.8) mm long; filaments c. 0.5 mm long; style 0.2–0.4 mm long; stigmas c. 1 mm long. Capsule oblong-ellipsoid, subacuminate to acute, \pm castaneous-brown, exceeding perianth; capsule segments 1.8–2.2 (–2.4) × 1.0–1.2 mm. Seeds pale (yellowish) brown, narrowly ellipsoid, 1.0–1.2 mm long, 0.5–0.6 mm wide; appendage indistinct; base sparsely fibrillate. $2n=24$, *fide* L.Hämet-Ahti & V.Virrankoski, *Ann. Bot. Fenn.* 8: 158 (1971). Fig. 11.

Western North America from the northernmost California, Idaho and Wyoming to Alaska; Kuril Islands, Russian Far East, and Hokkaido, Japan. 31: KAM, KUR, PRM. 38: JAP. 70: ALU, ALA, YUK. 71: ABT, BRC. 73: IDA, MNT, ORE, WAS, WYO. 76: CAL. Snowbeds and mesic heaths in the mountains and in the north. Map 38.

31. KURIL IS.: Paramushir, Kassivobara, 29 Sep 1946, *D.Vorobev* (VLA); Shumshu, *J.Ohwi & H.Yoshii* 5644 (KYO). 38. JAPAN: Ishikari, Mt Daisetsu, Takaminega-hara, *K.Inagaki* 163351 (TNS). 70. ALEUTIAN IS.: Atka, *W.J.Eyerdam* 1038 (S). ALASKA: Skagway, *J.P.Anderson* 1646a (S); Chugach Mtns, Thompson Pass, *L.Hämet-Ahti* 860 (H). 71. ALBERTA: Banff National Park, Lake Louise, *C.J.F.Skottsberg s.n.* (UPS). BRITISH COLUMBIA: Tenquille Lake area, Crown Mtn, 1800 m, *Beamish & K.Vrugtman* 60980 (OULU). 73. OREGON: Mt Hood, 29 Jul 1886, *T.Howell* (P). WASHINGTON: Cascade Mtns, Stevens Pass Region, Aug 1929, *J.M.Grant* (PR, S).

19. *Luzula hitchcockii* Hämet-Ahti, *Ann. Bot. Fenn.* 8: 370 (1971)

Luzula glabrata var. *hitchcockii* (Hämet-Ahti) Dorn, *Vasc. Pl. Wyoming* 297 (1988). T: USA, Idaho, Valley Co., Sawtooth Mts, Gold Fork Lookout, 8000 ft, *J.W.Thompson* 13769; holo: WTU; iso: MICH, PR, UC, US.

Illustrations: C.L.Hitchcock *et al.*, *Vasc. Pl. Pacif. Northw.* 1: 218 (1969) as *L. glabrata*; L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 371, fig. 2 (1971).

Maps: L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 369, fig. 1 (1971); J.Coffey Swab, *Fl. North Amer.* 22: 259 (2000).

Perennials (20–) 25–30 cm tall, loosely caespitose, bright green; rhizome branched, creeping-ascending; stolons usually ascending. Basal leaves usually to 10 cm long, 5–6 mm wide; cauline leaves 3–4, 2–6 cm long, 6–8 (–10) mm wide. All leaves with papillose-serrulate margins; tip acute. Lower bract herbaceous, to 2.5 cm long, conspicuously shorter than inflorescence; middle bracts brownish or purplish membranous, ciliate. Inflorescence loose, \pm nodding to suberect, many-flowered, c. 8 × 6 cm; flowers borne singly or less often in 2-flowered clusters. Bracteoles membranous, often suffused castaneous, to 1.5 mm long. Tepals equal, glabrous, lanceolate, (2.5–) 2.7–3.0 (–3.5) mm long, acute, dark brown to castaneous brown. Stamens 6; anthers (1.0–) 1.2–1.5 (–1.6) mm long; filaments 0.4–0.6 mm long; style 0.5–1.0 mm long; stigmas 1.5–2.5 mm long. Capsule ovoid, acute-trigonus, dark castaneous-brown, exceeding perianth; capsule segments (2.8–) 3.0–3.5 (–3.8) × 1.8–2.0 mm, with a beak to 0.9 mm long. Seeds dark brown, \pm ellipsoid, c. 1.5 mm long, c. 0.7 mm wide;

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Figure 11. *Luzula piperi*. A, habit; B, flower with bracteoles; C, seed. *Luzula hitchcockii*. D, habit; E, flower with bracteoles; F, seed. *Luzula parviflora* subsp. *parviflora*. G, habit; H, flower with bracteoles; I, seed. Drawn by J.R.Janish. Reproduced with permission, from C.L.Hitchcock, A.Cronquist, M.Ownbey & J.W.Thompson, *Vasc. Pl. Pacific Northw.* 1: 216 (1969). © University of Washington Press.

appendage indistinct; base fibrillate. $n=12$ ($2n=24$); *fide* J.Pojar, *Canad. J. Bot.* 51: 625 (1973). Fig. 11.

Endemic to SW Canada (Alberta and British Columbia) and Pacific NW of USA, from Washington and Montana to Oregon. 71: ABT, BRC. 73: IDA, MNT, ORE, WAS. Montane coniferous woodlands near timberline to subalpine and alpine slopes, ridges, meadows. Map 39.

71. BRITISH COLUMBIA: Manning Park, *J.A. Calder & D.B.O. Savile 11642* (DAO, WTU). 73. MONTANA: Glacier National Park, *B. Maguire & Piranian 15397* (WTU, UC). OREGON: Crater Lake National Park, *Baker 6124* (UC). WASHINGTON: Mt Paddo, 5 Sep 1904, *W. Suksdorf 4309* (L). Not located: 'from Fort Colville to Rocky Mts., 49° N', 1861, *D. Lyall* (P).

20. *Luzula glabrata* (Hoppe) Desv., *J. Bot. (Desvaux)* 1: 143 (1808)

Juncus glabratus Hoppe, *Herb. Viv. Pl. Rar. Praes. Alp.*, cent. 3, sine no. (1800); *Juncus intermedius* Host, *Icon. Descr. Gram. Austriac.* 3: 65 (1805), *nom. illeg.*; *Luzula intermedia* [Host] Baumg., *Enum. Stirp. Transsilv.* 3: 330 (1816), *nom. illeg.*, *non* Hornem. (1815); *Luzula spadicea* var. *glabrata* (Hoppe) E.Mey., *Syn. Luzul.* 8 (1823); *Luzula parviflora* var. *intermedia* [Host] Wahlenb., *Fl. Suec.* 217 (1824), *nom. illeg.*; *Luzula glabrata* var. *vera* Buchenau, *Krit. Verz. Juncac.* 83 (1879), *nom. inval.*; *Juncoides glabrata* (Hoppe) E.Sheld., *Bull. Geol. Nat. Hist. Surv.* 9: 63 (1894). T: Austria, Salzburg, Untersberg, *D.H. Hoppe*; lecto: MW, *fide* L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 371 (1971); isolecto: PR.

Juncus pilosus [Abart] C. *glabrescens* Schrank, *Baier. Fl.* 1: 621 (1789); *Luzula glabrescens* (Schrank) Dalla Torre & Sarnth., *Farn- u. Blütenpfl. Tirol.* 1: 434 (1906), *nom. superfl.* T: [Austria] 'aus dem Salzburgerischen [Alpen]', *K.M. Moll*; *syn. n.v.*

Illustrations: N.T. Host, *Icon. Descr. Gram. Austriac.* 3: plate 99 (1805); S. Pignatti, *Fl. Ital.* 3: 445 (1982).

Perennials, usually 15–30 cm tall, loosely caespitose, subglabrous to ±glabrous; rhizome creeping to ascending; stolons usually ascending. Leaves of sterile shoots usually 10–15 cm long, (4–) 5–7 (–10) mm wide; leaves at stem base usually short, 2–5 cm long; cauline leaves 3–4, usually 3.5–6.0 cm long, 4.5–8.0 mm wide. All leaves with papillose-serrulate margins; apex acute. Lower bract ±herbaceous, to 2–3 cm long, much shorter than inflorescence. Inflorescence ±loose, ±nodding to suberect, ±divaricate, usually 5–9 × 3–6 cm, usually more than 35–50-flowered; flowers usually borne singly. Bracteoles ±ovate, membranous, often suffused brownish, c. 1.5–2.0 mm long, ciliate. Tepals equal, glabrous, ±lanceolate, acuminate, 2.4–3.0 mm long, deep to dark castaneous-brown, with margins indistinct or narrow, paler brownish. Stamens 6; anthers (1.1–) 1.4–1.6 (–2.1) mm long, up to 10 times as long as filaments; filaments 0.2–0.3 mm long; style 0.5–0.9 mm long; stigmas 1.0–1.5 mm long. Capsule ±ovoid, acute, shortly rostrate, dark brown, usually slightly exceeding perianth; capsule segments 2.5–2.9 × c. 1.4–1.6 mm. Seeds ±oblong-ovoid, c. 1.2–1.4 mm long, c. 0.7 mm wide; appendage indistinct; base fibrillate. $2n=12$ [AL], *fide* H. Nordenskiöld, *Hereditas* 37: 330–331 (1951).

Confined to the E Alps, from Berchtesgadener Alpen, Germany, to N Italy. 11: AUT, GER. 13: ITA. Alpine grasslands, stony slopes, usually above (1700–) 2000 m. Map 40.

11. AUSTRIA: Niederösterreich, Raxalpe, 26 Jul 1921, *G.E. Du Rietz* (UPS); Niederösterreich, Schneeberg, 1800–2050 m, *G. Beck [Fl. Exs. Austro-Hung.] 1871/II* (H, PR, SAM, W, WU); N Salzburg, Lofer, *A. Spitzel [H.G. Reichenbach, Fl. Germ. Exs.] 1126* (H, K, PR). GERMANY: Bavaria, Berchtesgaden, Hohe Göll, Aug 1895, *T. Wulff* (LD); Berchtesgadener Alpen, Aug 1853, *A. Progel* (PR).

21. *Luzula desvauxii* Kunth, *Enum. Pl.* 3: 304 (1841)

Luzula spadicea var. *desvauxii* (Kunth) E.Mey., *Linnaea* 22: 400 (1849); *Luzula glabrata* var. *desvauxii* (Kunth) Buchenau, *Krit. Verz. Juncac.* 83 (1879); *Luzula glabrata* subsp. *desvauxii* (Kunth) K.Richt., *Pl. Eur.* 1: 185 (1890); *Luzula glabrata* proles *desvauxii* (Kunth) P.Fourn., *Quatre Fl. France* 153 (1935). T: France, Auvergne, Mont Dore, *Maire*; *holo: B, destroyed.*

Perennials usually (25–) 35–40 (–65) cm tall, loosely caespitose, subglabrous; rhizome creeping, branched; stolons short, ascending. Leaves of sterile shoots usually 15–20 cm long, 3–6 mm wide; basal leaves few, intermediate between cataphylls and cauline ones; cauline leaves 3–5, usually 10–20 cm long, 3.0–5.5 (–7.5) mm wide, conspicuously overlapping, with upper ones sometimes exceeding inflorescence. All leaves almost glabrous, with

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papillose-serrulate margins; apex acute. Lower bract herbaceous, usually 2.5–5 cm long, shorter than or almost equalling inflorescence. Inflorescence many-flowered, ±nodding, later suberect, usually 5–7 × 4–5 cm; flowers borne singly or crowded in 2 (3–4)-flowered groups. Bracteoles scarious, ovate, ciliate, c. 1.5 mm long. Tepals equal, glabrous, lanceolate, acuminate, usually 2.4–2.8 mm long, deep to dark castaneous-brown; margins inconspicuous, paler (straw-) brown. Stamens 6; anthers (1.0–) 1.1–1.4 (–1.7) mm long; filaments 0.3–0.5 mm long; style c. 0.8–1.0 mm long; stigmas 1.0–1.5 mm long. Capsule oblong-ovoid, ±acute, shortly mucronate, dark brown, shining, ±equalling, or slightly longer than perianth; capsule segments (2.4–) 2.5–2.8 (–3.0) × c. 1.3–1.5 mm. Seeds ±ovoid, 1.1–1.3 mm long, c. 0.8 mm wide, brown; appendage to 0.1 mm long, fibrillate. 2n=12 [AL], *vide* A.-M.Lambert & J.Giesi, *Inform. Annuelles Caryosyst. Cytogén.* 1: 28 (1967).

SW Europe, disjunctly in the E Pyrenees, Massif Central, Vosges and S Schwarzwald. Reported from Montes Cantábricos, N Spain, but material not seen [see P.Montserrat, *Anales Inst. Bot. Cavanilles* 21(2): 459-461 (1964)]. 11: GER. 12: FRA, SPA. Subalpine stony meadows, along streams, usually on non-calcareous substrates above 1200 m. Map 41.

11. GERMANY: Schwarzwald, Belchen, Jul 1858, *H.A. de Bary* (W). 12. FRANCE: Vosges, Hohneck, *I.S.Perrin* [*F.W.Schultz, Herb. Norm.*] 1154 (PR); Puy-de-Dôme, Mont-Dore, Grande Cascade, 1200–1300 m, 17 & 22 Jun 1971, *Rastetter* (H, LD); Auvergne, Puy-Mary, 1200 m, 28 Jul 1909, *J.J.Héribaud* (PR, W); Auvergne, Puy-Ferrand, 2 Sep 1852, *E.Desvaux* (H); Hautes Cévennes, S of Mt Mézenc, 1400 m, *N.Y.Sandwith* 3897 (K); E Pyrenees, Vallée d'Eyne, c. 2100 m, *E.Wängsjö & G.Wängsjö* 3366 (LD); *E.M.Sennen* [*Pl. Esp.*] 4055 (LD); E Pyrenees, L'Hospitalet, *Ellman & N.Y.Sandwith* 247 (K). SPAIN: E Pyrenees, Nuria, 1850 m, *E.M.Sennen* [*Pl. Esp.*] 1809 (BC, W).

22. *Luzula parviflora* (Ehrh.) Desv., *J. Bot. (Desvaux)* 1: 144 (1808)

Juncus parviflorus Ehrh., *Beitr. Naturk.* 6: 139 (1791); *Luzula spadicea* var. *parviflora* (Ehrh.) E.Mey., *Linnaea* 22: 402 (1849); *Juncoides spadicea* var. *parviflora* (Ehrh.) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891); *Juncoides parviflora* (Ehrh.) Coville, *Contr. U.S. Natl. Herb.* 4: 209 (1893). T: [Sweden, Lappland], *C.Linnaeus*; lecto: *Flora Lapponica* 124, Institut de France, Paris, designated here; photo BM, PRA.

Luzula parviflora var. *densiflora* Lange, *Consp. Fl. Groenland.* 125 (1880). T: [not indicated; numerous syntypes from E and W Greenland].

Luzula parviflora var. *sparsiflora* Lange, *Consp. Fl. Groenland.* 125 (1880). T: [not indicated; numerous syntypes from Greenland].

Map: E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 166 (1986).

Perennials 30–90 cm tall, loosely caespitose; rhizome ascending; stolons short, ascending, less often absent. Basal leaves 10–20 cm long, usually 5–10 mm wide; cauline leaves (3–) 4–5, 3–10 mm wide. All leaves with papillose-serrulate margins; apex acute. Lower bract herbaceous or brownish membranous, usually 1.5–4.0 cm long, shorter than inflorescence. Inflorescence usually lax, sometimes nodding, with some main branches to 13 cm long, often arcuate; flowers borne singly. Bracteoles subglabrous to sparsely ciliate, ovate, membranous. Tepals equal, glabrous, ±lanceolate, 1.8–2.3 (–2.5) mm long. Stamens 6; anthers 0.3–0.6 mm long, as long as or shorter than filaments. Capsule smooth above. Seeds ±ellipsoid, brown to dark brown, 1.0–1.4 mm long; base fibrillate.

A widely distributed northern circumpolar species, most common in subarctic areas and in the mountains of N Europe, N Asia and temperate North America. Three subspecies are recognized.

- | | | |
|----|---|---------------------------------------|
| 1 | Inflorescence many-flowered with long main branches and short most distal secondary branches (peduncles); perianth segments medium brown | 22a. subsp. parviflora |
| 1: | Inflorescence few-flowered, with long main branches and long distal secondary branches (almost divaricate); perianth segments usually pale brown to stramineous | |
| 2 | Stem conspicuously reddish at base; cauline leaves mid-green, shining, tepals with a distinct midrib | 22b. subsp. fastigiata |
| 2: | Stem without reddish coloration or with indistinct reddish tinge at base; cauline leaves bluish or greyish green, dull, tepals with an indistinct midrib | 22c. subsp. melanocarpa |

22a. *Luzula parviflora* (Ehrh.) Desv. subsp. *parviflora*

Luzula neglecta Kunth, *Enum. Pl.* 3: 301 (1841); *Luzula spadicea* f. *parviflora* (Ehrh.) I.Grint., *Fl. Rep. Soc. Roman.* 11: 594 (1966). T: Norway, Dovrefjeld, Vollasoe, 1828, [anonymous]; syn: herb. Buek, n.v.; syn: 'in herb. Lucaeno', n.v.; iso: PR.

Illustration: J. Lid, *Norsk & Svensk Fl.* 202, fig. 99c (1963).

Map: N.K.Kovtonyuk, in L.I.Malyshev & G.A.Peshkova, *Fl. Sibiri 4 (Araceae – Orchidaceae)*: map 38 (1987) [Siberia].

Plants usually (30–) 40–60 cm tall, slightly reddish at base. Basal leaves 12–17 cm long, 5–8 mm wide; cauline leaves (3) 4–5, lanceolate, acuminate, up to 7–9 cm long, 3–8 mm wide, often shorter than internodes. Inflorescence many-flowered; main branches to 9 (–10) cm long, nodding to suberect; distal secondary branches short (partial inflorescences not distinctly loose). Bracteoles entire and glabrous to sparsely ciliate. Tepals acute, not rigid; midrib not distinct, usually 1.9–2.3 (–2.5) mm long. Anthers 0.4–0.5 mm long; filaments c. 0.5 mm long; style 0.2–0.3 mm long; stigmas c. 0.5–0.7 mm long. Capsule oblong-ellipsoid, acute to acuminate-trigonus; mucro c. 0.2 mm long, dark brown; capsule segments 1.9–2.3 × 1.0–1.3 mm. Seeds mid-brown, 1.1–1.3 mm long, 0.6–0.7 mm wide; appendage indistinct, to 0.1 mm; base strongly fibrillate. 2n=24 [BL], *fide* H.Nordenskiöld, *Hereditas* 37: 330–331 (1951); *fide* T.Engelskjøn, *Opera Bot.* 52: 14 (1979); 2n=22 [2AL+20BL], *fide* L.Hämet-Ahti & Virrankoski, *Ann. Bot. Fenn.* 8: 158 (1971). Fig. 11.

N Europe, N Asia and mountains of C Asia, and northern part of North America. 10: FIN, NOR, SWE. 14: RUN. 30: ALT, BRY, CTA, IRK, KRA, TVA, WSB, YAK. 31: AMU, KAM, KUR, MAG, PRM. 32: KAZ. 36: CHN, CHX. 37: MON. 70: ASK, GNL, NWT, YUK. 71: ABT, BRC. 72: NFL, QUE. 73: COL, IDA, ORE, WYO. 76: ARI, CAL, NEV, UTA. Found in a variety of habitats, from humid woodlands, meadows and stream banks, to sub-alpine grasslands and tundra. Map 42.

10. SWEDEN: Abisko, Torneträsk Lake, 18 Jun 1948, *A.Pilát & J.A.Nannfeldt* (PR). 14. RUSSIA NORTH: Vorkuta, Aug 1983, *V.V.Morozov* (MW). 30. KRASNOYARSK: Yenisei R., Myelnitsa, 12 Jul 1876, *M.Brenner* (K). 31. MAGADAN: W Chukotka, Bilibino, *V.Petrovskiy & T.Koroleva* (VLA). 32. KAZAKHSTAN: Kungei-Alatau, Cilik R., 23 Aug 1934, *M.Popov* (AA). 36. CHINA NORTH-CENTRAL: Shanxi, Wu-tai-shan, *A.Serre A524* (UPS). 37. MONGOLIA: Bulganskiy Aimag, *I.Gubanov 9783* (MW). 70. ALASKA: Kaolak R., *H.Sherman 5859* (H). GREENLAND: Nigerdleq, *P.M.Jørgensen & Larsson [Pl. Vasc. Groenl. Exs.] 402* (C, PR). 71. BRITISH COLUMBIA: Smithers, 3–8 Aug 1931, *V.Kujala & A.Cajander* (H).

Occurrence in Inner Mongolia, N China, is probable but material has not been seen. A very variable subspecies; many aberrant populations are found in the S part of the North American range. Intermediates between the type subspecies and subsp. *fastigiata* have been reported from Alaska, British Columbia, Wyoming, California, Utah and Colorado.

22b. *Luzula parviflora* subsp. *fastigiata* (E.Mey.) Hämet-Ahti, *Ann. Bot. Fenn.* 8: 374 (1971)

Luzula fastigiata E.Mey., *Syn. Luzul.* 9 (1823); *Luzula melanocarpa* var. *fastigiata* (E.Mey.) E.Mey., *Linnaea* 3: 374 (1828); *Luzula parviflora* var. *fastigiata* (E.Mey.) Buchenau, *Krit. Verz. Juncac.* 83 (1879). T: Canada, British Columbia, Nootka, *T.Haenke*; holotype: PR, *cf.* L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 374 (1971).

Illustration: L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 374, fig.4 (1971).

Maps: L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 375, fig. 5 (1971); L.Hämet-Ahti, *Ann. Bot. Fenn.* 12: 28 (1975).

Plants usually 30–50 (–70) cm tall, distinctly reddish at base. Basal leaves to 10 cm long, to 8 mm wide; cauline leaves 4–5, lanceolate, acuminate, usually to 10 cm long, to 6–7 mm wide. Inflorescence lax, up to 13 × 12 cm, usually few-flowered, sometimes ±divaricate; distal inflorescence branches usually long; flowers borne singly. Bracteoles entire, ciliate. Tepals acute, pale brown to straw-brown, ±rigid; midrib distinct, 1.8–2.2 mm long. Anthers 0.3–0.4 (–0.5) mm long; filaments 0.5–0.6 mm long; style c. 0.2 mm long; stigmas 0.8–1.0 mm long. Capsule oblong-ellipsoid, acute to acuminate, with mucro 0.1–0.2 mm long, pale brown to straw-brown, longer than perianth; capsule segments 2.1–2.4 × 1.1–1.3 mm. Seeds dark brown, 1.2–1.3 mm long, 0.7–0.8 mm wide; appendage 0.1–0.2 mm, fibrillate. 2n=24 [BL], *fide* L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 375 (1971).

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Russian Far East and Kuril Is., Aleutian Is. and from mainland Alaska to California, Utah and Colorado. 31: KAM, KUR, MAG, PRM. 70: ALU, ASK. 71: ABT, BRC. 73: COL, IDA, ORE, WAS, WYO. 76: ARI, CAL, NEV, UTA. 77: NWM. Found in humid to mesic woodlands. Map 43.

31. KAMCHATKA: Karaginskiy Distr., Ossora, 4 Sep 1976, *S.Kharkevicz & T.Bucz* (VLA); Middle Opala R., *E.Hultén* 2452 (S). KURIL IS., Paramushir, 13 Aug 1971, *T.Neczaeva* (VLA); Urup, *M.Tatewaki* 9857 (SAP, TI). 70. ALEUTIAN IS.: Amchitka Is., *Reich & Y.M.C.McCann* 390, 621 (OULU). 71. BRITISH COLUMBIA: Vancouver Is., Goldstream, 27 Jun 1887, *J.Macoun* (BM). 73. IDAHO: Latah Co., the Thatuna Hills, Crumarine Ck, *L.A.Dillon* 564 (PR, S). OREGON: 'coniferous woods', May 1882, *T.Howell s.n.* (PR). WASHINGTON: Mt Rainier, c. 1600 m, *Godman* 475 (BM). WYOMING: Lincoln Co., Jackson's Hole, *E.B.Payson & L.B.Payson* 2256 (H).

There are intermediates of presumed hybrid origin between subsp. *fastigiata* and the type subspecies (see above).

22c. *Luzula parviflora* subsp. *melanocarpa* (Michx.) Hämet-Ahti, *Ann. Bot. Fenn.* 8: 377 (1971)

Juncus melanocarpus Michx., *Fl. Bor.-Amer.* 1: 190 (1803); *Luzula spadicea* var. *melanocarpa* (Michx.) E.Mey., *Linnaea* 22: 403 (1849); *Luzula spadicea* var. *aucta* Schur, *Enum. Pl. Transsilv.* 681 (1866), *nom. illeg.*; *Luzula parviflora* var. *melanocarpa* (Michx.) A.Gray, *Manual*, 5th edn, 536 (1867); *Juncoides parviflora* var. *melanocarpa* (Michx.) E.Sheld., *Minnesota Bot. Stud.* 1: 63 (1894); *Luzula parviflora* f. *melanocarpa* (Michx.) Neuman, *Sver. Fl.* 663 (1901); *Juncoides parviflora* subsp. *melanocarpa* (Michx.) Cockerell, in F.P.Daniels, *Fl. Boulder* 90 (1911); *Luzula spadicea* f. *melanocarpa* (Michx.) I.Grint., *Fl. Rep. Soc. Roman.* 11: 595 (1966); *Luzula parviflora* subsp. *melanocarpa* (Michx.) Tolm., *Arctic Fl. SSSR* 4: 34 (1963), *nom. inval.* T: 'Hab. in montibus sinum Hudsonis inter & Canadam, juxta lacum Cygnorum'; syn: P. *Luzula arida* Steud., *Syn. Pl. Glumac.* 2: 293 (1855). T: Canada, Labrador, [Hopedale, 1846–1848], *C.G.Albrecht*; holo: P, *fide* J.Cayouette & S.J.Darbyshire, *Taxon* 43: 178 (1994).

Luzula labradorica Steud., *Syn. Pl. Glumac.* 2: 291 (1855), *nom. illeg.*, non Raf. 1840. T: Canada, Labrador, [Hopedale, 1846–1848], *C.G.Albrecht*; holo: P, *fide* J.Cayouette & S.J.Darbyshire, *Taxon* 43: 178 (1994).

Illustration: S.E.Clemants, *Juncac. New York State* 50 (1990).

Map: L.Hämet-Ahti, *Ann. Bot. Fenn.* 12: 28 (1975).

Plants usually 60–90 cm tall, not or slightly reddish at base. Basal leaves dull, bluish green, to 20 cm long, to 8–10 mm wide; cauline leaves 4–6, 8–12 cm long, (6–) 8–10 mm wide. Inflorescence few-flowered but large, c. 12 (–20) × 8 cm; primary branches long; secondary distal branches long, spreading to reflexed; flowers borne singly. Bracteoles ±glabrous to very sparsely ciliate. Tepals acute, rigid, brown to pale brown, often ±translucent, c. 1.8–2.1 mm long; midrib not distinct. Anthers 0.4–0.6 mm long; filaments c. 0.5 mm long; style c. 0.5 mm long; stigmas 0.8–1.3 mm long. Capsule ±ellipsoid, acute, with mucro 0.2–0.5 mm long, usually dark brown, longer than perianth; capsule segments 1.9–2.2 × 1.0–1.2 mm. Seeds dark brown, c. 1.2 mm long; appendage not distinct; base fibrillate. 2n=24 [BL], *fide* Á.Löve & D.Löve, *Univ. Colorado Stud. Ser. Biol.* 17: 26 (1965).

Eastern North America, from Labrador to Alberta, Saskatchewan and Minnesota in the west, and to New York State in the south. 71: ABT, MAN, SAS. 72: LAB, NBR, NFL, NSC, ONT, PEI, QUE. 74: MIN, WIS. 75: CON, MAI, MAS, MIC, NWH, NWY, RHO, VER. In mountain meadows and along streams; less often in humid montane woodlands. Map 44.

72. LABRADOR: Twin Falls, 23 Jul 1937, *I.Hustieh s.n.* (H). NEWFOUNDLAND: Cormack, *T.Ahti* 2229 (H). ONTARIO: Algome Distr., High Falls, *C.E.Garton et al.* 14499 (H). QUÉBEC: Parc des Lamentides, *R.Cayouette & J.Cayouette* 8143 (H); Ile d'Anticosti, Crique de la Chaloupe, *F.Marie-Victorin & L.Rolland-Germain* 25799 (P). 74. MINNESOTA: Grand Marais, 26 Jun 1891, *coll. unknown* (H). 75. NEW HAMPSHIRE: Mt Washington, c. 1600 m, *H.Nordenskiöld s.n.* (UPS); Coos Co., Dolly Copp Road, 450 m, *D.M.Bates & W.C.Elsik* 71 (UPS). VERMONT: Mt Mansfield, 22 Jun 1877, *C.G.Pringle s.n.* (K).

23. *Luzula effusa* Buchenau, *Krit. Verz. Juncac.* 88 (1879)

Juncoides spadicea Kuntze var. *effusa* (Buchenau) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891). T: Sikkim, alt. 10000 ped. [c. 3000 m], *J.D.Hooker* 3; syn: K.

Perennials (20–) 40–80 (–100) cm tall, loosely caespitose, subglabrous; rhizome creeping or ascending, branched; stolons usually present, short or to c. 10 cm long. Leaves with densely papillose-serrulate margins; apex acute; basal leaves few; cauline leaves 3–6 (upper 2 or 3 represent leaf-like bracts). Inflorescence usually lax, usually constituting $\frac{1}{3}$ – $\frac{1}{2}$ of plant height, decomposed, storied; partial inflorescences subtended by leaf-like bracts; branches diverging at wide angles; flowers borne singly, rarely in 2 (–3)-flowered clusters. Tepals equal, glabrous, \pm lanceolate, usually 1.8–2.8 mm long, pale reddish brown to dark castaneous-brown. Stamens 6; anthers 0.5–1.1 mm long; filaments 0.6–1.0 mm long; style usually 0.4–0.5 mm long; stigmas 1.0–1.5 mm long. Capsule obovoid to \pm ellipsoid, subacute to acute, with mucro 0.2–0.4 mm long, distinctly papillose above when ripe, equalling or \pm longer than perianth; capsule segments c. 2.1–2.3 \times 1.1–1.4 mm. Seeds deep brown, 1.2–1.4 mm long, (0.6–) 0.7–0.8 mm wide; apex usually distinct; basal appendage indistinct, to 0.1 mm, fibrillate.

A widely distributed variable complex of populations extending from E Nepal to SW China, Taiwan and S Malasia. The variation is centred in Sichuan and adjacent territories where two varieties linked by occasional intermediates are recognized. The whole group is in need of revision. Most common habitats include humid mountain forests, wet scrub, shady ravines and cliff-faces.

Lower cauline leaves usually 4–11 mm wide; tepals \pm brown to deep (castaneous-)brown; stem usually less than 1.5–2.0 mm in diam.

23a. var. *effusa*

Lower cauline leaves usually 10–21 mm wide; tepals paler reddish brown to brown; stem usually 3–6 mm in diam.

23b. var. *chinensis*

23a. *Luzula effusa* Buchenau var. *effusa*

Illustrations: Muh-Tsuen Kao & C.E. Devol, in Hui-Lin Li, *Fl. Taiwan* 5: 155, plate 1304 (1978); H.J. Noltie, *Fl. Bhutan* 3(1): 263, fig. 25 (1994); K.F. Wu, *Fl. Reipubl. Popularis Sin.* 13(3): 240, plate 58 (1997).

Plants usually to (50–) 80 cm tall, often slender; stolons short to long. Stem usually 1–2 mm diam. Cauline leaves usually 4–11 mm wide. Tepals \pm brown to deep (castaneous-)brown, usually 1.8–2.8 mm long. Anthers 0.5–1.1 mm long; filaments usually 0.6–0.8 (–1.0) mm long.

The East Himalaya from E Nepal to Manipur, N Burma, SW and C China, Taiwan, Luzon, Borneo, Sulawesi and New Guinea. 36: CHC, CHN, CHT. 38: TAI. 40: EHM, NEP. 41: BMA. 42: BOR, NWG, PHI, SUL. Humid mountain woodlands, shrubby slopes and subalpine ravines. Map 45.

36. TIBET: Kongbo, Doshong La, 4000 m, *F. Ludlow, G. Sherriff & G. Taylor 4676a* (BM, UPS). CHINA SOUTH-CENTRAL: Sichuan, Mt Omei [Emei], Chiu-lo Tung, 2000 m, *F.T. Wang 23312* (S). CHINA NORTH-CENTRAL: Gansu ['Kansu orient.'], 4 Sep 1890, *Potanin* (K, LE). 38. TAIWAN: Taichung, W slope of Mt Loyehwei-shan, *Shimizu & Chuang 20183* (S). 40. NEPAL: Tamur Valley, Topke Gola, c. 3530 m, *J.D.A. Stainton 976* (UPS). BHUTAN: Pele-La, *Gould 345* (K). 42. BORNEO: Sabah, Kinabalu, Masilau R., *M.S. Clemens 51371* (K). NEW GUINEA: Papua, Goilala, Mt Albert Edward, 3600 m, *J.R. Croft et al. 61394* (BM, K). PHILIPPINES: Luzon, Mt Pulog, *E.D. Merrill 6490* (K). SULAWESI: Enrekang, Rante Mario, 3300 m, *P.J. Eyma 879* (K).

A very variable taxon. Rarely, very young plants have the inflorescence only indistinctly storied. Plants from Taiwan and Malaya have tepals usually 2.5–2.8 mm long, longer than capsules. The Malayan plants have more numerous basal leaves and, on average, longer stolons. Intermediates between the two varieties are not rare.

23b. *Luzula effusa* var. *chinensis* (N.E.Br.) K.F. Wu, *J. E. China Norm. Univ., Nat. Sci. Ed.*, 1992(3): 92 (1992)

Luzula chinensis N.E.Br., *J. Linn. Soc., Bot.* 36: 161 (1903). T: China, [Sichuan] Szechuan, *A. Henry 8829*; syn: K; S (fragment); China, Szechuan, near Tibetan frontier, Tachienlu [Kangding], *A. Pratt 360*; syn: BM, K.

Plants usually 50–100 cm tall, robust; stolons short. Stem usually 2–6 mm in diam. Cauline leaves usually to 20 cm long and 10–21 mm wide. Tepals usually 1.9–2.3 mm long, paler reddish brown to brown. Anthers 0.5–0.6 mm long; filaments 0.6–0.8 mm long.

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Most frequently found in Sichuan and Yunnan, less common in Tibet, Hubei, Guizhou and N Burma. 36: CHC, CHT. 41: BMA. Mesic to humid woodlands. Map 46.

36. CHINA SOUTH-CENTRAL: Hubei [originally Hupeh, without detailed locality], *A. Henry 6809* (K); Sichuan, Ta-hsiang-ling, 2700 m, *H. Smith 2083* (UPS); Nanchuan-hsien, c. 200–2200 m, *W.P. Fang 974* (E); 1157 (E, K); Omei [Emei] Shan, *E.H. Wilson 5303, 5304* (BM, K); Yunnan, Yangbi Xian, W side of Diancang Shan, 3300–3600 m, *B. Bartholomew et al. 423* (E). TIBET: Pome [Bomi], Tongkah, *F. Ludlow, G. Sherriff & R.H.J. Williams 13770* (BM).

Extremely robust forms of var. *chinensis* are very different from the type variety but intermediates are known.

24. *Luzula alpinopilosa* (Chaix) Breistr., *Bull. Soc. Sci. Isère* 61: 609 (1947)

Juncus alpinopilosus Chaix, in D. Villars, *Hist. Pl. Dauphiné* 1: 318 (1786). T: *Haller 1326* [A. von Haller, *Hist. Stirp. Helv.* 2: no. 1326 (1768)]; syn: P-Haller; France, Chaliol-le-Viel, *D. Chaix*; syn: G, *n.v.*

Luzula variabilis Buchenau, *Bot. Jahrb. Syst.* 7: 171 (1885), ['species collectiva'], *nom. illeg.*

Perennials 10–65 cm tall, subglabrous, loosely caespitose; rhizome branched, ascending; stolons often present, short. Basal leaves few, intermediate between cataphylls and cauline leaves; cauline leaves 3–5, 1.5–9.0 mm wide. All leaves with papillose-serrulate margins; apex acute. Lower bract herbaceous to subherbaceous, shorter than or rarely \pm equalling inflorescence. Inflorescence a loose to subdense suberect or \pm nodding panicle to 7×6 cm; flowers borne singly and in 2–3 (–7)-flowered clusters. Bracteoles ovate-lanceolate, 1.5–2.0 mm long, brownish, ciliate. Tepals \pm equal, glabrous, lanceolate, with outer ones acuminate, 1.8–3.3 mm long, blackish brown to dark castaneous-brown; margins indistinct or very narrow. Stamens 6; anthers 0.6–1.2 mm long, 3–9 times longer than filaments; filaments 0.1–0.4 mm long; style 0.6–1.2 mm long; stigmas 1–2 mm long. Capsule ovoid to oblong-ovoid, subobtuse to \pm acute, shortly mucronate, usually \pm exceeding perianth, dark castaneous-brown, smooth; capsule segments usually $2.1\text{--}2.4 \times 1.2\text{--}1.5$ mm. Seeds pale brown, oblong-ovoid, 1.1–1.3 mm long, 0.6–0.7 (–0.9) mm wide; apex distinct, pale, to 0.1–0.2 mm long; basal appendage minute, as a paler patch to 0.1 mm long; base fibrillate.

Mountains of C and S Europe. Very variable in size, leaf width, tepal length and anther/filament length ratio. Three subspecies are recognized but numerous intermediates exist. Subalpine and alpine grasslands, rocky slopes, on gravel along streams, confined to silicic substrates.

- | | | |
|----|--|--|
| 1 | Filaments 0.1–0.2 (–0.3) mm long; anthers 4–9 times longer than filaments | 24b. subsp. obscura |
| 1: | Filaments 0.3–0.4 mm long; anthers usually 2–4 times longer than filaments | |
| 2 | Cauline leaves 4–7 cm long, 1.5–5.5 mm wide; anthers usually 0.9–1.2 mm long; lower bract substantially shorter than inflorescence | 24a. subsp. alpinopilosa |
| 2: | Cauline leaves 7–13 cm long, 4–9 mm wide; anthers usually 0.7–0.8 mm long; lower bract \pm equalling inflorescence or shorter | 24c. subsp. deflexa |

24a. *Luzula alpinopilosa* (Chaix) Breistr. subsp. **alpinopilosa**

Juncus spadiceus All., *Fl. Pedem.* 2: 216 (1785), *nom. illeg., non* Vill. (1779); *Luzula spadicea* [All.] DC., *Fl. Franç.*, 3rd edn, 3: 159 (1805); *Luzula spadicea* var. *allionii* E. Mey., *Linnaea* 22: 401 (1849), *nom. inval.*; *Luzula spadicea* var. *barbata* Neill., *Nachtr. Fl. Wien* 100 (1851); *Luzula variabilis* Buchenau, *Bot. Jahrb. Syst.* 7: 171 (1885), [doubtfully valid: 'species collectiva'], *nom. illeg.*; *Juncoides spadicea* Kuntze, *Revis. Gen. Pl.* 2: 724 (1891). T: *Haller 1326*; syn: P-Haller; *Scheuchzer It. Alp.* 6: 458; syn: *n.v.* [authentic material of Scheuchzer in W]

Luzula spadicea var. *laxiflora* Desv., *J. Bot. (Desvaux)* 1: 146 (1809); *Luzula spadicea* f. *laxiflora* (Desv.) I. Grint., *Fl. Rep. Soc. Roman.* 11: 594 (1966). T: 'in pratis humidis Alpium Europae' [otherwise not indicated].

Luzula spadicea β [unranked] *elatior* Gaudin, *Fl. Helv.* 2: 569 (1828). T: [Switzerland] in valle Champé, *J. Gay*; syn: *n.v.*

Luzula spadicea var. *candollei* E.Mey., *Linnaea* 22: 401 (1849); *Luzula spadicea* subsp. *candollei* (E.Mey.) K.Richt., *Pl. Eur.* 1: 185 (1890); *Luzula alpinopilosa* subsp. *candollei* (E.Mey.) Rothm., *Feddes Repert. Spec. Nov. Regni Veg.* 67: 4 (1963). T: France, E Pyrenees, Val d'Eynes, 13 Sep 1839, *R.J.Shuttleworth*; syn: W; Switzerland, Geneve, *Castan*; syn: *n.v.*; Pyrenees, Meles, *L.Marchand*; syn: *n.v.*

Illustrations: H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 1: 519 (1967), as *L. spadicea*; S.Pignatti, *Fl. Ital.* 3: 445 (1982).

Plants (10–) 15–20 (–35) cm tall. Leaves of sterile shoots (when present) usually 5–10 (–20) cm long, 2–4 (–5) mm wide; cauline leaves usually 4–7 cm long, 1.5–3.5 (–5.5) mm wide. Lower bracts subherbaceous or pale brownish, 2–3 (–4) cm long, substantially shorter than inflorescence. Inflorescence usually 4–7 × 3–6 cm, suberect to slightly nodding, ±evenly branched, most flowers usually borne singly, but with 2–4-flowered clusters usually also present. Tepals 1.8–2.7 mm long. Anthers 0.9–1.2 mm long, usually 3–4 times longer than filaments; filaments 0.3–0.4 mm long; style (0.7–) 0.9–1.2 mm long; stigmas c. 1.5 mm long. 2n=12 [AL], *fide* H.Nordenskiöld, *Hereditas* 37: 330–331 (1951); Druskovic, *Int. Organ. Pl. Biosyst. Newslett.* 24: 13 (1995).

Mountains of Central and southern Europe: the Alps, the N Apennines, the Pyrenees, the Vosges. 11: AUT, GER, SWI. 12: FRA, SPA. 13: ITA, YUG-SL. Rocky and stony subalpine and alpine slopes. Map 47.

11. AUSTRIA: Steiermark, Bösenstein, 1896 m, *G.Strobl [Fl. Exs. Austro-Hung.] 1872* (PR, PRC, WU); Vorarlberg, Montafon, Hochmaderjoch, *Gölles 462* (WU). SWITZERLAND: Tessin, St. Gotthard, Monte Prosa, 2400 m, *A.Kneucker [Cyper. Junc. Exs.] 90* (PR, PRA); Valais, Zermatt, Riffelberg, *F.O.Wolf [A.Kneucker, Cyper. Junc. Exs.] 90a* (PR). 13. ITALY: N Apennines, Corno alle Scale, 21 Jul 1840, *P.Savi* (PR); Saint-Rhémy, 2400 m, *A.Charpin, W.Greuter & Hainard [Exs. Genav.] 117* (W).

Very variable but the two extremes (the broad-leaved, small-flowered form often recognized as subsp. *candollei*, and the typical narrow-leaved large flowered plants) often coexist within populations, and intermediates are not rare.

24b. *Luzula alpinopilosa* subsp. *obscura* S.E.Fröhner, *Preslia* 40: 426 (1968)

Luzula obscura (S.E.Fröhner) Novikov, *Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol.* 95(6): 66 (1990). T: Slovakia, Vysoké Tatry, Zbojnická chata, 1900 m, 14 Aug 1965, *S.Fröhner*; holotype: PR.

Luzula carpatica Kitt. ex Kanitz, *Linnaea* 32: 327 (1863), *an nom. validum?*; *Luzula spadicea* A.b. [unranked] *carpatica* (Kitt. ex Kanitz) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 513 (1904); *Luzula spadicea* f. *carpatica* (Kitt. ex Kanitz) I.Grint., *Fl. Rep. Soc. Roman.* 11: 594 (1966). T: [Slovakia], 'in der kleinen Kohlbach', *J.D.T.Mauksch*; holotype: *n.v.*, probably BP.

Illustration: T.Szynał & J.Małdalski, *Atlas Fl. Polsk.* 2(2): 151 (1931).

Plants 10–30 cm tall. Cauline leaves 3–8 cm long, 3.5–6.5 mm wide. Lower bract usually herbaceous, usually 1.5–4.5 cm long, shorter than inflorescence. Inflorescence c. 4–5 × 3–5 cm, ±nodding to suberect; main branches long; secondary branches often abbreviated; flowers borne singly and usually in (2–) 3–5 (–7)-flowered loose clusters. Tepals (2.0–) 2.2–3.0 mm long. Anthers 0.9–1.2 mm long, usually 4–9 times longer than filaments; filaments 0.1–0.2 (–0.3) mm long; style 0.8–0.9 mm long; stigmas 1.2–2.0 mm long. 2n=12 [AL], *fide* J.Májovský & A.Murín, *Karyotax. Prehl. Fl. Slov.* 361 (1987). Fig. 12.

C Europe, confined to the Carpathians from Slovakia and Poland to Romania. 11: CZE-SL, POL. 13: ROM. 14: UKR. Map 48.

11. SLOVAKIA: Nizké Tatry, Kráľova Hôľa, 1700 m, 20 Aug 1898, *K.Točl* (PR); Vysoké Tatry, Mlynická dolina, 1700 m, 10 Jul 1925, *K.H.Rechinger* (W). 13. ROMANIA: Retezat [Mtns], Gura Apei, Zanova Lake, 2 Jul 1970, *J.Soják* (PR); Muntii Fogarasului, Vistea, Sambatei Valley, 1200–2000 m, 30 Jun 1970, *J.Soják* (PR). 14. UKRAINE: the East Carpathians, Mt Goverla, 2030 m, 7 Jul 1948, *E.Brady & A.Zanjatova* (MW); Zakarpatskaya area, Rachiv, Mt Turkul (1850 m) 16 km NE of Bogdan, 1740 m, 27 Jul 1996, *Z.Kaplan 96/506* (PRA).

The overall variation of subsp. *obscura* is greater than that described in the protologue. In particular, narrow-leaved and small-flowered plants occur in populations of subsp. *obscura*. Some plants from Bulgaria (the Stara Planina Mtns) are intermediate between subsp. *obscura* and subsp. *deflexa*.

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Figure 12. *Luzula alpinopilosa* subsp. *obscura*. **A**, habit; **B**, inflorescence; **C**, terminal group of flowers; **D**, flower; **E**, capsule; **F**, seed; **G**, tepal; **H**, bracteole; **I**, stem T.S.; **J**, leaf T.S. (**A**, **C**–**J**, *Piasecki*, 4 Aug 1890, KRA; **B**, *A.Rehman s.n.*, KRA). Scale bars: **A**, **B** = 5 cm; **C** = 5 mm; **D**–**H** = 2 mm; **I**, **J** = 1 mm. Drawn by T.Szynal. Reproduced with permission, from T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2/2: 151 (1931).

24c. *Luzula alpinopilosa* subsp. *deflexa* (Kožuharov) Kirschner, *Taxon* 50: 1109 (2001)

Luzula deflexa Kožuharov, *Fl. Bulg.* 2: 402 (1965); *Luzula glabrata* subsp. *deflexa* (Kozhukh.) Kozhukh., in N.Andreev et al., *Opred. Vissh. Rast. B'lgar.* 786 (1992). T: Bulgaria, [Mtns] Vitosha, A.Yavashev; holo: SOM.

Luzula spadicea var. *sarplaninae* Rohlena, *Věstn. Král. České Společn. Nauk, Tr. Mat-Prir* 1937(1)6: 7 (1938). T: F.Y.R. Macedonia, Šar Planina, Crni vrh, 2400–2500 m, 14 Jul 1934, K.Hrubý, A.Jirásek & T.Martinec; holo: PRC.

Luzula spadicea var. *velenovskii* Kožuharov, *Izv. Bot. Inst. Bulg. Akad. (Sofia)* 11: 130 (1963), *nom. inval.*; *Luzula alpinopilosa* subsp. *velenovskii* [Kožuharov ex] Chrtek & Křisa, *Preslia* 46: 212 (1974), *nom. inval.* Authentic material: Bulgaria, 'Rila, Rodopi', V.Střibrný; PRC, SOM.

Luzula spadicea var. *davidovii* Kožuharov, *Izv. Bot. Inst. (Sofia)* 11: 130 (1963), *nom. inval.* Authentic material: Bulgaria, Vitosha, A.Yavashev; SOM.

Luzula spadicea f. *pumila* Kožuharov, in D.Jordanov, *Fl. (N. R.) B'lgar.* 2: 402 (1964), *an nom. valid.?* T: Bulgaria, Mt Rila reg. alpina [collector not given]; holo: *n.v.*

Luzula spadicea f. *compacta* Kožuharov, in D.Jordanov, *Fl. (N. R.) B'lgar.* 2: 402 (1964), *an nom. valid.?* T: Bulgaria, Mt Pirin reg. alpina [collector not given]; holo: *n.v.*

Plants (10–) 25–50 (–65) cm tall. Leaves of sterile shoots (when present) to 30 cm long, c. 5–7 mm wide; cauline leaves usually 4–5, usually (7–) 9–13 cm long, 4–8 (–9) mm wide. Lower bract herbaceous, usually (2–) 4–8 cm long, ±equalling or shorter than inflorescence. Inflorescence usually 4–7 × 3–6 cm; main branches long; secondary branches short; flowers usually in 2–3 (–5)-flowered clusters, some borne singly. Tepals (2.0–) 2.5–2.8 (–3.3) mm long. Anthers 0.7–0.8 (–1.0) mm long, 2–3 times longer than filaments; filaments 0.3–0.4 mm long; style 0.6–0.7 mm long; stigmas 1.0–2.0 mm long.

S Europe, confined to Balkan Peninsula: Albania, Bulgaria, F.Y.R. Macedonia and Greece. 14: ALB, BUL, GRC, YUC. Subalpine and alpine grasslands, wet scree, rocky slopes, rock ledges. Map 49.

14. BULGARIA: the Rila [Mtns], Malyovitsa, near Malyovitsa Chalet, c. 1800 m, *J.Kirschner B-664* (PRA); the Rila [Mtns], Mt Polič, 27 Jul 1912, *B.Davidov* (SOM); the Rila [Mtns], Mermera Mtn, 2630 m, 5 Aug 1964, *M.Simeonovski* (SOM); the Pirin, Todorin Vrh, 14 Jul 1926, *D.Yordanov* (SOM). F.Y.R. MACEDONIA: Shar Planina, above Shtrbtse, 1900 m, *K.Vandas* (PR).

Very variable in size, tepal length and leaf width. In many characters it overlaps with those of subsp. *obscura*. Plants intermediate between subsp. *obscura* and subsp. *deflexa* occur in N Bulgaria; plants from Greece probably are similar.

Presumed hybrids

Luzula parviflora (Ehrh.) Desv. × *L. piperi* (Coville) M.E.Jones

Reputed hybrid, *fide* L.Hämet-Ahti, *Ann. Bot. Fenn.* 8: 378 (1971). The only specimen referred to the hybrid combination, [USA, Montana, Ravalli Co., *C.L.Hitchcock* & *C.V.Muhlick 15340* (UC)] is reported to be seed sterile.

Luzula × *sichuanensis* K.F.Wu, J. E. *China Norm. Univ., Nat. Sci. Ed.*, 1992(3): 92 (1992), *pro sp.*

T: China, Sichuan, Maerkang Xian, Ma-tang, *H.Smith 4385*; holo: PE, photo TI, PRA; iso: UPS.

Plants to 50–60 cm tall; rhizome short, ascending; stolons short. Basal leaves to 25 cm long, 4–6 mm wide; cauline leaves (1–) 2–3 (–4), 8–12 cm long, 4–6.5 mm wide. All leaves subglabrous, with papillose-serrulate margins; apex acute. Inflorescence lax, to 12 × 12 cm, terminal (not storied), few-flowered; flowers borne singly; secondary branches long. Bracteoles ±entire, later sublacerate above. Tepals ±equal, lanceolate, (1.5–) 1.7–1.9 mm long, mid-brown to paler brown. Stamens 6; anthers 0.3–0.5 mm long (in the UPS isotype; original description gives 0.6–0.8 mm); filaments 0.4–0.5 mm long; style c. 0.4 mm long; stigmas 1.2–1.5 mm long. Capsule ±ovoid-ellipsoid, subacute, longer than perianth, dark

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castaneous-brown, smooth above; capsule segments 1.9–2.1 × 1.3–1.4 mm. Seeds 1.2–1.3 mm long, c. 0.7 mm wide; appendage indistinct; base fibrillate.

The type plant is intermediate between *L. parviflora* and *L. effusa* in many characters. The material is too scanty to allow a more definite conclusion; it may be a result of hybridization or old introgression, or alternatively, it may represent a local, isolated aberrant derived from *L. parviflora*. In addition to the above locality, similar plants but closer to *L. effusa* were identified from SW Sichuan, near Muli monastery, *H. Handel-Mazzetti 7475* (WU); they are more robust and have slightly papillose capsules. All these intermediates seem to be fertile.

Sect. 5. ALPINAE

Luzula sect. *Alpinae* Chrtek & Křisa, *Preslia* 46: 211 (1974)

Luzula subsect. *Alpinae* (Chrtek & Křisa) Kovtonyuk, *Bot. Žurn. (Moscow & Leningrad)* 72: 1399 (1987); *Luzula* sect. *Spicatae* K.F.Wu, *J. E. China Norm. Univ., Nat. Sci. Ed.*, 1992(3): 101 (1992), *nom. illeg.* T: *Luzula spicata* (L.) DC.

Perennials. Leaves with acute to acuminate tips (mostly all leaves, sometimes only cauline ones). Lower bract herbaceous to membranous. Inflorescence usually nodding, less often erect (if so, then usually a ±compact single head), spike-like or paniculate, congested or interrupted at base. Seeds subglobular to ellipsoid; appendage indistinct, to 0.2 mm long or ±lacking; base fibrillate. Diploids or agmatoploids.

An intricate, not yet fully monographed group of 20 species distributed in the mountains of the northern hemisphere, and in South America and New Zealand, again mainly in high mountains. Here a new revision is presented but a number of questions remain unanswered.

- | | | |
|----|---|------------------------------------|
| 1 | Abaxial surface of basal leaves with thick white tomentum | 25. <i>L. ulophylla</i> |
| 1: | Abaxial surface of basal leaves glabrous (margins usually ciliate) | |
| 2 | Plants stoloniferous | |
| 3 | Stem 10–45 cm long; inflorescence ±nodding; stem much overtopping basal leaves; tepals reddish-blackish | 42. <i>L. vulcanica</i> |
| 3: | Stem less than 5 cm long; inflorescence ±erect; stem shorter than or scarcely equalling basal leaves, often not visible; tepals whitish-membranous with pale brown midrib | 27. <i>L. celata</i> |
| 2: | Stolons absent | |
| 4 | Stamens 3, rarely 4–5 | |
| 5 | Inflorescence an interrupted panicle composed of remote panicles of spike-like flower clusters; inflorescence constitutes at least 1/3 of plant height | |
| 6 | Outer tepals usually 2.5–3.0 mm long; style 0.4–0.5 mm long; stigmas 1.0–1.2 mm long | 32. <i>L. ecuadoriensis</i> |
| 6: | Outer tepals usually up to 2 mm long; style 0.2–0.4 mm long; stigmas 0.5–0.7 mm long | 33. <i>L. excelsa</i> |
| 5: | Inflorescence ±spike-like (not composed of panicles of clusters), compact or interrupted or of usually 3–6 cylindrical ±pedunculate clusters; inflorescence constitutes less than 1/5 of plant height | |
| 7 | Tepals ciliate | |
| 8 | Plants to 13 cm tall; stem thin, c. 0.3–0.4 mm diam. in upper part; inflorescence ±erect to slightly nodding, usually 2.5–5 cm long | 43. <i>L. antarctica</i> |
| 8: | Plants usually 20–60 cm tall; stem rigid, about 1 mm diam. in upper part; inflorescence nodding, usually 1.0–1.5 cm long | 41. <i>L. peruviana</i> |

- 7: Tepals ±glabrous (not to be confused with ciliate bracteoles)
- 9 Inflorescence usually distinctly nodding
- 10 Style 0.1–0.2 mm long; capsule segments 1.5–1.8 mm long; leaf margin ±densely papillose-serrulate **40. *L. racemosa***
- 10: Style 0.3–0.4 mm long; capsule segments 1.8–2.1 mm long; leaf margin ±smooth **26. *L. traversii***
- 9: Inflorescence erect to suberect
- 11 Inflorescence composed of 3–6 (10) distinct elongated cylindrical flower clusters; lower clusters pedunculate and upper subsessile **37. *L. brachyphylla***
- 11: Inflorescence congested, usually a single head, ovoid to lobate, rarely interrupted at base; clusters ±sessile
- 12 Basal leaves 4–9 mm wide; basal bract herbaceous; style c. 0.3 mm long. [Juan Fernández Is.] **35. *L. masafuerana***
- 12: Basal leaves c. 1 mm wide; basal bract membranous; style c. 0.1 mm long. [NW Argentina] **44. *L. ruiz-lealii***
- 4: Stamens 6, rarely 4 or 5
- 13 Tepals densely to sparsely ciliate **36. *L. alopecurus***
- 13: Tepals ±glabrous
- 14 Seeds (excluding basal appendage) more than 1.2 mm long
- 15 Seeds 2.1–2.4 mm long **30. *L. pediformis***
- 15: Seeds less than 2.0 mm long
- 16 Anthers 2.0–2.9 mm long, at least 5 times as long as filaments **31. *L. caespitosa***
- 16: Anthers less than 1.2 (–1.5) mm, up to 3 times as long as filaments
- 17 Style 0.6–0.9 mm. [S Europe] **28. *L. pindica***
- 17: Style 0.3–0.6 mm. [South America]
- 18 Tepals ±equal, c. 2.7–3.3 mm long; anthers usually 0.6–0.9 mm long; inflorescence ±compact **38. *L. chilensis***
- 18: Tepals unequal, with outer ones 3.5–4.8 mm long; anthers usually 0.7–1.5 mm long; inflorescence often interrupted at base **39. *L. leiboldii***
- 14: Seeds (excluding basal appendage) less than 1.2 mm long
- 19 Inflorescence erect to suberect
- 20 Inflorescence of a single compact ±ovoid head; cauline leaves absent; basal leaves ±obtuse; basal bract membranous, to 1 cm long **44. *L. ruiz-lealii***
- 20: Inflorescence composed of 3–6 (–10) distinct spike-like elongated cylindrical flower clusters; lower clusters pedunculate and upper ones subsessile; cauline leaves 1 or 2; basal bract herbaceous, 1.5–4.0 cm long **37. *L. brachyphylla***
- 19: Inflorescence nodding
- 21 Inflorescence a panicle of remotely interrupted partial inflorescences, each of long pedunculate secondary panicles composed of 3–10 spike-like clusters; lowermost secondary panicle often 10–15 cm below the terminal one **34. *L. mendocina***
- 21: Inflorescence congested in a single head, sometimes lobate or interrupted at base; basal clusters subsessile, not remote

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22 Leaf margin \pm smooth; basal leaves acute with acicular tip

26. *L. traversii*

22: Leaf margin \pm densely papillose-serrulate; basal leaves \pm obtuse to acute (on a single plant)

29. *L. spicata*

25. *Luzula ulophylla* (Buchenau) Cockayne & Laing, *Trans. Proc. New Zealand Inst.* 43: 366 (1911)

Luzula racemosa var. *ulophylla* Buchenau, *Oesterr. Bot. Z.* 48: 245 (1898). T: New Zealand, South Island, Albertown, Lake Wanaka, *D.Petrie*; syn: W [seen in 1994, in 1998 not located]; Southern Canterbury Alps, Castle Hill Distr., 2200 ft., Dec 1894, *L.C.Cockayne*; syn: B, destroyed; Castle Hill, 1893, *L.C.Cockayne*; neo: WELT 12668, *fide* E.Edgar, *New Zealand J. Bot.* 4: 165 (1966); E.Edgar, in L.B.Moore & E.Edgar, *Fl. New Zealand* 2: 72 (1970).

Perennials (5–) 9–20 (–28) cm long, densely hairy, densely caespitose; rhizome short, vertical, \pm many-headed; stolons absent. Basal leaves short, usually 3–6 cm long, (1–) 2–3 mm wide, usually inrolled, narrow, whole, or upper two thirds of abaxial surface with thick white tomentum; cauline leaves absent or 1 (–2), with blade reduced, filiform, 1–2 cm long; sheath to 2 cm long. All leaves with subulate acute tip; margins \pm smooth. Lower bract ovate, straw-brown, membranous, c. 5 mm long, similar to middle bracts. Inflorescence erect, cylindrical to \pm ovoid, densely congested, spike-like, usually 0.8–2.0 \times 0.6–1.0 cm, of 1–5 few-flowered clusters. Bracteoles ovate, scarious, 1.5–2.0 mm long, ciliate near apex. Tepals \pm entire, subequal, rarely \pm denticulate near apex, (1.3–) 1.6–1.9 (–2.1) mm long, acuminate; lower middle part dark castaneous brown; margins broad, white-scarious. Stamens 3 (4–6); anthers 0.4–0.5 (–0.7) mm long; filaments 0.3–0.5 mm long; style c. 0.3 mm long; stigmas c. 0.5 mm long. Capsule obovoid, equalling or slightly exceeding perianth, \pm obtuse to subacute, dark brown to black; capsule segments 1.5–2.0 \times c. 1.1–1.3 mm. Seeds pale castaneous, 0.8–0.9 mm long, c. 0.6 mm wide; appendage minute, appearing as a paler basal fibrillate swelling to 0.1 mm long. $2n=48$ [48CL], *fide* H.Nordenskiöld, *New Zealand J. Bot.* 4: 186 (1966); $2n=44$, *fide* J.B.Hair, *New Zealand J. Bot.* 5: 18 (1967). Fig. 13.

Endemic to the South Is. of New Zealand. 51: NZS. Wind-eroded shingly open ground or grasslands, between 300 and 1500 m. Map 50.

51. NEW ZEALAND SOUTH: South Is., Otago, head of Eweburn Dam, *H.E.Connor & H.Nordenskiöld S151* (UPS); C Otago, Queenstown, Ben Lomond, *H.E.Connor & H.Nordenskiöld S189* (UPS); Canterbury, Acheron R., near diversion to Lake Coleridge, *E.Edgar G5791* (CHR, PR); S Canterbury, Lake Tekapo, Boundary Stream, 13 Jan 1961, *H.E.Connor* (CHR 113675, K); Canterbury, Lake Heron, 720 m, *A.D.Wilton 98048* (CHR, PRA).

Easily distinguished by the dense white tomentum on the abaxial surface of the leaves.

26. *Luzula traversii* (Buchenau) Cheeseman, *Man. New Zealand Fl.*, 2nd edn, 305 (1925)

Luzula racemosa var. *traversii* Buchenau, *Bot. Jahrb. Syst.* 12: 133 (1890). T: New Zealand, *H.H.Travers*; lecto: WELT 12718, *fide* E.Edgar, *New Zealand J. Bot.* 4: 164 (1966); E.Edgar, in L.B.Moore & E.Edgar, *Fl. New Zealand* 2: 71 (1970).

Perennials 10–40 cm tall, densely caespitose; rhizome short; stolons absent. Leaves with \pm acicular tip and sparsely ciliate, with \pm smooth margins. Lower bract herbaceous, exceeding inflorescence, 3–5 cm long. Inflorescence \pm nodding, of (1–) 3–9 clusters congested into a lobate or pyramidal head up to 2–3 \times 1.5 cm. Bracteoles ovate, entirely membranous, often castaneous at base, 1.5–2.0 mm long, \pm entire or sparsely ciliate near apex. Tepals subequal, \pm entire, usually with a dark castaneous brown midrib and broad whitish-membranous margins. Style 0.3–0.4 mm long; stigmas c. 1.0–1.2 mm long. Capsule subacute, equalling or \pm exceeding perianth. Seeds 1.0–1.2 mm long, 0.6–0.7 mm wide; appendage indistinct, to 0.1 mm, fibrillate.

Endemic to the South Is. of New Zealand. Similar to *L. racemosa* but inflorescence not interrupted, tepals with broad scarious-membranous margins, and longer style, capsule segments and seeds. *L. masafuerana* differs from *L. traversii* in having broader leaves with papillose-serrulate margins, broader bracts and suberect inflorescence. Two varieties are recognized within *L. traversii*; intermediates are known (Canterbury, Cave Stream, *N.T.Moar & H.Nordenskiöld S118*, UPS). E.Edgar, *New Zealand J. Bot.* 4: 164 (1966), mentioned

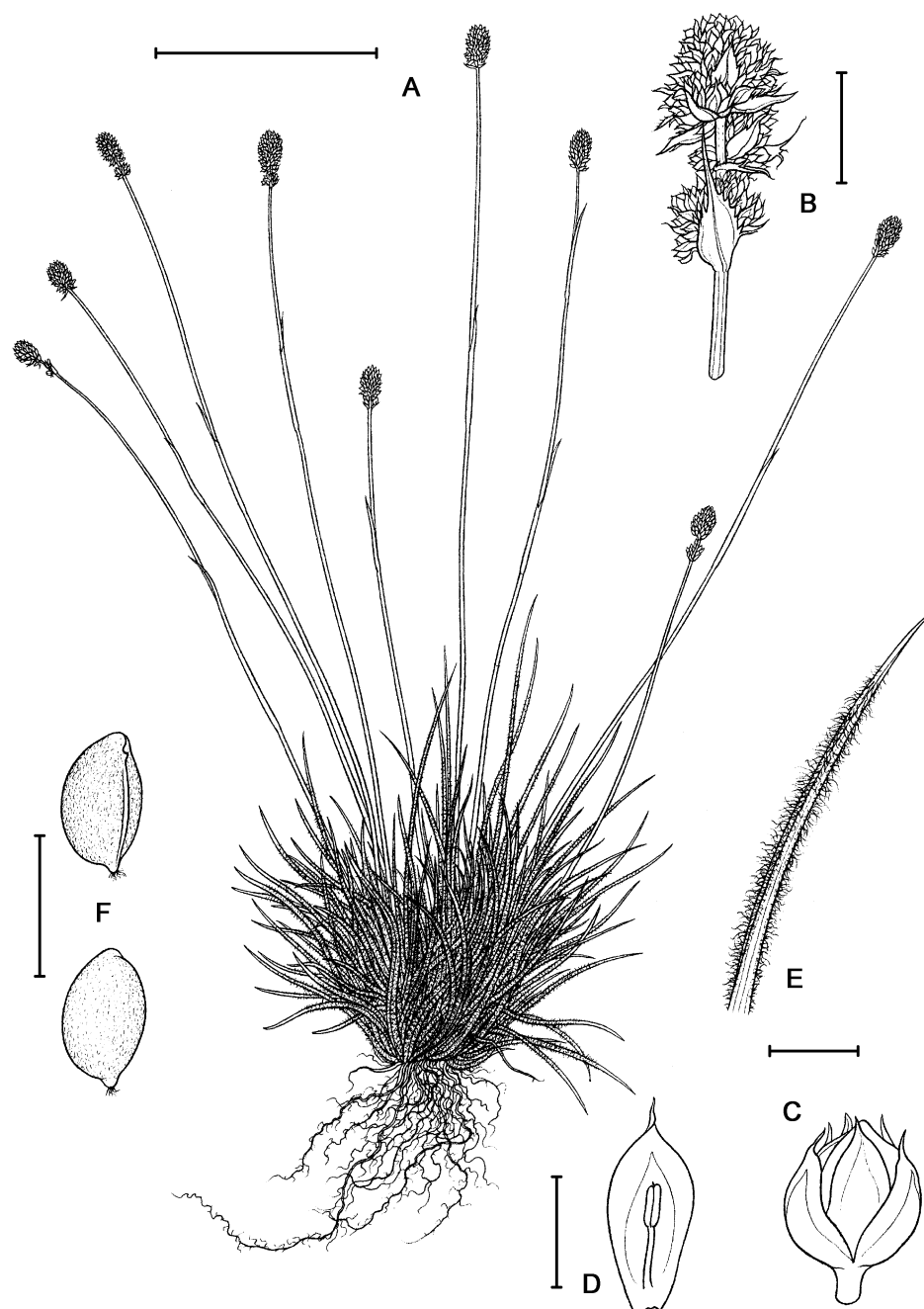


Figure 13. *Luzula ulophylla*. **A**, habit; **B**, inflorescence; **C**, perianth and capsule; **D**, tepal and stamen; **E**, leaf apex, note the abaxial surface indumentum and acute tip; **F**, seeds. (**A**, **B**, *E. Edgar* G5791, PR; **C**–**F**, *H. E. Connor & H. Nordenskiöld* S151, UPS). Scale bars: **A** = 5 cm; **B** = 5 mm; **C** = 1 mm; **D** = 1 mm; **E** = 1 cm; **F** = 1 mm. Drawn by © E. Smrčinová.

JUNCACEAE (*Luzula*)

dwarf plants from C Otago as a part of the variation range of *L. traversii*. The absence of herbaceous bracts might indicate a distinct taxon.

Stamens usually 3; anthers \pm as long as filaments; basal leaves usually 2–4 mm wide **26a. var. *traversii***

Stamens usually 6; anther/filament ratio c. 2; basal leaves usually to 2 mm wide **26b. var. *tenuis***

26a. *Luzula traversii* (Buchenau) Cheeseman var. *traversii*

Basal leaves usually up to 12–15 cm long, (1–) 2–4 (–5) mm wide; cauline leaves 2 or 3, usually up to 6–7 cm long. Tepals 1.8–2.2 (–2.5) mm long. Stamens 3– (4–5); anthers 0.5–0.6 mm long; filaments 0.4–0.5 mm long. Capsule castaneous brown; capsule segments 1.8–1.9 \times c. 1.2 mm. 2n=46 [46CL], *fide* H.Nordenskiöld, *New Zealand J. Bot.* 4: 186 (1966); 2n=32, *fide* J.B.Hair, *New Zealand J. Bot.* 5: 18 (1967).

Endemic to the South Is. of New Zealand. 51: NZS. Rocky slopes, 600–1500 m. Map 51.

51. NEW ZEALAND SOUTH: South Is., Canterbury, Mt. Cook, Mueller Moraines, 800–950 m, *N.T.Moar S82* (UPS); Canterbury, Mt Cook District, Hooker Valley, *J.D.Lovis 1087* (BM); Mt Cook, Bull Hut, *H.St.John 24675* (K); Otago, Lindis Pass, 1450 m, *N.T.Moar & H.Nordenskiöld S225* (UPS); Broken R., *A.Sinclair & J.F.J. von Haast 236* (K); Craigieburn Range, Mt Hamilton, *R.Melville 5695C* (K).

26b. *Luzula traversii* var. *tenuis* Edgar, *New Zealand J. Bot.* 4: 164 (1966)

T: New Zealand, South Island, C Otago, Cromwell Gorge, 5 Feb 1958 *H.Nordenskiöld S173 & H.E.Connor*; holo: CHR113666; iso: UPS.

Basal leaves usually up to 10–15 cm long, 1–2 (–2.5) mm wide; cauline leaves (1–) 2 (–3), up to 6–7 cm long. Tepals 2.1–2.8 mm long. Stamens 6; anthers 0.8–1.0 mm long; filaments 0.4–0.5 mm long. Capsule dark castaneous brown; capsule segments 1.8–2.1 \times 1.3–1.4 mm. 2n=46 [46CL], *fide* H.Nordenskiöld, *New Zealand J. Bot.* 4: 186 (1966); 2n=42, *fide* J.B.Hair, *New Zealand J. Bot.* 5: 18 (1967).

Known only from a small area of C Otago, South Is., New Zealand. 51: NZS. Rocky slopes, 200–450 m. Map 52.

51. NEW ZEALAND SOUTH: South Is., C Otago, Lindis Valley, above Tarras, 31 Dec 1949, *McNeur* (CHR); Cromwell Gorge, near railway station, *H.H.Allan* (CHR50088); Cromwell Gorge, *E.Edgar* (K); Alexandra, *J.E.Holloway* (OTA2964); Alexandra, *A.Wall* (CANTY1787).

27. *Luzula celata* Edgar, *New Zealand J. Bot.* 4: 165 (1966)

T: New Zealand, South Is., Canterbury, Rangitata Valley, near Potts River bridge, 29 Oct 1964, *E.Edgar*; holo: CHR149586; iso: K.

Illustration: P.J.Lange, A.D.Wilton & C.Beard, *New Zealand Bot. Soc. Newsl.* 53: front cover (1998).

Perennials, loosely tufted, forming loose cushions up to 3 cm tall; rhizome creeping to ascending, branched; stolons present, with base covered with membranous-scarious cataphylls with distinct veins. Leaves up to 4 cm long, c. 0.5–1.0 mm wide, involute to canaliculate; apex acute; margins \pm smooth, usually densely ciliate. Stem abbreviated, much shorter than leaves, often not visible. Lower bract 1 (–3), usually 0.5–1.0 cm long, base and middle part herbaceous, otherwise \pm membranous. Inflorescence reduced to a single (very rarely two) (3–) 6–16-flowered cluster. Bracteoles scarious, c. 1 mm long, ciliate. Tepals \pm equal, glabrous, ovate-lanceolate, 1.7–2.1 mm long, scarious with pale castaneous base and midrib. Stamens 3, equalling to slightly exceeding perianth; anthers 0.4–0.6 mm long; filaments 1.4–1.8 mm long. Capsule \pm globular, subacute, pale brown, \pm equalling perianth; capsule segments 1.8–2.0 \times 1.7–1.8 mm. Seeds ellipsoidal, c. 1.0–1.2 mm long, c. 0.6–0.7 mm wide; appendage c. 0.1 mm long, fibrillate. 2n=12, *fide* E.Edgar, *New Zealand J. Bot.* 4: 165 (1966).

Endemic to South Island, New Zealand. 51: NZS. Sandy or shingly ground on old river terraces or in dune systems. Usually growing in, or near, cushions of *Raoulia australis* Hook.f. (Asteraceae). Map 53.

51. NEW ZEALAND SOUTH: South Is., Marlborough, Upper Awatere Valley, Muller Station, *L.B. Moore* (CHR77227); Ashburton R., Blowing Point, *A. Wall* (CANTY1737); Dunedin, Hoopers Inlet, *L.B. Moore* (CHR120151); Otago, Cromwell, Chafer Beetle Reserve, 210 m, *A.D. Wilton 98223* (CHR, PRA); Otago, Crystall's Beach, Cooks Head, *A.D. Wilton 98019* (CHR, PRA); Stewart Is. Mason Bay, E of Big Sandhill, *H. Wilson* (CHR).

Known from about 15 sites in the South Island and one site in Stewart Is.; vulnerable. This species is extremely elusive, and is easily overlooked.

28. *Luzula pindica* (Hausskn.) Chrtek & Křisa, *Webbia* 19: 6 (1964); *Notes Roy. Bot. Gard. Edinburgh* 25: 164 (1964)

Luzula spicata β [unranked] *pindica* Hausskn., *Mitt. Thür. Bot. Ver.* 13–14: 33 (1899); *Luzula bulgarica* subsp. *pindica* (Hausskn.) Chrtek & Křisa, *Bot. Not.* 115: 308 (1962); *Luzula spicata* subsp. *pindica* (Hausskn.) Gamisans, *Candollea* 29: 42 (1974). T: Greece, Pindhos Mtns, Mt Zygos, Jul 1885, *H.C. Haussknecht*; syn: JE, W.

Illustration: J. Chrtek & B. Křisa, *Bot. Not.* 115: 309, fig. 7 (1962).

Maps: J. Chrtek & B. Křisa, *Bot. Not.* 115: 307, fig. 6 (1962); J. Chrtek & B. Křisa, *Webbia* 19: 8 (1964).

Perennials (15–) 20–35 (–45) cm tall, densely caespitose, sparsely hairy; rhizome short, vertical; stolons absent. Basal leaves ±flat, c. 3.5–6 (–9) cm long, of variable width, some usually 3.5–5.0 mm wide; cauline leaves 2–4, remote, c. 2–5 cm long, with lower ones often 3–4 mm wide and upper ones 2–3 mm wide, sometimes narrower (c. 1.0–1.5 mm wide). All leaves ±acute to subobtuse; margins densely papillose-serrulate. Lower bract sometimes remote, subherbaceous, very narrow, acute, c. 1–2 cm long, usually shorter than inflorescence; middle bracts conspicuous, membranous, whitish straw-brown, castaneous at base, lanceolate-aristate, usually 6–9 mm long. Inflorescence nodding (on arcuate upper part of stem), ±dense to inconspicuously interrupted at base, spike-like, usually 1.2–2.5 × c. 1 cm, of 2–7 few-flowered clusters. Bracteoles scarious, often brownish at base, ±ciliate, ovate-lanceolate, c. 2.5 mm long. Tepals subequal, glabrous, lanceolate, acuminate, usually 2.8–3.7 mm long, dark castaneous-brown, with narrow paler membranous margins. Stamens 6; anthers 0.9–1.2 mm long; filaments 0.3–0.4 mm long; style 0.6–0.9 mm long; stigmas c. 1.1–1.7 mm long. Capsule ±ovoid, subacute, pale to dark castaneous-brown, ±exceeding perianth; capsule segments 2.5–3.0 × 1.9–2.2 mm. Seeds subglobose, pale to dark brown, 1.4–1.8 mm long, 1.1–1.3 mm wide; appendage yellowish, c. 0.2 mm long, fibrillate. 2n=24, *vide* R. Franzén, *in* A. Strid & Kit Tan, *Mount. Fl. Greece* 2: 742 (1991).

Southern Europe: Balkan Peninsula and S Italy. 13: ALB, BUL, GRC, ITA, YUC. Subalpine meadows, usually on siliceous rocks, usually between 1800 and 2500 m. Map 54.

13. ALBANIA: Permët, Biovizhdë, Nemerçka Mtns, *A. Alston & N.Y. Sandwith 1811* (K). BULGARIA: Pirin Mtns, Banderica, below Mt Vihren, c. 2200 m, *J. Kirschner 4465* (PRA). GREECE: Macedonia, Samarina, Mt Smolikas, 2150 m, *E.K. Balls & H.W. Gourlay 3418* (K); Thessalia, Mt Olympos, 2600–2650 m, *A. Strid 1505* (C, LD); Pindhos Mtns, Trikala, Dokimi, *P.E.E. Sintenis [It. Thessal.] 844* (LD, PRC); Evritania, Karpenision, Mt Timfrestos, 2050–2100 m, *L.-Å. Gustavsson 1626* (LD). ITALY: Basilicata, Mt Volturino, 1830 m, *O. Gavioli s.n.* (FI). CRNA GORA: Javorje Planina [Mtns], Jul 1903, *J. Rohlena* (PRC); Štavna, Mt. Kom, Jul 1903, *J. Rohlena* (PR, LD). F.Y.R. MACEDONIA: Štrba, Šar Planina [Mtns], 2100 m, 18 Sep 1922, *K. Vandas* (PR).

At the sites with a common occurrence of *L. pindica* and *L. spicata* subsp. *italica* in the Balkans, intermediates between the two taxa are found. They are probably of a hybrid origin. A specimen from E Anatolia [Amasya, Mt Ak-dagh, *J.F.N. Bornmüller [Pl. Exs. Anatol. Or.] 884* (WU)] has most of the attributes of typical *L. pindica* but the material is insufficient for a sure identification.

29. *Luzula spicata* (L.) DC., *in* J.B.A.P. de M. de Lamarck & A.P. de Candolle, *Fl. Franç.*, 3rd edn, 3: 161 (1805)

Juncus spicatus L., *Sp. Pl.* 330 (1753); *Gymnodes spicata* (L.) Fourr., *Ann. Soc. Linn. Lyon*, sér. 2, 17: 173 (1869); *Juncoides spicata* (L.) Kuntze, *Revis. Gen. Pl.* 2: 725 (1891). T: Sweden, Lapland, *C. Linnaeus 125*; lecto: *Flora Lapponica* herbarium, Institut de France, Paris, *designated here*.

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Luzula spicata (L.) DC. var. *compacta* E.Mey., *Syn. Luzul.* 19 (1823); *Luzula compacta* (E.Mey.) Dalla Torre & Sarnth., *Farn- u. Blütenpfl. Tirol.* 1: 437 (1906), *non sensu orig., nom. superfl.*; *Luzula spicata* f. *compacta* (E.Mey.) I.Grint., *Fl. Rep. Soc. Roman.* 11: 596 (1966). T: Bohemia, 'Riesengebirge' [the Krkonoše Mtns]; syn: A.J.Krocker, *Fl. Siles.* 5(1): tab. 52 (1787) [a mixture of elements belonging to subsp. *spicata* and subsp. *conglomerata* were given by E.Meyer; the name was validated through a reference to A.J.Krocker, *Fl. Siles.* 5(1): 572 (1787)].

Luzula spicata var. *relaxa* Krylov, *Fl. Alt. & Tomsk. Gub.* 6: 1401 (1912). T: not indicated.

Maps: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 7(1): map 218 (1958); H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 88 (1965).

Perennials, usually (5–) 10–30 (–40) cm tall, densely caespitose; rhizome short; stolons absent. Basal leaves numerous, usually 1.0–2.5 (–3.5) mm wide; cauline leaves 2–3 (–4); basal leaves ±acute to obtuse (not swollen); cauline leaves and bract acute, with margins ±densely papillose-serrulate. Lower bract subherbaceous or brownish membranous, shorter than or equalling inflorescence. Inflorescence nodding, rarely suberect, ±interrupted at base or not so, composed of clusters subtended by conspicuous middle bracts; middle bracts ovate-lanceolate, acuminate, membranous, ciliate. Tepals ±equal, glabrous, oblong-lanceolate, acuminate, brown, with indistinct paler margins distally. Stamens 6; style 0.2–0.4 mm long; stigmas 0.8–1.3 mm long. Capsules dark castaneous-brown, usually subacute. Seeds ±ellipsoidal, ±paler brown, (0.8–) 0.9–1.1 (–1.3) mm long, (0.5–) 0.6–0.7 mm wide; seed-coat distinct, forming a pale apex; appendage whitish-yellowish, 0.1 (–0.2) mm long, fibrillate.

A widely distributed complex of distantly disjunct populations confined to the Arctic and high altitudes in the N hemisphere mountains. Individual populations differ from one another in a series of mostly quantitative traits. The geographical variability is accompanied by an agmatoploid variation. The following 5 subspecies are recognized; some populations (in Turkey and the Alps) do not fit this pattern. The whole complex requires a detailed revision. A recent study (C.Garcia-Herran, *in litt.*) revealed a unique feature of the *L. spicata* group: partially fragmented ("aneuploid") chromosome sets in populations or groups of populations.

Note: Differences between the size of seeds, capsules and tepals given below and that reported in the literature is a consequence of a different method of measurement. Seeds (as everywhere in *Luzula*) are measured excluding the basal appendage, seen from above (dorsal view), tepals and capsule segments are first liberated from the inflorescence and measured separately.

- | | | |
|----|--|---------------------------------|
| 1 | Anthers 0.4–0.5 (–0.7) mm long, ±equalling filaments | |
| 2 | Inflorescence usually interrupted at base | 29a. subsp. spicata |
| 2: | Inflorescence compact | |
| 3 | Seeds usually 0.9–1.2 mm long; capsule segments 1.5–2.1 mm long; inflorescence 1.2–1.5 × c. 1.0 cm | 29b. subsp. conglomerata |
| 3: | Seeds usually 0.7–0.9 (–1.0) mm long; capsule segments 1.2–1.7 mm long; inflorescence 0.7–1.3 × 0.7–0.8 cm | 29c. subsp. mongolica |
| 1: | Anthers (0.5–) 0.6–0.9 (–1.2) mm long, at least 1.5–2.0 times as long as filaments | |
| 4 | Capsule segments 2.0–2.8 mm long | 29d. subsp. italica |
| 4: | Capsule segments 1.4–1.9 mm long | 29e. subsp. nevadensis |

29a. *Luzula spicata* (L.) DC. subsp. *spicata*

Luzula obtusata Steud., *Syn. Pl. Glumac.* 2: 294 (1855). T: Greenland, 'Friedrichthal Groenlandiae', R.F.Hohenacker; syn: P, PR.

Luzula spicata var. *petraea* Laest., *Bot. Not.* 1858: 145 (1858) [vel *Nova Acta Regiae Soc. Sci. Upsal.* 11: 260–270 (1839), *n.v.*]. T: Njammats i Qvickjock, L.L.Laestadius; syn: UPS.

Luzula spicata var. *major* Lange, *Consp. Fl. Groenland.* 128 (1880). T: [Greenland] 'Disco i Lyngmarken, T. Fries; syn: *n.v.*; Tunugdliarfik-Fjord, A.Kornerup; syn: C.

Luzula spicata f. *petraea* Laest. ex Neuman, *Sver. Fl.* 665 (1901). T: Sweden [otherwise not indicated].

Luzula cusickii Gand., *Bull. Soc. Bot. France* 66: 295 (1919). T: USA, Oregon, Blue Mts., Anthony's Ck, *W.C.Cusick* 2248; holo: LY, n.v.

Luzula spicata var. *nova* Smiley, *Univ. Calif. Publ. Bot.* 9: 128 (1921); *Luzula spicata* subsp. *saximontana* Á.Löve & D.Löve, *Univ. Colorado Stud. Ser. Biol.* 17: 17 (1965). T: California, Sierra Nevada, Tulare Co., near Mineral King, *F.V.Coville & F.Funston* 1535; holo: n.v.

Illustrations: J.Kirschner, *Stud. Českoslov. Akad. Věd* 1989(10): 12, fig. 1 (1989); J.Chrtek & B.Křisa, *Webbia* 19: 2, fig. 1, Plate i, Feb (1964).

Map: J.Chrtek & B.Křisa, *Bot. Not.* 115: 302, fig. 4 (1962).

Plants usually 15–25 (–40) cm tall. Basal leaves usually up to 1.5–2.0 (–3.0) mm wide. Inflorescence lobate, ±interrupted at base or not so, often narrow, elongated, up to 3 × 1.5 cm. Tepals usually 2.2–2.8 (–3.3) mm long. Anthers (0.4–) 0.5–0.6 (–0.7) mm, ±equalling filaments; filaments c. 0.4–0.5 mm long. Capsule segments usually 1.6–2.3 × 1.0–1.2 mm. Seeds usually 0.9–1.1 × c. 0.6 (–0.7) mm; appendage 0.10–0.15 mm long. 2n=24 [24BL], *vide* H.Nordenskiöld, *Hereditas* 37: 334–335 (1951).

Northern and Central Europe (the Alps, including southern Alps, the Krkonoše, the Pyrenees), N Great Britain, the N Urals region, Greenland, arctic and mountain regions of N America. 10: FIN, FOR, GRB, ICE, NOR, SVA, SWE. 11: AUT, CZE, GER, POL, SWI. 12: FRA, SPA. 13: ITA, YUC-SL. 14: RUN. 30: WSB. 70: ASK, GNL, NWT, YUK. 71: ABT, BRC, MAN. 72: LAB, NFL, QUE. 73: COL, IDA, MNT, ORE, WAS. 75: MAI, NWH, NWY, VER. 76: ARI, CAL, NEV. 77: NWM. Arctic and alpine tundra, on wind-eroded acidic soils. Map 55.

10. GREAT BRITAIN: Easternness, Cairn Gorm, Coire an Lochan, *A.Melderis* 418 (S); SWEDEN: Torne Lappmark, Jukkasjärvi, Björkliden, 400 m, 22 Jul 1928, *Levan* (K). 11. CZECH REPUBLIC: Krkonoše Mtns, Mt Sněžka, *Missbach [Petrak Fl. Bohem. Morav. Exs.]* 138 (BRNU, PRC, PR). 12. FRANCE: Puy-de-Dôme, Mont-Dore, Puy Ferrand, 1400–1800 m, *P.Billiet [C.Magnier Fl. Select. Exs.]* 988 (LD, PRC). 14. RUSSIA NORTH: Archangelsk Region, Kanin Peninsula, mouth of Schoyna R., *Sergienko [Gerb. Fl. SSSR]* 6105 (K). 70. GREENLAND: Fiskefjord, Qeqertat, *J.Feilberg [Pl. Vasc. Groenl. Exs.]* 689 (UPS); W Greenland, Neria, 61°33' N, 3 Jul 1931, *J.Eugenius* (LD, PR). 71. ALBERTA: Waterton Lakes Nat. Park, Mt Lineman, *A.Breitung* 14023 (S). 72. QUEBEC: E coast of Hudson Bay, Great Whale River, *O.Hedberg* 2624 (UPS). 75. NEW HAMPSHIRE: Mt Lafayette, *M.L.Fernald [Pl. Exs. Gray.]* 191 (LD, PRC, W, WU).

Variable. Some plants from Greenland are exceedingly robust (described as *L. obtusata* Steud.); the aberrant variation probably depends on edaphic conditions. Plants from W USA and SW Canada require further study; towards the south, the western plants show a tendency to broader leaves, longer tepals and broader seeds. The stamen and seed characters, however, are within the subsp. *spicata* limits. If the western plants prove to represent a distinct taxon, two names, var. *nova* Smiley, and subsp. *saximontana* Á.Löve & D.Löve, are referable to it.

29b. *Luzula spicata* subsp. *conglomerata* (W.D.J.Koch) Murr, *Magyar Bot. Lapok* 28(1929): 67 (1930)

Luzula glomerata Miel. ex Huebener, *Flora* 22: 489 (1839); *Luzula spicata* var. *conglomerata* W.D.J.Koch, *Syn. Fl. Germ. Helv.*, 2nd edn, 848 (1844) [*L. conglomerata* Mielichhofer' mistakenly cited]. T: Austria, Salzburg, Gastein Tal, Rathausberg, *M.Mielichhofer*; lecto: PR, *designated here*; isolecto: W9004.

Luzula spicata a. [unranked] *subpediformis* Schur, *Enum. Pl. Transsilv.* 683 (1866). T: [Romania] 'Auf der Keprereaszee der Arpaser Alpen, am Keprereaszee See', *F.Schur*; syn: n.v.

Luzula spicata subsp. *mutabilis* Chrtek & Křisa, *Bot. Not.* 115: 302 (1962). T: Slovakia, Vysoké Tatry, Furkotský štít, *K.Domin & V.Krajina [Fl. Čechosl. Exs.]* 337; holo: PRC.

Luzula spicata subsp. *montsignatica* P.Monts., *Anales Inst. Bot. Cavanilles* 21(2) [1963]: 478 (1964). T: [Spain] Montseny, Matagalls, 1650 m, 31 Jul 1949, *O.Bolós*; holo: BC113857.

Luzula spicata f. *minima* [Schur ex] I.Grint., *Fl. Rep. Soc. Roman.* 11: 596 (1966), *nom. inval.* T: not designated.

Illustrations: T.Szynal & J.Mądalski, *Atlas Fl. Polsk.* 2(2): 146 (1931); Chrtek & Křisa, *Webbia* 19: 2, fig. 2, Plate iii, iv (1964).

Map: J.Chrtek & B.Křisa, *Bot. Not.* 115: 305, fig. 5 (1962).

JUNCACEAE (*Luzula*)

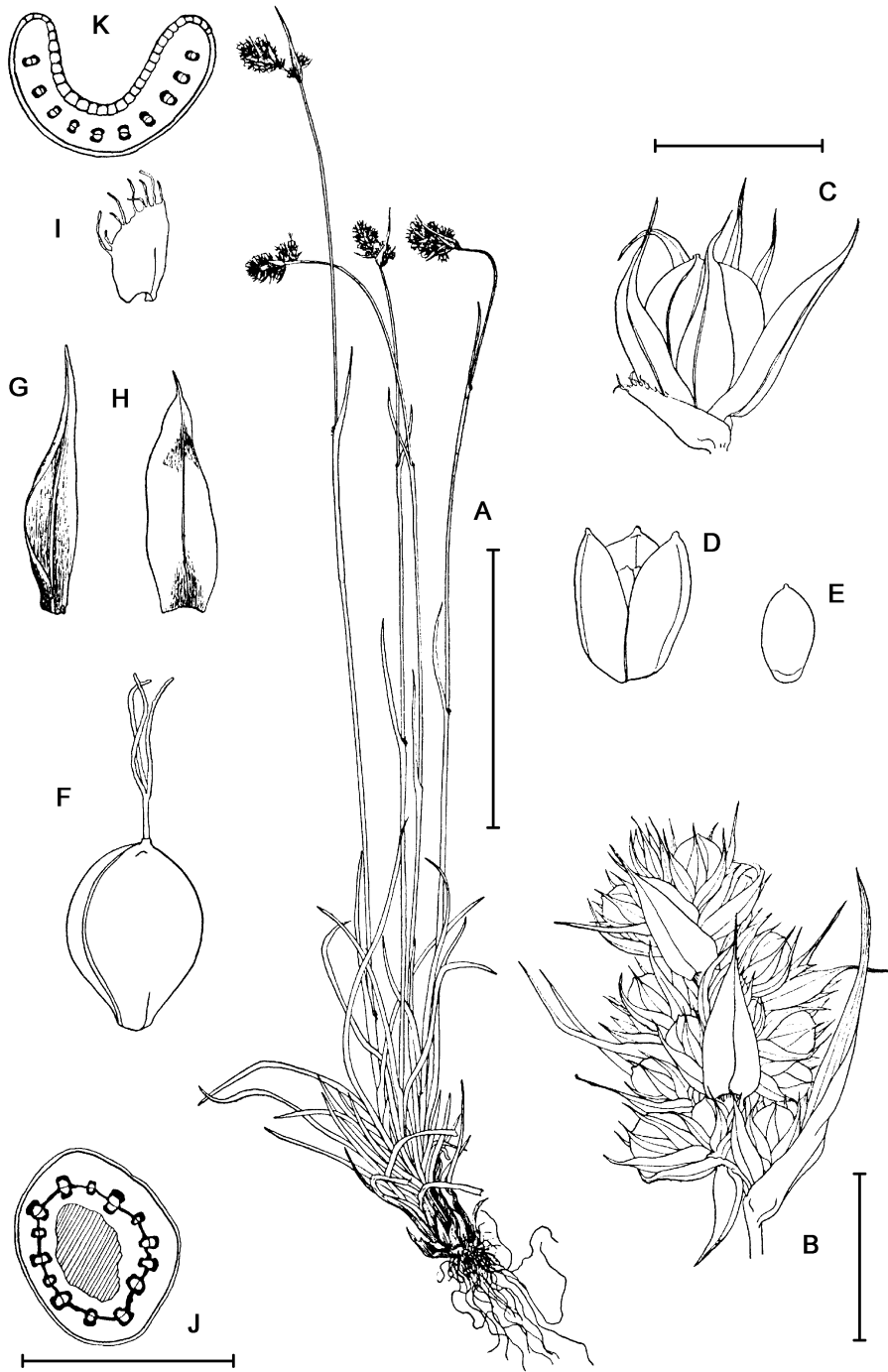


Figure 14. *Luzula spicata* subsp. *conglomerata*. **A**, habit; **B**, partial inflorescence; **C**, perianth and capsule; **D**, capsule; **E**, seed; **F**, immature capsule with style and stigmas; **G**, **H**, tepals; **I**, bracteole; **J**, stem T.S.; **K**, leaf T.S. (*A.Rehman s.n.*, KRA). Scale bars: **A** = 5 cm; **B** = 5 mm; **C-I** = 2 mm; **J**, **K** = 1 mm. Drawn by T.Szynal. Reproduced with permission, from T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2/2: 146 (1931).

Plants 7–15 (–20) cm tall. Basal leaves up to 1.5–2.0 mm long. Basal bract often \pm equalling inflorescence. Inflorescence \pm abbreviated, subglobose, not interrupted, rarely lobate, up to 1.5 \times 1.0 cm. Tepals usually 1.8–2.4 (–2.7) mm long. Anthers 0.3–0.5 (–0.6) mm long, \pm equalling filaments; filaments c. 0.4–0.5 mm long. Style 0.2 mm long; stigmas c. 1.0 mm long. Capsule segments 1.5–2.1 \times c. 1.1–1.2 mm. Seeds 0.9–1.2 \times c. 0.6 mm; appendage c. 0.1 mm long. $2n=12$, *vide* H.Nordenskiöld, *Hereditas* 37: 334–335 (1951); J.Májovský & A.Murín, *Karyotax. Prehl. Fl. Slov.* 362 (1987); $2n=18$ [6AL+12BL], $2n=24$ [24BL], *vide* C.García-Herran, *in litt.* Fig. 14.

Mountains of C and SW Europe: the Carpathians, the Alps and N Italy, the Pyrenees and N Iberian mountains, Swiss Jura. 11: AUT, CZE, GER, POL, SWI. 12: FRA, SPA. 13: ITA, ROM, YUC-SL. 14: UKR. Oligotrophic, wind-eroded alpine tundra. Map 56.

11. AUSTRIA: Kärnten, Hohe Tauern, Mallnitz, 2460 m, 19 Aug 1919, *G.Beck* (PRC); Kärnten, Heiligenblut, Pasterze Glacier, *D.H.Hoppe* (PR); Tirol, Sterzing, Riedberg, 2500–2700 m, *R.Huter* [*Fl. Exs. Austro-Hung.*] 3914 (PR, PRC, UPS). POLAND: Tatry Wysokie, Rysy, 2200–2500 m, *B.Pawłowski* [*Pl. Polon. Exs.*] 84 (K, KRA, KRAM). SLOVAKIA: Vysoké Tatry, Skalnaté pleso, 14 Jul 1943, *F.Nábělek* (SAV). SWITZERLAND: Valais, between Riffelberg and Gornergrat, 2500–3000 m, *F.O.Wolf* [*A.Kneucker, Cyper. Junc. Exs.*] 180 (PR). 13. ROMANIA: Bucegi Mtns, 2000 m, 5 Jul 1904, *J.Prodan* (PR); 25 Jul 1970, *I.Morariu et al.* (LD).

Very variable. While in the E Alps subsp. *conglomerata* is easily distinguishable from subsp. *spicata*, in the W Alps the limit is not so clear-cut, and karyological variation has also been observed. The type of the name *L. spicata* subsp. *montsignatica* has anther length and anther/filament ratio at the upper limit of the subspecies; further study is needed.

29c. *Luzula spicata* subsp. *mongolica* Novikov, *Nov. Sist. Vyssh. Rast.* 26: 34 (1989)

T: Mongolia, Mongolian Altai, Munch-Chajrchan-Ula, 14 Aug 1978, *Ogureeva*; holo: MW; iso: LE.

Luzula spicata var. *kunawurensis* D.Don, *Trans. Linn. Soc.* 18(3): 324 (1840). T: India, 'Kunawur ad Lipa' [probably: Li-phu-lie-khe-shan-khou, Uttarpradesh], *J.F.Royle*; holo: LIV, *n.v.*; iso: W.

Illustrations: S.M.H.Jafri, *Fl. Pakistan* 138: 24, fig. 6 (1981); K.F.Wu, *Fl. Reipubl. Popularis Sin.* 13(3): 252, plate 61 (1997).

Plants usually 8–13 (–20) cm tall. Basal leaves short, usually canaliculate, 1.0–1.5 (–2.8) mm wide. Lower bract brownish membranous, often remote. Inflorescence not interrupted, compact, subglobose, dark castaneous-brown, 7–13 \times 7–8 mm. Tepals 1.9–2.4 (–2.7) mm long. Anthers 0.3–0.5 mm long; filaments 0.4–0.5 mm long; style c. 0.2–0.3 mm long; stigmas 0.8–1.1 mm long. Capsule segments 1.2–1.7 \times 1.0–1.2 mm. Seeds 0.7–0.9 (–1.0) mm long, 0.5–0.6 mm wide; appendage 0.10–0.15 mm long, fibrillate. $2n=12$, *vide* C.García Herran, *in litt.*

Mountains of Middle Asia, the Himalayas, China (Tibet, Xinjiang, Sichuan, Yunnan) and Mongolia, the Altai and southernmost Siberia. 30: ALT, BRY, IRK, KRA, TVA, WSB. 32: KAZ, KGZ, TZK, UZB. 34: AFG. 36: CHC, CHT, CHX. 37: MON. 40: JMK, PAK. Alpine tundra, scree, and margins of woodland patches near the timberline. Map 57.

30. ALTAI: Kosh-Agatsh, South Tshuya Range, upper Elangash R., *N.Frizen* 1928 (PRA); SE Altai, South Tshuya Range, Tarkhata R., 14 Jul 1982, *N.K.Kovtonyuk* (PRA); Altai, Kuraiskiy Range, 2800 m, 30 Jun 1982, *N.K.Kovtonyuk* (PRA). 34. AFGHANISTAN: Wakhan, E of Tergan Qurum Valley, S of Bishutik Lake, 4700 m, *C.Grey-Wilson & T.F.Hewer* 1530 (W). 36. CHINA SOUTH-CENTRAL: NW Sichuan, upper Yalong basin, Chola Shan, Dege to Garze, Maniganggo, 4850 m, *G.Miehe, S.Miehe & U.Wündisch* 94-421-1 (E). TIBET: Mekong – Nu Jiang [Salween] divide, NE of the pass above Bamda, 4800 m, *G.Miehe & U.Wündisch* 94-41-19 (E). QINGHAI, Daban Shan, Nan Shan, *P.Küpfer* (NEU 95-492; $2n=12$). SICHUAN: Xinjiang, Altaï, 2640 m, *P.Küpfer* (NEU 95-491; $2n=12$). 37. MONGOLIA: Lake Khubsugul, Manku-Sardyk, 8 Aug 1975, *L.I.Malyshev & Tshepurnov* (PRA). 40. INDIA: Kashmir, Mt Apharwat, 4200 m, *R.R.Stewart* 8690 (S). PAKISTAN: Chitral, Barum Gol, South Barum Glacier, 4500 m, 3 Jul 1950, *P.Wendelbo* (S).

Similar to subsp. *conglomerata* but seeds, capsule segments and inflorescence usually smaller.

JUNCACEAE (*Luzula*)

29d. *Luzula spicata* subsp. *italica* (Parl.) Arcang., *Comp. Fl. Ital.* 713 (1882)

Luzula italica Parl., *Fl. Ital.* 2: 309 (1857); *Luzula spicata* var. *italica* (Parl.) Rouy, *Fl. France* 13: 267 (1912); *Luzula spicata* f. *italica* (Parl.) H.Lindb., *Acta Soc. Sci. Fenn.*, n. s. B 1(2): 37 (1932). T: Corsica, Monte Renoso; syn: *n.v.*; Sardinia, Monte Genargentu, *E.Requien*; syn: FI; *G.G.Moris*; syn: *n.v.*

Luzula bulgarica Chrtek & Křisa, *Bot. Not.* 115: 304 (1962); *Luzula spicata* subsp. *bulgarica* (Chrtek & Křisa) Gamisans, *Candollea* 29: 42 (1974). T: Bulgaria, Rila Planina, Edigeol, 2350 m, 1 Aug 1923, *F.A.Novák*; holotype: PRC.

Luzula stilbocarpa Kirschner & Křisa, *Preslia* 51: 336 (1979). T: Russia, Caucasus, Dombay, between Severnyi Priyut and Lake Klukhorskoe ozero, 2000–2500 m, 14 Jul 1977, *J.Kirschner, M.Šourková et al.*; holotype: PRC; isotype: PRC.

Illustrations: J.Kirschner & B.Křisa, *Preslia* 51: 337, fig. 2 (1979) as *L. stilbocarpa*; J.Chrtek & B.Křisa, *Webbia* 19: 5, fig. 3, Plate v (1964).

Maps: J.Chrtek & B.Křisa, *Bot. Not.* 115: 307, fig. 6 (1962); Chrtek & Křisa, *Webbia* 19: 8 (1964).

Plants usually 12–30 cm tall. Basal leaves usually canaliculate, up to 2.0 (–2.5) mm wide, usually densely ciliate at blade base. Inflorescence usually lobate and/or interrupted, c. 1.5–2.5 × 1.0 cm. Tepals usually (2.0–) 2.3–2.8 (–3.0) mm long. Anthers (0.5–) 0.6–0.9 (–1.2) mm, usually 1.5–3.0 times as long as filaments; filaments 0.3–0.4 mm long; style 0.3–0.4 mm long; stigmas c. 1.0–1.5 mm long. Capsule segments usually (1.9–) 2.0–2.4 (–2.8) × 1.2–1.4 mm. Seeds (0.9–) 1.0–1.1 (–1.3) mm long, 0.6–0.8 mm wide; appendage c. 0.1 (–0.2) mm long, fibrillate. 2n=24 [24BL], *vide* J.Kirschner, *ined.*; 2n=16 [8AL+8BL], *vide* C.Garcia-Herran, *in litt.*

Mountains of southern Europe from Corse, Sardinia and C Italy to Balkan Peninsula, Turkey, the Caucasus and NW Iran. 12: COR, SAR. 13: ALB, BUL, GRC, ITA, YUC. 33: NCS, TCS. 34: IRN, TUR. Subalpine and alpine meadows, alpine tundra, usually above 2000 m. Map 58.

12. CORSE: Mt D'Oro, cascades des Anglais, 1900 m, 16 Jun 1991, *C.Garcia-Herran* (NEU91-921; 2n=12). 13. BULGARIA: Rodopi, Mt Musala, 19 Aug 1936, *J.Dostál* (PRC). CRNA GORA: Mt Maglič, Aug 1905, *J.Rohlena* (PRC). F.Y.R. MACEDONIA: Mt Luboten, 2500 m, 9 Sep 1922, *K.Vandas* (PR49527). BOSNIA-HERZEGOVINA: Herzegovina, Gacko, Mt Lebršnik, Aug 1913, *K.Vandas* (PR49524). ITALY: Abruzzi, Monti Sibillini, Vettore, 2200–2300 m, 10 Aug 1898, *S.Sommier* (FI). 33. RUSSIA: the Caucasus, Tyrnyauz, Mt Cheget, 2300–2500 m, 28 Jul 1981, *V.Vašák* (W). GEORGIA: Mt Tskhra-Tskhro, 2300 m, 23 Aug 1991, *P.Küpfner* (NEU93-926; 2n=8AL+8BL). 34. TURKEY: Bursa, Uludag, 2 Aug 1944, *M.Basarman* (ISTF4571, LD); Kastambuli, Tossia, Giaurdag, 17 May 1892, *P.E.E.Sinten* [*It. Orient.*] 3929 (LD, PR).

A variable complex of regional populations characterized by long anthers, usually much longer than the filaments, usually interrupted or distinctly lobate inflorescence, and large capsule segments and seeds. Local populations often are relatively distinctive, deviating from the average values in a number of quantitative characters. However, numerous substantial overlaps of the quantitative character ranges do not allow recognition of the local types at a rank higher than variety. A unique feature is the multiple, fixed occurrence of 2n=16=8AL+8BL in the Caucasus.

29e. *Luzula spicata* subsp. *nevadensis* P.Monts., *Anales Inst. Bot. Cavanilles* 21(2): 478 (1964)

T: Spain, Sierra Nevada, Mulhacén, Chorreras Negras, 2800 m, 19 Jul 1923, *P.Font Quer*; holotype: BC89906.

Luzula hispanica Chrtek & Křisa, *Novit. Bot. Delect. Seminum Horti Bot. Univ. Carol. Prag.* 1965: 28 (1965). T: Spain, Sierra Nevada, Valle del Lanjarón, Peñon Elorrieta, 3200 m, 6 Aug 1930, *Ceballos & C.Vicioso*; holotype: M19783.

Plants usually 6–20 cm tall. Basal leaves flat or canaliculate, up to 2.0 (–2.5) mm wide. Inflorescence usually ±interrupted or at least lobate, up to 2.0 × 1.0 cm. Lower bract often equalling inflorescence. Tepals usually 1.8–2.4 mm long. Anthers (0.5–) 0.6–0.8 mm long, about 1.5–2.0 times as long as filaments; filaments 0.3–0.5 mm long; style 0.2–0.3 (–0.4) mm long; stigmas 1.0–1.3 mm long. Capsule segments usually 1.4–1.9 × c. 1.1–1.2 mm. Seeds 0.8–1.0 mm long, 0.5–0.6 mm wide; appendage c. 0.1 mm long, fibrillate. 2n=24 [24BL], *vide* C.Garcia-Herran, *in litt.*

Mountains of Spain and the Great Atlas in N Africa. 12: SPA. 20: MOR. Alpine grasslands and open scree slopes. Map 59.

12. SPAIN: Granada, Sierra Nevada, Picacho Veleta, 2800 m, *E.Wängsjö & G.Wängsjö 3840* (LD); *P.Porta & G.Rigo [It. iii Hisp.] 512* (WU); Sierra Nevada, Valle de Genil, Hoya de la Moya, 2600 m, *E.Wängsjö & G.Wängsjö 3865* (LD); Madrid, Sierra de Gredos, Risco de la Cocina, *E.Bourgeau [Pl. Esp.] 2555* (W); Sierra de la Demanda, Laguna Negra, 1930 m, 21 Jul 1990, *C.García-Herran* (NEU91-1190; 2n=24); Huesca, Pirineos centrales, Formigal, 1700 m, 21 Aug 1992, *C.García-Herran* (NEU92-892; 2n=24). 20. MOROCCO: the Great Atlas, Jebel Toubkal, 3300–3600 m, *P.H.Davis 55492* (E).

A taxon very close to subsp. *italica* but with all floral parts smaller. The relationship of some inland Spanish populations and some Pyrenean plants remains unclear.

30. *Luzula pediformis* (Chaix) DC., in J.B.A.P. de M. de Lamarck & A.P. de Candolle, *Fl. Franç.*, 3rd edn, 3: 162 (1805)

Juncus pediformis Chaix, in D.Villars, *Hist. Pl. Dauphiné* 1: 318 (ii 1786). T: France, 'à Chaudun, à la Grangette'; syn: *n.v.*; 'Dauphiny', *D.Villars*; possible syn: LINN-SMITH; Col de la Coche, Lautaret, *D.Villars*; authentic material: GRM26858.

Juncus nutans Chaix ex Vill., in J.-E.Gilibert, *Syst. Pl. Eur.* 1: 34 (1785), *nom. inval., opus oppressus*; *Fl. Delphin.* 34 (vi 1786); *Luzula nutans* (Vill.) Duval-Jouve, *Bull. Soc. Bot. France* 10: 80 (1863); *Juncoides nutans* (Vill.) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891). T: [France] 'Challiol de Vieil, Embrun etc.', *D.Chaix*; syn: ?GRM, *n.v.*

Illustration: S.Pignatti, *Fl. Ital.* 3: 447 (1982).

Perennials (25–) 30–55 (–85) cm tall, loosely caespitose. Rhizome long, horizontal to oblique, branched, c. 4–6 mm in diam.; upper part covered with dark castaneous-brown leaf sheath bases; older sheath remains often forming dark brown fibrous cover; stolons absent. Stem thick, usually 1.5–2.3 mm in the middle, with upper part nodding. Basal leaves ±flat, usually 10–20 cm long, (4–) 5–6 (–8) mm wide; leaves of intravaginal shoots narrower; cauline leaves 3–4 (–5), usually 5–9 cm long; all leaves ±densely ciliate, densely papillose-serrulate, acute with hyaline apex. Lower bract usually narrow, herbaceous (rarely lacking), usually equalling or overtopping inflorescence. Inflorescence nodding, (15–) 20–45 (–80)-flowered, spike-like, lobate, often interrupted at base, usually 2.0–3.5 (–5.0) × 1.0–1.5 cm, composed of 3–10-flowered clusters, with lower 1 (–2) clusters often remote, ±pedunculate. Bracteoles 2.5–3.5 mm long, ±ovate, acuminate, ciliate, brownish-membranous. Tepals subequal, castaneous brown with broad straw-brown membranous margins, c. 4.5–6.0 × 1.5–2.0 mm; outer tepals long acuminate, entire to (later) denticulate; inner tepals usually denticulate near apex, mucronate. Stamens 6; anthers 2.2–2.9 mm long; filaments c. 0.5–0.7 mm long; style 1.8–2.2 mm long; stigmas usually 2.5–3.0 mm long. Capsule paler castaneous-brown, acute to ±acuminate, ±mucronate; capsule segments 3.7–4.8 × c. 2.5–2.7 mm. Seeds pale brown, broadly ovoid, 2.1–2.4 mm long (including a 0.2–0.4 mm long apical caruncle), c. 1.5 mm wide; basal appendage an indistinct paler patch c. 0.1 mm long; base fibrillate. 2n=12, *vide* C.García-Herran, *in litt.*; C.Favarger & P.Küpfer, *Collect. Bot. (Barcelona)* 7: 353 (1968).

SW Europe, from SW Alps to the mountains of N, C and S Spain. 12: FRA, SPA. 13: ITA. Mountain grasslands. Map 60.

12. FRANCE: Hautes Alpes, Lautaret, 14 Aug 1888, *Pellat* (UPS); Hautes Alpes, Montgenèvre, Gondron, Lannes [*C.Magnier, Fl. Sel. Exs.*] 1314 (W); Alpi Graie, Col du Mont Cenis, *J.Bonjean [H.G.Reichenbach, Fl. Germ. Exs.] 1314* (UPS, W); E Pyrenees, Cerdagne, Dorres, 1900 m, *E.M.Sennen [Pl. Esp.] 2863* (W); Pyrenees, Gèdre, Saugué, 1000 m, *Bordère [K.G.Baenitz, Herb. Eur.] 2799* (PR, UPS). SPAIN: Aragon, Panticosa, *M.Willkomm [It. Hisp. ii] 358* (K); Huesca, Port de Gavarnie, 2 Aug 1959, *G.Een* (S); Granada, Poble, Sierra de la Sagra, 1900 m, *E.Reverchon [A.Kneucker, Cyper. Junc. Exs.] 59* (PR, WU); Segovia, Sierra de Guadarrama, Cerro del Aguila, 1860 m, 17 Jul 1978, *S.Rivas-Martínez* (BCF46672); Asturias, Macizo Occidental de los Picos de Europa, Vegarredonda, 1600 m, 28 Jul 1982, *H.S.Nava* (FCO13916). 13. ITALY: Piemont, Col della Maddalena, 30 Jun 1958, *E.Müller* (UPS); 'montagnes du Piemont', *G.B.Balbis* (LD).

JUNCACEAE (*Luzula*)

31. *Luzula caespitosa* (E.Mey.) Steud., *Syn. Pl. Glumac.* 2: 294 (1855)

Luzula pediformis var. *caespitosa* [Gay ex] E.Mey., *Linnaea* 22: 420 (1849); *Juncoides caespitosa* (E.Mey.) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891); *Luzula pediformis* subsp. *caespitosa* (E.Mey.) Guinea, *Fl. Santander* 355 (1953). T: Spain, Asturias, Cangas de Tineo, Pico de Arvas, 1835, M.C.Durieu [*Pl. Sel. Hispan. Lusit.*] 216; lecto: K, designated here; isolecto: W.

Luzula caespitosa subsp. *sanabriae* P.Monts., *Anales Inst. Bot. Cavanilles* 21(2) [1963]: 473 (1964). T: Spain, Zamora, Sierra Segundera, Rivadelago, Moncalvo, laguna de Lacillos, 1700–1800 m, Jun 1948, T.M.Losa & P.Montserrat; holo: BC114621; iso: BCF4132, 46673.

Luzula caespitosa subsp. *iberica* P.Monts., *Anales Inst. Bot. Cavanilles* 21(2) [1963]: 473 (1964). T: Spain, Burgos, Cordillera Ibérica, Laguna Negra, sobre Neila, 1800 m, P.Font Quer 339; holo: BC63341.

Map: P.Montserrat, *Anales Inst. Bot. Cavanilles* 21(2): map 4 (1964).

Perennials usually 20–30 cm tall, loosely caespitose, densely hairy at base; rhizome long, ±densely branched, subvertical to ascending, c. 2–3 mm in diam., often covered with greyish brown fibrous remains of old leaf sheaths. Stem up to 1 mm in diam., upper part nodding. Basal leaves usually ±canaliculate, usually 4–7 (–11) cm long, up to 2 mm wide, (leaves of new tillers and intravaginal shoots much narrower, c. 0.5 mm). Cauline leaves 2–3; blade usually 3–4 cm long, ±equalling or shorter than leaf sheaths. All leaves with ±papillose-serrulate margins; apex acute to acuminate. Lower bract herbaceous at base, ±brownish, 1.0–2.0 (–2.5) cm long, usually exceeding inflorescence; middle bracts ovate-lanceolate, membranous, c. 6–9 mm long, ciliate. Inflorescence ±nodding, usually 4–9 (–13)-flowered, spike-like, usually congested, rarely with a ±remote basal cluster (or flower). Bracteoles ovate, membranous, ciliate, c. 2.0–2.5 mm long. Tepals ±equal, entire to sparsely denticulate at apex, usually 3.7–4.5 mm long, castaneous-brown with paler to ±membranous margins above. Stamens 6; anthers 2.0–2.9 mm long; filaments 0.3–0.4 mm long; style 1.8–2.5 mm long; stigmas 2.0–2.5 mm long. Capsule straw-brown to pale castaneous-brown, subglobose, subacute, ±mucronate; capsule segments 3.0–3.5 × 2.6–3.0 mm long. Seeds pale brown, broadly ovoid, usually 1.6–1.9 mm long (including a small paler apex c. 1.5 mm wide); basal appendage yellowish, c. 0.2 mm long, fibrillate. 2n=12 [12AL], *vide* C.Garcia-Herran, *in litt.*

Mountains of NW and C Spain and EC Portugal. 12: POR, SPA. Rocky slopes and dry mountain grasslands, usually above 1600 m. Map 61.

12. PORTUGAL: Beira Baixa, Serra de Estrela, Rua dos Mercadores, A.Fernandes, F.Sousa & J.Matos 4483 (UPS); Serra de Estrela, Torre, Manteigas, 13–25 Jun 1987, A.Polatschek (W). SPAIN: Asturias, Leitiriegos, Cueto de Arvas, P.Font Quer & W.Rothmaler [*Fl. Iber. Sel.*] 205 (BCF, S, UPS); Asturias, Pico de Arvas, Jul 1898, M.Gandoger (W); Palencia, Pico de Curavacas, 16 Jul 1990, C.Garcia-Herran (NEU90-1038; 2n=12); León, Picos del Mampodre, Cervunal de Valverde, 1800–1900 m, 5 Aug 1952, T.M.Losa & P.Montserrat (BCF4129); León, Hayedo del Gildar, 1900 m, Garcia-Gonzales (JACA109685); Madrid/Segovia, Sierra de Guadarrama, Siete Picos, Ceredilla – La Granja, 2080–2120 m, V.J.Aran & M.J.Toha (JACA172898, MA); Soria, Laguna Negra, 21 Jul 1991, C.Garcia-Herran (NEU91-1089; 2n=12); Soria, Coraleda, Pico de Urbión, 2000–2200 m, J.L.Benito (JACA19895).

A species variable in the size of its vegetative parts and in the shape and size of its inflorescence. The variation shows considerable overlaps between local populations, and extremes are scattered throughout the species' range. Thus, the aberrant plants described by P.Montserrat as subspecies are here subsumed within the species.

32. *Luzula ecuadoriensis* Balslev, *Fl. Ecuador* 11: 11 (1979)

T: Ecuador, Cotopaxi, 3550 m, 1939, E.Asplund 6494; holo: S; iso: S.

Illustration: H.Balslev, *Fl. Neotrop. Monogr.* 68: 62, fig. 31 (1996).

Map: H.Balslev, *Fl. Neotrop. Monogr.* 68: 63, fig. 32 (1996).

Perennials 50–75 cm tall, sparsely hairy to subglabrous; rhizome ascending. Basal leaves (5–) 10–20 (–25) cm long, usually 6–10 mm wide; cauline leaves usually 3–5, with sheath to 7 cm long, usually 9–15 cm long, up to 10 mm wide; all leaves acute with densely papillose-serrulate margins. Lower bracts similar to leaves, up to 17 cm long, distally gradually shorter (lower inflorescence branches often in axils of upper or middle cauline leaves). Inflorescence an interrupted ±drooping panicle in upper 1/3 (–1/2) of plant height, composed of dense oblong-ovoid partial inflorescences on long primary peduncles; further composed of

cylindrical to oblong spike-like clusters 1–2 × 0.4–0.8 cm. Bracteoles membranous, ± lanceolate, 1.5–2.0 mm long, fimbriate-ciliate above. Tepals ± castaneous brown, subequal, with outer tepals (2.3–) 2.5–3.0 mm long, lanceolate, acuminate, glabrous or very sparsely ciliate; margin pale, indistinct to ± absent. Stamens usually 3, sometimes 4–5; anthers 0.4–0.5 mm long; filaments 0.6–0.7 mm long; style 0.4–0.5 mm long; stigmas c. 1.0–1.2 mm long. Capsule subglobose to obovoid, paler castaneous brown; capsule segments 1.5–1.8 × c. 1.2 mm, glossy. Seeds c. 1.0 mm long, 0.5–0.6 mm wide; seed-coat distinct, forming a pale apex; basal appendage c. 0.1 mm long, fibrillate. Fig. 15.

Endemic to Ecuador and Peru. 83: ECU, PER. Páramos and subpáramos or rocky slopes between 3300 and 3900 m. Map 62.

83. ECUADOR: Azuay, Cuenca, Angas, 3400 m, *H.Balslev 1509* (NY); Pichincha, Mt Pichincha above Quito, 3700 m, *H.Balslev 23615* (AAU, NY). PERU: Cajamarca, 2700–3700 m, *B.Becker & F.M.Terrones 1225* (AAU); Lambayeque, Incahuasi, Cerro Negro, 3300 m, *A.Sagástegui et al. 12827* (AAU, F, MO).

33. *Luzula excelsa* Buchenau, *Abh. Naturwiss. Vereine Bremen* 4: 126, tab. 4, fig. 1–8 (1874)

Juncooides excelsa (Buchenau) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891). T: Bolivia, La Paz, Lancha de Cochipata, 2700–3000 m, 1860, *G.Mandon 1449*; lecto: GOET, *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 61 (1996); isolecto: BM, BR, F, GH, K, P, PR, S, US.

Luzula hieronymi Buchenau & Griseb., in A.H.R.Grisebach, *Symb. Fl. Argent.* 318 (1879); *Juncooides hieronymi* (Buchenau) Kuntze, *Revis. Gen. Pl.* 2: 734 (1891). T: Argentina, Tucumán, Cienega, 1874, *P.G.Lorentz & G.Hieronymus 735*; lecto: GOET, *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 61 (1996); isolecto: CORD, NY, K, S.

Luzula hieronymi Buchenau & Griseb. var. *pusilla* Castillon, *Bol. Mus. Hist. Nat.* 7: 19 (1926). T: Argentina, Tucumán, Tafi, Cumbres Calchaquies, 4200 m, 29 Jan 1907, *M.Lillo 5600*; lecto: LIL, *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 61 (1996); photo: PRA.

Luzula hieronymi Buchenau & Griseb. f. *bonariensis* Barros, *Darwiniana* 10: 335 (1953). T: Argentina, Buenos Aires, Pigüé, Sierra de Curumalan, *A.Burkart 4875*; lecto: SI, *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 61 (1996).

Luzula castellanosi Barros, *Darwiniana* 10: 349 (1953). T: Argentina, Salta, Cafayate, Sierra de los Quilmes, 26 Jan 1943, *A.Castellanos*; holotype: BA46656.

Illustrations: F.G.P.Buchenau, *Abh. Naturwiss. Vereine Bremen* 4: plate 4 (1874); F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 76, fig. 49 (1906); M.Barros, *Darwiniana* 10: 334, fig. 16, 337, fig. 17 (1953); H.Balslev, *Fl. Neotrop. Monogr.* 68: 64, fig. 33 (1996).

Perennials 40–100 cm tall, hairy to sparsely hairy; rhizome ascending to ± erect, rarely ± creeping. Basal leaves usually up to 25 cm long, (5–) 8–13 (–20) mm wide; cauline leaves usually 3–6, with upper ones to 17–20 cm long and 13 mm wide; all leaves acute, with densely papillose-serrulate margin. Primary bracts long, leaf-like, herbaceous, often ± equalling their partial inflorescences (lower inflorescence branches often in axils of upper cauline leaves). Inflorescence a loosely branched drooping interrupted panicle constituting $\frac{1}{3}$ – $\frac{1}{2}$ of plant height, composed of long pedunculate interrupted partial panicles of numerous small, cylindrical clusters usually 5–8 (–15) × 3–4 (–5) mm. Bracteoles membranous, ovate, acuminate, c. 1 mm long, fimbriate-ciliate above. Tepals straw-brown to pale castaneous brown, (1.3–) 1.5–1.8 (–2.2) mm long, ± equal, ± glabrous, with a distinct membranous or paler margin. Stamens 3; anthers 0.3–0.5 mm long; filaments 0.5–0.7 mm long; style 0.2–0.4 mm long; stigmas 0.5–0.7 mm long. Capsule ± ovoid, ± trigonous, acute, straw-brown to brown; capsule segments 1.4–1.6 × 0.9–1.1 mm. Seeds ellipsoidal, distinctly dark apiculate, 0.8–0.9 mm long, 0.5–0.6 mm wide; appendage whitish, 0.10–0.15 mm long, fibrillate. Fig. 16.

From southern Peru and Bolivia to Argentina and northern Patagonia. 83: BOL, PER. 85: AGE, AGW. Open mountain rocky slopes and open woodlands, 1400–3500 m. Map 63.

83. BOLIVIA: Noryungas, Unduari, 3100–4000 m, *O.Buchtien 2601* (GH, M, NY, UPS, US); La Paz, Murillo, Pongo, 3600 m, *E.Asplund 1049* (UPS). 85. ARGENTINA NORTHEAST: Buenos Aires, Sierra de Curumalan, *A.Fabris & H.Schwabe 4909* (CTES). ARGENTINA NORTHWEST: Catamarca, El Candado, *P.Joergensen 1350* (SI); Tucumán, Chicligasta, Las Pavas, 3200 m, *S.Venturi 3053* (S, US); Tucumán, Tafi del Valle, 2300 m, *K.Hueck 15* (SI); Jujuy, Capital, Quebrada de Yala, *A.L.Cabrera 27379* (SI); Catamarca, Andalgalá, Alto Blanco, *P.Joergensen 1564* (LIL); La Rioja, La Vega de La Hoyada, 2700–2800 m, 22 Jan

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Figure 15. *Luzula ecuadoriensis*. General habit. (*E. Asplund* 6494, S). Scale bar: 5 cm. Drawn by K. Tind. Originally published in G. Harling & B. Sparre (eds.), *Fl. Ecuador* 11: 12, fig. 3 (1979), reproduced with permission, from H. Balslev, *Fl. Neotrop. Monogr.* 68: 62, fig. 31 (1996), © Lunds Botaniska Förening, © 1996, The New York Botanical Garden.



Figure 16. *Luzula excelsa*. **A**, habit; **B**, terminal part of partial inflorescence. (E.W.D.Holway & M.M.Holway 619, US). Scale bars: **A** = 5 cm; **B** = 2 mm. Drawn by K.Tind. Reproduced with permission, from H.Balslev, *Fl. Neotrop. Monogr.* 68: 64, fig. 33 (1996), © 1996, The New York Botanical Garden.

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1908, *F.Kurtz 15129* (CORD). ARGENTINA SOUTH: Chubut. Tehuelches, Lago Vintter, 29 Jan 1995, *E.Nicora 10083* (SI); Neuquén, Norquén, Copahué, 2000 m, *C.A.O'Donnell 110458* (SI).

A variable species with its highest diversity in N Argentina. *Luzula castellanosi* seems to be a depauperate, narrow-leaved form of *L. excelsa*.

34. *Luzula mendocina* Barros, *Darwiniana* 10: 322 (1953)

T: Argentina, Mendoza, Tunuyán, Cerro de las Piedras, 2220 m, 23 Mar 1935, *A.Ruiz Leal 3105*; lecto: LIL46294A, *designated here*; isolecto: LIL46294B.

Illustration: M.Barros, *Darwiniana* 10: 323, fig. 12 (1953).

Perennials 25–60 cm tall, sparsely hairy caespitose; rhizome short; stolons absent. Basal leaves usually 12–15 cm long, 3.5–6.5 mm wide. Cauline leaves 2–3; upper ones usually short, 3–6 cm long, 2.5–3.5 mm wide. All leaves acute-subulate; margins with sparse reddish papillae. Primary bracts herbaceous, of variable length, usually 2.5–5.0 cm long. Inflorescence panicle composed of remotely interrupted, relatively dense, long pedunculate secondary panicles. Secondary panicles 2–4 × 1–2 cm, with lowermost often 10–15 cm below terminal one, of 3–10 spike-like dense clusters. Bracteoles scarious-membranous, 1–2 mm long, ± lanceolate, not or sparsely ciliate. Tepals subequal, entire, glabrous, lanceolate, acuminate; inner tepals 2.0–2.5 mm long; outer tepals 2.1–2.8 mm long. Stamens 6, rarely 1 or 2 rudimentary; anthers 0.6–0.8 mm long; filaments 0.3–0.4 mm long; style 0.3–0.4 mm long; stigmas 0.8–1.1 mm long. Capsules narrowly ovoid, ± acute, brown, shining, shorter than perianth; capsule segments 1.5–1.7 × 1.0–1.1 mm. Seeds oblong-ovoid, c. 0.8–1.0 mm long, 0.6–0.7 mm wide; appendage indistinct, base fibrillate.

Central Argentina (Mendoza, Córdoba, San Luis and Buenos Aires provinces). 85: AGE, AGW. Mountain grasslands, 700–3000 m. Map 64.

85. ARGENTINA NORTHEAST: Buenos Aires, Sierra de la Ventana, Partido de Tornquist, Cerro de la Nerilana, 24 Mar 1948, *A.L.Cabrera 54* (SI). ARGENTINA NORTHWEST: Mendoza, Tunuyán, Cuchilla del Cerro Bayo, 3000 m, *A.Ruiz Leal 3085* (para: LIL); Tunuyán, Rincón Colorado, 3000 m, *A.Ruiz Leal 1279* (para: LIL46292A, B); Tunuyán, Las Cuevas, *A.Ruiz Leal 3195* (LIL); Tunuyán, Bella Vista, 2300 m, *G.Covas* (SI18003); San Luis, La Carolina, *A.Burkart 10777* (SI); Córdoba, Pampa de Achala, 13–14 Dec 1945, *A.T.Hunziker 6425* (CORD).

Distinct in having several, long pedunculate, ± dense secondary panicles ('heads'); it is unique in this respect among hexandrous taxa.

35. *Luzula masafuerana* Skottsbg., *Nat. Hist. Juan Fernandez* 2: 775 (1953)

Luzula racemosa subsp. *insularis* Skottsbg., in C.J.F.Skottsberg, *Nat. Hist. Juan Fernandez* 2: 110 (1922); *Luzula insularis* (Skottsbg.) Skottsbg., *Veröff. Geobot. Inst. Rübel Zürich* 3: 89 (1925), *nom. illeg., non* (Briq.) Prain (1921). T: Juan Fernández, Masafuera, Las Torres, 1100–1350 m, *C.J.F.Skottsberg & I.Skottsberg 408*; lecto: S, *designated here*; isolecto: BM, K, LD, UPS.

Illustration: C.J.F.Skottsberg, in C.J.F.Skottsberg, *Nat. Hist. Juan Fernandez* 2: 110, fig. 5, b-e (1922).

Perennials up to 35–40 cm tall, robust, densely hairy caespitose; rhizome short; stolons absent. Basal leaves usually 4–7 cm long, 4–9 mm wide, flat; cauline leaves 2 (–3), usually (3–) 5–7 cm long and 3.5–5.0 mm wide; all leaves acute, with papillose-serrulate margins. Lower bracts herbaceous, usually 2.5–6.0 cm long, exceeding inflorescence. Inflorescence erect to slightly bent, congested, compact, lobulate, or subdivided in 2–3 ovoid clusters and ± elongated, 2.0–3.5 (–4.0) cm long. Bracteoles ± ovate, membranous, 1.0–1.5 mm long, densely fimbriate-ciliate. Tepals ± equal, lanceolate, distinctly acuminate, 2.2–3.0 mm long, ± brown, ± glabrous to very sparsely ciliate. Stamens 3; anthers 0.3–0.6 mm long; filaments 0.5–0.6 mm long; style c. 0.3 mm long; stigmas 1.0–1.2 mm long. Capsule ± ovoid, subacute, castaneous brown; capsule segments 1.7–2.0 × c. 1.3 mm. Seeds ellipsoidal, brown, 1.0–1.1 mm long, 0.6–0.7 mm wide; appendage absent; base fibrillate.

Endemic to the Juan Fernández Is. 85: JNF. Found on rocks and rocky slopes. Map 65.

85. JUAN FERNÁNDEZ IS.: Masafuera, N slope of Quebrada Casas, 900 m, 17 Jan 1986, *T.Stuessy et al. 9048* (OS); Quebrada de las Casas, ladera mirando al Sur Riscos, *Muñoz & E.Sierra 7400* (OS); Masafuera, Quebrada Pasto, 1060–1100 m, 29 Jan 1986, *T.Stuessy 9411 & T.Lammas* (OS); Masafuera, Las Torres,

1370 m, 29 Jan 1955, *I. Skottsberg & C.J.F. Skottsberg* 399 (S); Masafuera, Cuchara, above Correspondencia Camp, 1350 m, *I. Skottsberg & C.J.F. Skottsberg* 162 (S); Masafuera, Quebrada Guaton, valley toward Cordon Atravesado, 1230 m, *A. Landero & L. Gaete* 9108 (OS); Masafuera, 1200–1300 m, *C.J.F. Skottsberg* 28 (UPS).

36. *Luzula alopecurus* Desv., *J. Bot. (Desvaux)* 1: 159 (1808)

Juncoides alopecurus (Desv.) Kuntze, *Revis. Gen. Pl.* 2: 734 (1891). T: 'ad fretum magellanicum'; 'Magell.', *P. Commerson*; syn: P.

Luzula villosa Wikstr., *Kongl. Vetensk. Akad. Handl.* 1823(2): 276 (1823). T: 'Terra del Fuego et Falklands Islands'; syn: not located in S or UPS.

Illustrations: F.G.P. Buchenau, in H.G.A. Engler, *Pflanzenr.* (iv.36) 25: 78, fig. 50 (1906); M. Barros, *Darwiniana* 10: 339, fig. 18 (1953).

Map: H. Meusel, E. Jäger & E. Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 88 (1965).

Perennials usually 10–35 cm tall, densely hairy caespitose; base often purplish, robust; rhizome short; stolons absent. Stem rigidly erect, (0.6–) 0.8–1.2 mm in diam. below inflorescence. Basal leaves densely ciliate, numerous, 8–15 (–18) cm long, 4–5 (–6) mm wide; cauline leaves unevenly distributed, usually with one near stem base and 1 or 2 close to inflorescence, 6–10 cm long, often overtopping inflorescence; all leaves acute, with margins papillose-serrulate. Lower bract herbaceous, c. 2–5 cm long, usually overtopping inflorescence; upper bracts scarious-brownish, fimbriate-ciliate, up to 2 cm long. Inflorescence erect, densely congested, c. 1.5–2.5 cm long, of whitish villose appearance when younger, rarely with a small separate flower cluster at base. Bracteoles inserted c. 0.5–1.0 mm below flower; upper bracteoles narrowly lanceolate with a filiform tip, c. 3.0–3.5 mm long (often as long as flowers), densely fimbriate-ciliate. Tepals subentire, with outer ones densely and inner ones usually very sparsely long ciliate, narrowly lanceolate, acuminate with filiform tip, \pm unequal (inner tepals 2.5–2.9 mm long, outer tepals 2.9–3.7 mm long), purplish castaneous brown to straw brown at base, with broad membranous border. Stamens 6; anthers 0.4–0.7 mm long; filaments 0.5–0.9 mm long, longer than anthers; style 0.1–0.2 mm long; stigmas c. 1.0 mm long. Capsule oblong-ovoid, \pm trigonus above, \pm acute, castaneous brown, shorter than perianth; capsule segments 1.8–2.0 \times 1.3–1.4 mm. Seeds ellipsoidal, with distinct yellowish seed-coat and yellowish apex, dark castaneous, 0.9–1.0 mm long, 0.5–0.6 mm wide; appendage yellowish, 0.1–0.2 mm, fibrillate. $2n=24$, *vide* D.M. Moore, *Fl. Tierra del Fuego* 325 (1993).

Endemic to southernmost Patagonia, Tierra del Fuego and the Falkland Islands. 85: AGS, CLS. 90: FAL. Grasslands and rocky slopes. Map 66.

85. ARGENTINA SOUTH: Santa Cruz, *C. Burmeister* 173 (SI); Tierra del Fuego, Ushuaia, Río Piper, *R. Santesson* 411 (S); Isla Soledad, Seal Rookery, *E.A. Ulibarri, M. Dimitri & E. Orfila* 1039 (SI). CHILE SOUTH: Magallanes, Punta Arenas, Loretto, 9 Dec 1903, *Scott Elliott* (BM); Tierra del Fuego, Porvenir, *R. Santesson* 1565 (S); Tierra del Fuego, Sierra Carmen Silva, N side of Río Chico valley, *D.M. Moore & R.N. Goodall* 225 (H, RNG, UPS). 90. FALKLAND IS.: West Falkland Is., Roy Cove Ck, *Vallentin* 84 (K); Port Stanley, *C.J.F. Skottsberg* 90 (BM); 4 Jan 1908, *C.J.F. Skottsberg* 28 (S); East Falklands, Kidney Is., *Sladen* 5/49 (BM).

37. *Luzula brachyphylla* Phil., *Linnaea* 33: 268 (1865)

Luzula racemosa f. *brachyphylla* (Phil.) Fuentes, *Bol. Mus. Nac. Hist. Nat.* 90: 137 (1917). T: Chile, Chiloé Is., Chacao, *Fonck* 44; holo: SGO.

Luzula patagonica Speg., *Rev. Fac. Agron. Univ. Nac. La Plata* 3: 577 (1897); *Juncoides patagonica* (Speg.) Kuntze, *Revis. Gen. Pl.* 2: 734 (1891). T: Argentina, Santa Cruz, Lago Argentino, Arroyo Leona, *C. Spegazzini*; syn: S.

Luzula chilensis f. *frequentior* Barros, *Darwiniana* 10: 321 (1953). T: Argentina, Chubut, valle Lonquifneu, Los Menucos, 8 Feb 1945, *A. Castellanos*; lecto: LIL114298, *designated here*.

Luzula correae Barros, in M.N. Correa, *Fl. Patagon.* 2: 118 (1969). T: Argentina, Santa Cruz, Calafate, *M.N. Correa* 2962, *L. Mendonza & C. Movia*; holo: BAB, photo PRA.

Perennials 15–30 (–55) cm tall, loosely caespitose, sparsely hairy; rhizome short or ascending; stolons absent. Basal leaves 4–8 (–17) cm long, 3–4 mm wide; cauline leaves 1 or 2, usually 3–7 cm long; all leaves \pm acute, with papillose-serrulate margins. Bracts erect to erecto-

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patent, 1.5–2.5 (–4.0) cm long, equalling or overtopping their partial inflorescence, with lower bracts herbaceous and upper ones scarious. Inflorescence erect, rarely slightly nodding, interrupted, 2.5–6 cm long, of 3–6 (–10) clusters, with lower clusters pedunculate and upper ones sessile; all clusters elongated, narrow (c. 4 mm in diam.), cylindrical composed of subclusters, many-flowered. Bracteoles c. 1 mm long, ovate, sparsely ciliate, scarious. Tepals \pm lanceolate, subequal, glabrous; outer tepals acuminate, subaristate; inner tepals \pm mucronate, 1.7–2.0 (–2.3) mm long; base castaneous; margin paler or membranous. Stamens 3 or 4–6; anthers 0.5–0.8 mm long; filaments 0.3–0.4 mm long; style 0.1–0.2 mm long; stigmas c. 1 mm long. Capsule \pm ovoid, \pm acute, deep brown; capsule segments 1.6–1.8 \times 1.0–1.1 mm long. Seeds dark, ellipsoidal, 0.9–1.0 (–1.1) mm long, 0.6–0.7 mm wide; seed-coat not distinct; apex not distinct; appendage c. 0.05 mm long, fibrillate. Fig. 17.

Southern Chile and Southern Argentina. 85: AGS, CLS. In grasslands, usually at lower altitudes. Map 67.

85. ARGENTINA SOUTH: Tierra del Fuego, Río Azopardo, *P.Dusén 584* (UPS); Laguna Patos near Río Carbon, 4 Jan 1909, *C.J.F.Skottsberg 943* (S, UPS); Chubut, Trevelin, *T.Meyer 9277* (LIL); Chubut, José de San Martín, 530 m, 22 Jan 1902, *Hözberg* (S); Neuquén, Norquén, Copahué, 2000 m, *C.A.O'Donnell 2097* (LIL); Neuquén, Pino Hachado, *A.Burkart 9651* (SI). CHILE SOUTH: Magallanes, Cerro Paine, *S.F.Anilot 6094* (SGO); Aysén, Laguna San Rafael, 3–4 m, *C.Muñoz 6147* (SGO); Los Lagos, Mechuque, *F.W.Pennel 12622* (SGO); Los Lagos, San Rafael, 1921, *C.M.Hicken* (SI 10974).

Most plants from Chile and from the southern part of the range are triandrous, with occasional occurrence of flowers with 4–6 stamens. Plants from Santa Cruz, Chubut and Neuquén, Argentina, are predominantly hexandrous (flowers with 3–5 stamens sometimes found in the same inflorescence as hexandrous ones). Differences in stamen number is the only significant variation found within the species (the names *L. patagonica* and *L. correae* refer to the predominantly hexandrous form).

38. *Luzula chilensis* Nees & Meyen ex Kunth, *Enum. Pl.* 3: 312 (1841)

Juncoides chilensis (Kunth) Kuntze, *Revis. Gen. Pl.* 2: 734 (1891). T: Chile, 'ad Maipú fluv., alt. 10000 ped.', 1831, *Meyen*; syn: B, destroyed, see F.G.P.Buchenau, *Abh. Naturwiss. Vereine Bremen* 6: 418, Plate iv, fig. 1, a–d (1879) [et *Junc. S.-Amer.*, 1879]; Chile, Biobío, Antuco, *E.F.Poeppig [Coll. Pl. Chil. III] 105*; syn: BM, P, S.

Luzula rigida Phil., *Linnaea* 33: 267 (1865); *Luzula chilensis* f. *rigida* (Phil.) Fuentes, *Bol. Mus. Nac. Hist. Nat.* 90: 138 (1917). T: Chile, Colchagua, 'in montibus subalpinis Talcaregué, Feb 1831, [*J.Gay*] 284; holo: SGO.

Luzula chilensis f. *longifolia* Barros, *Darwiniana* 10: 322 (1953). T: Argentina, Neuquén, Río Alumine, *Otto Asp.* 98; syn: BAF; Chubut, Río Percey, 6 Feb 1945, *A.Castellanos*; syn: LIL114302.

Perennials, usually 12–25 (–55) cm tall, caespitose, sparsely to \pm densely hairy; rhizome short; stolons absent. Basal leaves (5–) 6–8 (–12) cm long, 2.5–3.5 (–6) mm wide; cauline leaves 2, usually short, 1.5–3.0 cm long; all leaves acute, with margins distinctly papillose-serrulate. Lower bract membranous-brownish, rarely herbaceous, usually 1.5–2.0 cm long, ciliate, \pm equalling inflorescence. Inflorescence usually congested as a single slightly nodding or \pm suberect head c. 2 \times 1.5 cm, of 5–6 clusters (usually 3–6-flowered); less often clusters distinct, \pm interrupted, inflorescence about 5 cm long. Bracteoles scarious with straw-brown base, ovate, acuminate, fimbriate-ciliate, 1.5–2.0 mm long. Tepals \pm equal, glabrous, lanceolate, c. 2.7–3.3 mm long, acuminate-aristate, pale castaneous brown below and on midrib, otherwise membranous to pale straw-brown. Stamens 6; anthers usually 0.6–0.9 mm long; filaments 0.4–0.5 mm long; style 0.3–0.4 mm long; stigmas 1.2–1.6 mm long. Capsule ovoid to subglobular, \pm obtuse, castaneous brown, shining, equalling or shorter than perianth; capsule segments 2.4–3.0 \times 1.5–2.1 mm. Seeds paler castaneous brown; seed-coat distinct, forming a yellowish apex, 1.2–1.5 mm long, (0.9–) 1.0–1.2 mm wide; appendage (0.1–) 0.2 mm long, fibrillate. Fig. 17.

Most common in S and C Chile and S and W Argentina, reaching Valparaíso (district of Aconcagua) in C Chile. 85: AGS, AGW, CLC, CLS. Distribution imperfectly known. Wet mountain slopes and grasslands, usually below 2000 m, rarely above 3000 m. Map 68.

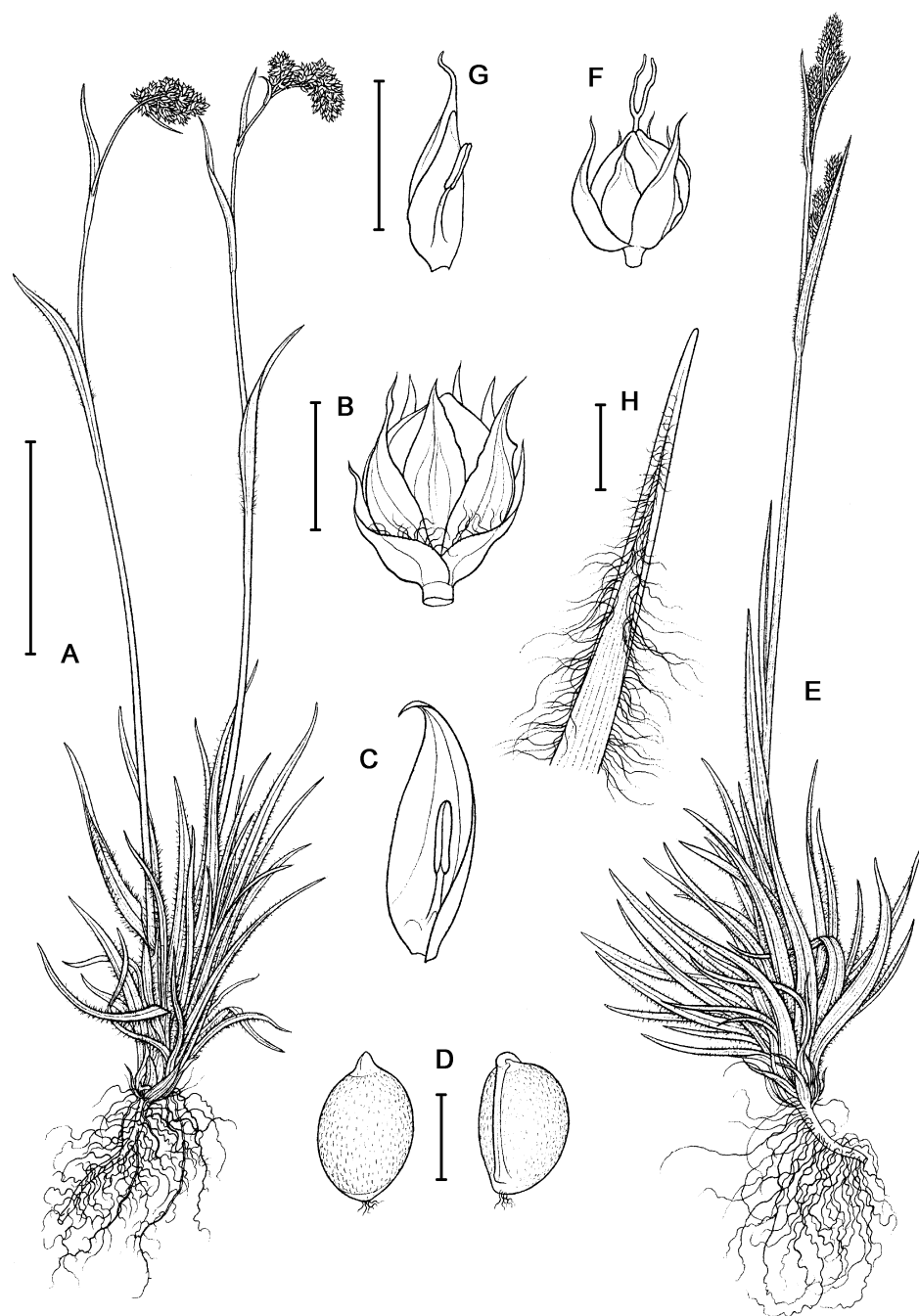


Figure 17. *Luzula chilensis*. **A**, habit; **B**, flower; **C**, tepal and stamen; **D**, seeds. *L. brachyphylla*. **E**, habit; **F**, perianth with unripe capsule; **G**, tepal and stamen; **H**, leaf apex and indumentum. (**A–D**, *E. Wall* 1727, S; *F. W. Pennel* 12442, S, SGO; **E–H**, *C. J. F. Skottsberg* 943, S, UPS; *A. Burkart* 9651, SI). Scale bars: **A**, **E** = 5 cm; **C**, **G** = 1.5 mm; **B**, **F** = 2 mm; **D** = 1 mm; **H** = 1 mm. Drawn by © E. Smrčinová.

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85. ARGENTINA NORTHWEST: Mendoza, Malarhue, Valle de Las Leñas, *R.Kiesling & A.Donath 7262*, 25 Dec 1989 (SI, MCNS). ARGENTINA SOUTH: Neuquén, Cordillera del Viento, Cerro las Yeguas, *A.Pastore 46* (S); Chubut, Lago Vintter, 1360–1450 m, *S.Halloy A-93* (LIL); Santa Cruz, Río de las Vueltas, Estancia Pérez, 1200 m, *H.Sleumer 1382* (LIL); Santa Cruz, Lago Argentino, 400 m, *P.Dusén 5777* (S, SI, UPS). CHILE CENTRAL: Valparaíso, Petorca, Río Sobrante, 3100–3300 m, *J.L.Morrison 17310* (S, SI); La Araucanía, Cautín, Volcán Llaima, 1200–1300 m, *E.Werdermann 1232* (LIL, S, SI); Valparaíso, Aconcagua, Portillo, 3000 m, *E.Wall 1727* (S). CHILE SOUTH: Ñuble, Baños de Chillán, 2100 m, *F.W.Pennel 12442* (S, SGO); Libertador, Cordillera del Peuco, 1886, *R.A.Philippi* (SGO).

The obvious type of the name *L. chilensis* was destroyed in B but details were depicted and described by F.G.P.Buchenau, *Junc. S.-Amer.* 418 (1879). The seed size, 6 stamens, and inflorescence shape clearly identify *L. chilensis*. The type of *L. rigida* does not bear Philippi's annotation of the name but the detailed description (with a number of measurements and individual features) allows identification of the type and its equation with *L. chilensis*.

39. *Luzula leiboldii* Buchenau, *Junc. S.-Amer.* 418 (1880)

Juncoides leiboldii (Buchenau) Kuntze, *Revis. Gen. Pl.* 2: 734 (1891). T: Chile, *F.E.Leibold 2969*; holo: W, not located; iso: S.

Illustration: M.Barros, *Darwiniana* 10: 326, fig. 13 (1953).

Perennials 12–30 cm tall, densely caespitose, hairy; base thick, with extravaginal erect shoots; stolons absent. Basal leaves usually 5–10 cm long, 3.5–5.0 mm wide; cauline leaves 1 or 2, 3.5–6.0 cm long, 2.0–3.0 mm wide; all leaves acute, rarely subobtuse, with margins ±smooth to sparsely papillose, sparsely ciliate. Lower and middle bracts castaneous-membranous, with prominent veins, aristate, ciliate, up to 1.5 cm long; upper bracts c. 5 mm, similar to tepals. Inflorescence erect to suberect, rarely slightly nodding, usually interrupted at base, ‘echinate’ with erecto-patent acute bracts, usually 1.5–2.0 (–3.0) cm long, usually of 3–7 few-flowered clusters subtended by conspicuous middle bracts. Bracteoles acuminate, membranous, 2.5–3.0 mm long. Tepals glabrous to sparsely ciliate, pale to castaneous brown at base, membranous-scarious above, acuminate-aristate, ±unequal; outer tepals 3.5–4.8 mm long; inner tepals 2.7–3.7 mm long. Stamens 6; anthers (0.7–) 0.8–1.2 (–1.5) mm long; filaments 0.4–0.6 mm long; style 0.5–0.6 mm long; stigmas 1.5–2.0 mm long. Capsule ovoid, subacute, deep castaneous, shorter than perianth; capsule segments 2.4–2.9 mm long. Seeds [unripe] 1.5–1.7 mm long, c. 1 mm wide; appendage indistinct, c. 0.1 mm long, fibrillate.

Recorded from Santiago province, Chile, and Mendoza and Neuquén, Argentina. 85: AGS, AGW, CLN. Habitat unknown. Map 69.

85. ARGENTINA NORTHWEST: Mendoza, Calmucó, *A.Burkart et al. 13849* (SI13849). ARGENTINA SOUTH: Neuquén, Lacar, Cordón del Cerro Colorado (Between Lago Lacar and Lago Lolog), 25 Jan 1986, *L.Bernardello & Moscone 620* (CORD). CHILE NORTH: Santiago, Río Yeso, Lago Negro, 2700 m, *W.Biese 937* (LIL); ‘Cordillera de Santiago’, *R.A.Philippi* (SGO, BM); Santiago, Cerro de Ramón, 2650 m, *C.Yсандино* (SGO).

Closely related to *L. chilensis*, and perhaps only an infraspecific taxon of it. *Luzula leiboldii* is distinct in having longer tepals, longer anthers with higher anther/filament ratio, and tepals sometimes hairy. The material available is too scanty for evaluation of variation ranges.

40. *Luzula racemosa* Desv., *J. Bot. (Desvaux)* 1: 162, tab. 6, fig. 3 (1808)

Juncoides racemosa (Desv.) Kuntze, *Revis. Gen. Pl.* 2: 734 (1891). T: ‘in America calidiore’; lecto: P, designated here [left hand specimen, the rest is a fragment of a *Luzula* of another section].

Luzula spicata var. *interrupta* E.Mey., *Linnaea* 22: 415. 1849, non *Luzula interrupta* Desv. T: Mexico, Palyas de Jorullo, *A.Humboldt*; syn: n.v.; Mexico, Toluca, *A.Humboldt*; syn: n.v.; Mexico, Mt Orizaba, *H.G.Galeotti*; syn: n.v.; *C.Schiede*; syn: n.v.

Luzula humilis Buchenau, *Abh. Naturwiss. Vereine Bremen* 4: 125 (1874); *Luzula racemosa* f. *humilis* (Buchenau) Buchenau, *Bot. Jahrb. Syst.* 12: 133 (1890); *Luzula racemosa* var. *humilis* (Buchenau) T.C.E.Fr., *Nova Acta Regiae Soc. Sci. Upsal.*, ser. 4, 1: 167 (1905). T: Bolivia, La Paz, Larecaja, near Sorata, 3700–4200 m, *G.Mandon 1448*; lecto: GOET, fide H.Balslev, *Fl. Neotrop. Monogr.* 68: 67 (1996); isolecto: GH, P, S.

Luzula macusaniensis Steud. ex Buchenau, *Abh. Naturwiss. Vereine Bremen* 4: 131 (1874); *Juncoides macusaniensis* (Buchenau) Kuntze, *Revis. Gen. Pl.* 2: 734 (1891). T: Peru, Puno, Macusani, 1854, *W. Lechler 1839*; lecto: P, *fide* H. Balslev, *Fl. Neotrop. Monogr.* 68: 467 (1996) (as 'holotype'); isolecto: BR, G, GOET, K, P, S, WRSL.

Illustrations: N.A. Desvaux, *J. Bot. (Desvaux)* 1: 162, tab. 6, fig. 3 (1808); H. Balslev, *Fl. Neotrop. Monogr.* 68: 66, fig. 34, C, D (1996).

Perennials (5–) 10–35 (–40) cm tall, caespitose, hairy; rhizome short, erect or ascending; stolons absent. Stem thin, nodding in upper part. Basal leaves canaliculate or flat, 5–18 cm long, typically 2.0–2.5 (–4.0) mm wide; cauline leaves (0–) 1 or 2, usually remote, narrow, usually 3.5–7 cm long; all leaves acute, with margins papillose-serrulate. Lower bract usually herbaceous, very narrow, up to 4–5 cm long, shorter than inflorescence; bracts supporting flower clusters linear-lanceolate, pale brownish-membranous, ciliate, up to 1 cm long, usually shorter than clusters. Inflorescence nodding, spike-like, (1.0–) 1.5–5 × 1.0–1.5 cm, of 3–8 elongated clusters, ±interrupted (rhachis visible), rarely compactly congested in high mountain forms (then only 1–1.5 cm long). Bracteoles ±membranous, 1.2–1.5 (–2.0) mm long, ovate, acuminate, ciliate. Tepals ±unequal, ±glabrous (rarely with few teeth or hairs), dark castaneous brown with paler apex and margins; outer tepals usually 2.0–2.4 (–3.0) mm long, lanceolate, acuminate-aristate; inner tepals 1.7–2.1 (–2.4) mm long. Stamens 3, rarely 4–5; anthers 0.3–0.5 mm long; filaments 0.3–0.6 mm long; style 0.1–0.2 mm long; stigmas 0.6–0.9 mm long. Capsules oblong-ovoid, usually ±obtuse, shorter than perianth, paler brown; capsule segments usually 1.5–1.7 (–1.8) × 0.9–1.1 mm. Seeds pale brown, shining, with darker apex, (0.7–) 0.9–1.0 mm long, c. 0.6 mm wide; appendage distinct, yellowish, 0.1–0.2 mm long, sparsely short fibrillate. $2n=24$, *fide* J.H. Beaman, *Amer. J. Bot.* 49(1): 41–50 (1962), *n.v.* Fig. 18.

Central (C Mexico and Guatemala) and South America, from Venezuela to Argentina and Chile. 79: MXC, MXG, MXS. 80: GUA, SMX. 82: VEN. 83: BOL, CLM, ECU, PER. 85: AGS, AGW, CLN, CLS. Sunny and rocky sites in open woodlands and páramo, usually between 3000 and 4000 m. Map 70.

79. MEXICO: Puebla, N side of Popocatepetl, *J.H. Beaman 1742* (DUKE, GH, TEX, US). 80. GUATEMALA: San Marcos, Totonicapan, Tecum Uman ridge, 3340 m, *J.H. Beaman 4180* (DUKE, NY, UC). 82. VENEZUELA: Mérida, Libertador, Sierra Nevada, Loma Redonda, 4045 m, *L.J. Dorr & L.C. Barnett 5213* (AAU, NY). 83. BOLIVIA: La Paz, Inquisivi, source of Rio Ocsalla, 3800 m, *M. Lewis 40912* (AAU, LPB, MO). COLOMBIA: Páramo Choachi, 3000 m, *A. Lindig 1404* (P, S). ECUADOR: Cotopaxi, 4 km S of Cotopaxi railway station, 3500 m, *H. Balslev 1183* (AAU, NY). PERU: Huaráz, Huascarán, Quebrada Churup, 3890–4260 m, *D.N. Smith, Valencia & A. Gonzales 9629* (AAU, MO). 85. ARGENTINA NORTHWEST: Jujuy, Santa Ana, *A. Burkart & N.S. Troncoso* (SI11763); Tucumán, Ciénaga Grande, Cumbres Calchaquies, 3800 m, *S. Halloy s.n.* (LIL567036). ARGENTINA SOUTH: Neuquén, Los Lagos, San Martín de los Andes, *A.E. Rasp 6* (SI)

An extremely variable species in most features of general habit. In various regions plants have features blurring the otherwise distinct limits of the species. In Mexico, flowers are close to the upper size limit, in Ecuador, an intermediate between *L. racemosa* and *L. chilensis* was found (Sayausí, *G. Harling 1424*, S). Plants in Argentina have a tendency towards longer peduncles of lower clusters, a feature found in related species. The plasticity of vegetative traits, depending often on available moisture and altitude, is also enormous. The whole complex is in a need of a detailed cultivation and karyological study.

41. *Luzula peruviana* Desv., *J. Bot. (Desvaux)* 1: 160 (1808)

Juncoides peruviana (Desv.) Kuntze, *Revis. Gen. Pl.* 2: 725 (1891). T: 'in Terra Patagonala et montibus frigidetis Peruviae Pumbo, Antisana et Soluca.'; America calidior, *sine coll.*; lecto: P, *fide* H. Balslev, *Fl. Neotrop. Monogr.* 68: 67 (1996) 1996: 67 [as holotype, left hand specimen typical]; Ecuador, Antisana, *A. Humboldt*; para: B-WILLD.

Luzula boliviensis Buchenau, *Abh. Naturwiss. Vereine Bremen* 4: 128 (1874); *Juncoides boliviensis* (Buchenau) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891). T: Bolivia, La Paz, Larecaja, Sorata, between Pongo and Anilaya, 3800 m, *G. Mandon 1454*; lecto: GOET, *fide* H. Balslev, *Fl. Neotrop. Monogr.* 68: 67 (1996); isolecto: BR, G, NY, P, S, UPS, US [*p.p.*]; a few plants belong to *L. racemosa* or to intermediates.

Luzula peruviana var. *longispica* Barros, *Darwiniana* 10: 346 (1953). T: Argentina, Jujuy, Volcán, Loma del Tambo, 2500–3000 m, 22 Feb 1924, *Schreiter 2909*; holo: LIL.

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Illustration: H.Balslev in *Fl. Ecuador* 11: 17, fig. 5 (1979).

Perennials up to 60 cm tall, caespitose, hairy; rhizome vertical or ascending; stolons absent. Stem thick, rigidly erect, with only the uppermost part nodding. Basal leaves numerous, often squarrose, rigid, flat or canaliculate, usually 5–10 cm long and 2–4 mm wide; cauline leaves 2–4, densely hairy, to 13 cm long, evenly distributed on stem, often overlapping; all leaves acute, indistinctly papillose-serrulate. Lower bract herbaceous, densely hairy, up to 5 cm long, overtopping inflorescence; middle bracts supporting flower clusters purplish-brownish membranous, lanceolate, aristate, densely ciliate, c. 0.8–1.5 (–2.0) cm long, often exceeding the partial inflorescence. Inflorescence erect to slightly nodding, compact (rhachis usually not visible), usually 2.5–5 × c. 1.5 cm, often lobulate, rarely interrupted at base, dark castaneous brown, composed of c. 3–8 dense clusters. Bracteoles castaneous-membranous, ovate-lanceolate, aristate, 2.0–2.5 mm, long ciliate. Tepals subequal or irregularly unequal, lanceolate, acuminate and aristate, usually ciliate, dark castaneous brown; upper part membranous with prominent midrib; longest tepals in flower 3.0–4.4 mm long. Stamens 3; anthers 0.3–0.4 mm long; filaments 0.6–0.9 mm long; style 0.1–0.2 mm long; stigma 0.5–1.1 mm long. Capsule oblong-ovoid, subacute to obtuse, paler brown; capsule segments 1.8–2.2 × 1.3–1.4 mm. Seeds paler brown, with darker apex, ellipsoidal, 1.1–1.4 mm long, c. 0.7 mm wide; appendage scarcely visible, c. 0.1 mm long, densely long fibrillate (seeds difficult to release from capsule).

Centred to Ecuador and Peru, rare in Colombia, Bolivia and northernmost Argentina, with an isolated station in C Mexico; further exploration needed. 79: MXC. 83: BOL, CLM, ECU, PER. 85: AGW. In páramos, grasslands, rocky slopes, usually between 3800 and 4500 m. Map 71.

79. MEXICO CENTRAL: Tlaxcala, Malinche, 4400–4450 m, *J.H.Beaman* 2223 (UPS). 83. BOLIVIA: La Paz, Murillo, Laguna Zongo, 4740 m, *J.Brandbyge* 582 (AAU). ECUADOR: Chimborazo, Mt Chimborazo, 4550 m, *E.Asplund* 7938 (S, UPS); Pichincha, Páramo de Guamani, 3800–4100 m, *H.Balslev* 1618 (AAU); Imbabura, Volcán Cotocachi, 3900–4100 m, *S.Laegaard* 54498 (AAU). PERU: Puno, Araranca, 4100–4300 m, *F.W.Pennell* 13456 (S); Huaron, 4500 m, *J.F.Macbride* & *F.Featherstone* 1132 (S); Ancash, Carhuaz, Quebrada Ulta, 4400–4600 m, *D.N.Smith* 11338 (AAU, MO). 85. ARGENTINA NORTHWEST: Salta, Santa Victoria, Cochita, Ruta 5, foot of cerro Campanario, 30–35 km W of Santa Victoria, 4100–4200 m, *L.J.Novara* 6683 (MCNS); Tucumán, Cumbres Calchaquíes, Callejones, 18 Feb 1915, *L.Castillón* (LIL 50636).

Variable, and in many features similar to *L. racemosa*. Main diagnostic characters are its ciliate longer tepals, longer seeds with smaller, densely fibrillate appendage, and the habit of the inflorescence. Flowers of both species indicate autogamy but intermediates of unknown nature are known from Ecuador and Peru.

42. *Luzula vulcanica* Liebm., *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 2: 44 (1850)

T: Mexico, Veracruz, Mt. Orizaba, 4250 m, *F.Liebmann*; lecto: C, *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 65 (1996) [as 'holo']; isolecto: C, GH, HAL, K, P, S.

Illustration: H.Balslev, *Fl. Neotrop. Monogr.* 68: 66, fig. 34, A, B (1996).

Map: H.Balslev, *Fl. Neotrop. Monogr.* 68: 63, fig. 32 (1996).

Perennials c. 10–45 cm tall, sparsely hairy; rhizome ascending to erect; stolons usually long, ascending. Stems erect, often slightly curved near the top (in the opposite direction to the nodding inflorescence). Basal leaves 3–15 cm long, usually 2–4 mm wide; cauline leaves usually 2, usually in upper half of stem, 1–5 (–11) cm long; all leaves acute, with papillose-serrulate margins. Bracts all scarious; lower bract membranous or castaneous (purplish), broadly lanceolate, c. 1 cm long, fimbriate-ciliate. Inflorescence a terminal spike like head, dark (reddish) castaneous brown, 1–4 × 0.5–1.2 cm, usually of 2–5 clusters, congested to slightly interrupted, suberect, if nodding then only the inflorescence not the upper part of stem. Bracteoles 1.5–2.0 mm long, usually castaneous-membranous. Tepals dark, reddish-blackish, subequal, glabrous, usually 2.7–3.7 mm long, acuminate. Stamens 3; anthers 0.4–0.5 mm long; filaments 0.8–1.0 mm long; style 0.1–0.2 mm long; stigmas c. 0.5–0.8 mm long. Capsule oblong-ovoid, ±trigonus above, paler castaneous; capsule segments 1.6–1.9 ×

1.0–1.2 mm, finely rugose. Seeds ellipsoidal, paler brown, 0.9–1.0 mm long, 0.5–0.6 mm wide; appendage c. 0.1 mm long, fibrillate. Fig. 18.

C Mexico and from Colombia to Bolivia. 79: MXC, MXG. 83: BOL, CLM, ECU, PER. Grasslands and dry open slopes in high altitudes. Map 72.

79. MEXICO CENTRAL: Mexico, SW of Mt Ixtaccihuatl, 3850 m, *J.H.Beaman 3527* (US). MEXICO GULF: Veracruz, Cofre de Perote, 4000 m, *J.Dorantes 338* (F). 83. BOLIVIA: La Paz, Murillo, La Cumbre, 4600 m, *E.Asplund 4380* (UPS); Huayna Potosi, Lago Zongo, 4700 m, *H.Balslev & S.G.Beck 1148A* (AAU, LPB, NY). ECUADOR: Imbambura, Volcán Cayambe, 4100 m, *P.C.D.Cazalet & T.D.Pennington 5723* (K, NY, US); Cotopaxi, Laguna Salayambo Cocha, 3800–4050 m, *B.Øllgaard & H.Balslev 9891* (AAU); Azuay, road between Soldados and Angas, 3850 m, *H.Balslev 1525* (AAU). PERU: Puno, Huancane, Occo Pampa, 3125 m, *R.S.Shepard 62* (GH, NY).

43. *Luzula antarctica* Hook.f., *Fl. Antarct.* 1: 359 (1847)

Juncoides antarctica (Hook.f.) Macloskie, *Rep. Princeton Univ. Exp. Patagonia, Bot.* 8: 302 (1904). T: Chile, Cape Horn, Hermite Is., *J.D.Hooker 14*; holo: K.

Perennials 7–13 cm tall, densely caespitose, densely to sparsely hairy; rhizome short, vertical; stolons absent, plant base greyish straw-brown. Upper part of stem 0.3–0.4 mm in diam., arcuate. Basal leaves usually 3–5 cm long, ±flat to canalicate, c. 2.0–3.0 (–3.5) mm wide, acute; margins subglabrous to densely ciliate, smooth or very remotely papillose. Cauline leaves (1–) 2, 1.5–3.5 cm long, c. 1.5 mm wide, acute. Lower bract (or uppermost leaf) usually slightly remote from inflorescence, brownish-membranous (or ±herbaceous), hairy, narrow, less than 2 cm long; upper bracts narrowly triangular to lanceolate or ovate-lanceolate, dark castaneous brown, paler above, c. 0.7–1.0 cm long. Inflorescence small, 1.0–1.5 × 0.7–0.9 cm, nodding, compact, dark castaneous brown, few-flowered. Bracteoles ±lanceolate to narrowly triangular, castaneous brown to membranous-brownish, paler near apex, usually 2.5–4.0 mm long. Tepals unequal; inner tepals 2.8–3.4 mm long; outer tepals 3.8–4.7 mm long, lacerate ciliate, dark castaneous brown (including bases of ciliae), lanceolate, acuminate, aristate (with a filiform tip). Stamens (0–2) 3; anthers 0.3–0.6 mm long; filaments 0.7–0.8 mm long; style c. 0.2 mm long; stigmas 1.0–1.2 mm long; gynoeceum in some flowers rudimentary, but in most there are rudiments of 1 (–2) stamens. Capsule dark brown, ovoid to subglobular, subobtuse, shorter than perianth; capsule segments usually 2.0–2.3 × 1.1–1.2 mm. Seeds ellipsoidal, brown; seed-coat not distinct, 1.0–1.1 mm long, 0.6–0.7 mm wide; appendage yellowish, 0.10–0.15 mm long, fibrillate.

Tierra del Fuego and adjacent territories, rare. 85: AGS, CLS. Exposed rocky slopes, grasslands. Map 73.

85. SOUTH ARGENTINA: Tierra del Fuego, Cerro Almanza, Lashifashaj, 900–1000 m, *D.M.Moore 1415* (H, K); Ushuaia, *H.Roivainen 2321* (H). CHILE SOUTH: Tierra del Fuego, Río Azopardo, 600 m, 9 Mar 1896, *P.Dusén 652* (UPS); 3 Mar 1908, *C.J.F.Skottsberg 849* (S); Isla Desolación, Puerto Angusto, 300–400 m, 8 Apr 1896, *P.Dusén 709* (UPS); Sierra Valdiviesa, Río Betbedero, 11 Mar 1908, *C.J.F.Skottsberg s.n.* (SGO, UPS).

Usually compared or synonymized with *L. alopecurus* on the basis of shared irrelevant characters [see D.M.Moore & M.C.Doggett, *Bol. Soc. Argent. Bot.* 17: 150–154 (1976)], but closer to the *L. racemosa* group. Distinct from the former in having three stamens and dark, nodding inflorescence, from the latter it can be distinguished by the compact inflorescence and much longer tepals.

44. *Luzula ruiz-lealii* Barros, *Darwiniana* 10: 346 (1953)

T: Argentina, Mendoza, Tunuyán, Valle del Alto Tunuyán, 16 Feb 1934, *A.Ruiz Leal 2140*; holo: LIL46295.

Luzula parvula Barros, *Darwiniana* 10: 356 (1953). T: Argentina, Mendoza, San Carlos, Laguna del Diamante, 3300 m, 16 Jan 1949, *A.Ruiz Leal 11717*; holo: LIL.

Illustrations: M.Barros, *Darwiniana* 10: 343, fig. 19 & 357, fig. 25 (1953).

Perennials to 15 cm tall, dwarf, densely caespitose, cushion-forming, subglabrous to sparsely hairy; rhizome ±erect, ±many-headed; stolons absent, with base covered with numerous brownish remains of leaf bases. Basal leaves rigid, glabrescent or ciliate, thick, canalicate,

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Figure 18. *Luzula vulcanica*. **A**, habit, note stolons; **B**, flower. *L. racemosa*. **C**, habit, note lack of stolons; **D**, flower. (**A**, **B**, B.Øllgaard & H.Balslev 9891, AAU; **C**, **D**, P.R.Bell 78, A). Scale bars: **A**, **C** = 5 cm; **B**, **D** = 2 mm. Drawn by K.Tind Originally published in G.Harling & B.Sparre (eds.), *Fl. Ecuador* 11: 15, fig. 4; 17, fig. 5 (1979), reproduced with permission, from H.Balslev, *Fl. Neotrop. Monogr.* 68: 66, fig. 34 (1996), © Lunds Botaniska Förening, © 1996, The New York Botanical Garden.

3–4 cm long, c. 1 mm wide, with ±obtuse to subobtuse tip and margins ±smooth; cauline leaves absent. Basal bract pale straw-brownish membranous, oblong-lanceolate, acute, ciliate, up to 1 cm long. Inflorescence spike-like, densely congested, terminal, cylindrical-ovoid, 1.0–1.5 × c. 0.7–0.8 cm, of 2–6 few-flowered clusters, or rarely of 1–3 remote basal clusters. Bracteoles whitish scarious, ovate, acuminate, ciliate, to 1.5–1.8 mm long. Tepals glabrous, ±equal, pale straw-brown or membranous above, brown below, acuminate (subaristate), with inner tepal ±mucronate, usually 2.1–2.6 mm long. Stamens 3–5 (–6); anthers 0.4–0.6 mm long; filaments 0.4–0.6 mm long; style c. 0.1 mm long; stigmas to 1 mm long. Capsule ovoid, subacute, paler brown, shorter than perianth; capsule segments 1.6–1.8 × c. 1.0 mm. Seeds 1.0–1.1 mm long, c. 0.6 mm wide; appendage yellowish, c. 0.2 mm long, fibrillate.

Endemic to Mendoza, Argentina. 85: AGW-ME. Open patches in dry grasslands, above 3000 m. Map 74.

85. ARGENTINA NORTHWEST: Mendoza, San Carlos, Laguna del Diamante, 3200 m, 16 Jan 1952, *A. Ruiz Leal 14584* (SI); 16 Jan 1949, *A. Ruiz Leal 11717* (LIL264113, MERL); Mendoza, Tunuyán, Valle del Alto Tunuyán, Cerro Pan de Azúcar, 6 Feb 1934, *A. Ruiz Leal 2140* (LIL, MERL).

A peculiar dwarf form, superficially similar to *L. ulophylla* of New Zealand. Number of stamens varies within inflorescence and cannot be used to separate *L. ruiz-lealii* and *L. parvula*. Suspected to be a depauperate form parallel to that of *L. racemosa* (*L. macusaniensis*) but cannot be equated with any of the southern hexandrous forms.

Doubtful names:

Luzula psilophylla Phil., *Linnaea* 33: 267 (1865)

Luzula chilensis f. *psilophylla* (Phil.) Fuentes, *Bol. Mus. Nac. Hist. Nat.* 90: 138 (1917). T: In Andibus 'Talcaregue'. [*J. Gay*]; holo: *n.v.*

The type material has not been located. The protologue description does not give relevant information, and later herbarium material annotated by Philippi is taxonomically heterogenous, including *Luzula leiboldii*, *L. chilensis* and *L. brachyphylla*.

Luzula chilensis var. *pallida* Buchenau ex Fuentes, *Bol. Mus. Nac. Hist. Nat.* 90: 138 (1917)

T: [not indicated].

Presumed Hybrids

Luzula × *somedana* Fern.-Carv. & Fern. Prieto in J.A. Fernández Prieto & M. de C. Fernández-Carvajal, *Stud. Bot.* 2: 134 (1983) = *Luzula pediformis* (Chaix) DC. × *L. sylvatica* subsp. *henriquesii* (Degen) Pirajá

T: Spain, Asturias, Somiedo, Sierra del Parámo, Laguna Cavera, 1720 m, 21 Jul 1978, *J.A. Fernández-Prieto*; holo: FCO8195; see also J.A. Fernández Prieto & C. Fernández-Carvajal, *Stud. Bot.* 2: 136, fig. A, B, C (1983).

A seed-sterile hybrid.

Luzula × *gayana* Font Quer & Rothm., *Cavanillesia* 7: 175 (1936) = *Luzula pediformis* (Chaix) DC. × *L. caespitosa* (E.Mey.) Steud.

T: Spain, Asturias, Cueto de Arvas, 1700 m, 15 Jul 1935, *P. Font Quer & W. Rothmaler*; holo, *n.v.*

Material not seen but the existence of the hybrid is probable.

Luzula × *marceloi* Rivas Mart., *Anales Inst. Bot. Cavanilles* 21(1): 289 (1963), *nom. inval.* = *Luzula caespitosa* (E.Mey.) Steud. × *L. spicata* (L.) DC.

T: Spain, Sierras de Guadarrama y Gredos, Ladera del Noruego, 2200 m, *S. Rivas Martínez*; holo: *n.v.*

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Sect. 6. THYRSANOCHLAMYDEAE

Luzula sect. *Thyrsochlamydeae* Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 30 (1938)

T: *Luzula unalaschkensis* (Buchenau) Satake; lecto, designated here.

Luzula subsect. *Thyrsochlamydeae* Novikov, *Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol.*, 95(6): 67 (1990), *nom. illeg.* T: *Luzula confusa* Lindeb.

Luzula subsect. *Tundricolae* Kovt., *Bot. Žurn. (Moscow & Leningrad)* 72: 1399 (1987). T: *Luzula tundricola* Gorodkov ex V.N.Vassil.

Luzula subsect. *Confusae* Kovt., *Bot. Žurn. (Moscow & Leningrad)* 72: 1399 (1987). T: *Luzula confusa* Lindeb.

Luzula subsect. *Nivales* [Chrték & Křisa ex] Kovt., *Bot. Žurn. (Moscow & Leningrad)* 72: 1399 (1987). T: *Luzula nivalis* (Laest.) Spreng.

Perennials. Leaves with tip acute, acuminate or mucronate. Lower bract short, membranous to brownish-membranous. Inflorescence subcongested, or in glomerules on thin peduncles which are usually arcuate or nodding, less often straight. Seeds ellipsoidal to narrowly ellipsoidal; appendage basal, short, up to 0.2 mm long, or lacking; base fibrillate.

Five species, almost confined to the Arctic and rare in the mountains in northern temperate regions. They represent a link between sect. *Diprophyllatae* and the type section. In particular, *L. arcuata* and *L. confusa* may have an allopolyploid origin of the above parentage, as indicated by their karyotypes (Nordenskiöld, 1949, 1951).

- | | | |
|----|--|-----------------------------------|
| 1 | Basal leaves usually 4.5–6.0 mm wide, bluish green; plants usually tall, 20–40 cm tall [California] | 45. <i>L. subcongesta</i> |
| 1: | Basal leaves usually narrower than 4 mm; plants usually less than 20 cm tall [circumpolar but north of California] | |
| 2 | Basal leaves with obtuse, often slightly swollen tip with a spinuliform mucro; seed base with appendage c. 0.2 mm long and fibrillate | 49. <i>L. nivalis</i> |
| 2: | Basal leaves subabruptly to gradually narrowing to acute or acuminate tip; seed base with short (to 0.1 mm long) appendage or without appendage, and always fibrillate | |
| 3 | Plant base straw-brown to dull brownish; flower clusters pale brown to straw-brown, ellipsoidal | 46. <i>L. kjellmaniana</i> |
| 3: | Plant base brown to purplish or reddish, usually shining; flower glomerules or clusters dark to blackish brown, ±globular or ellipsoidal | |
| 4 | Peduncles c. 0.2 mm in diam., with secondary branches, usually arcuate to nodding; glomerules (1–) 2–6 (–8)-flowered, broader than wide; number of glomerules usually 5–10; stem less than 0.5 mm in diam. below inflorescence | 47. <i>L. arcuata</i> |
| 4: | Peduncles c. 0.3 mm in diam., without secondary branches, usually straight, erect, less often arcuate; subsessile clusters more than 10-flowered; number of clusters usually 1–3; stem 0.5–0.9 mm in diam. below inflorescence | 48. <i>L. confusa</i> |

45. *Luzula subcongesta* (S.Watson) Jeps., *Fl. Calif.* 1: 258 (1921)

Luzula spadicea var. *subcongesta* S.Watson, *Bot. California* 2: 202 (1880); *Luzula parviflora* var. *subcongesta* (S.Watson) Buchenau, *Bot. Jahrb. Syst.* 12: 110 (1890); *Juncoides parviflora* var. *subcongesta* (S.Watson) E.Sheld., *Bull. Geol. Nat. Hist. Surv.* 9: 63 (1894); *Juncoides subcongesta* Coville, *Muhlenbergia* 1: 105 (1904). T: California, Sierra Nevada, near Donner Lake, *J.Torrey*; syn: *n.v.*

Illustration: Jepsen, *Fl. Calif.* 1: 259, fig. 45c, d, e (1921).

Map: J.Coffey Swab, *Fl. North Amer.* 22: 267 (2000).

Perennials, loosely tufted, subglabrous, bluish green, with horizontal rhizome. Stem 20–40 cm long; cauline leaves 3–4, usually 3–5 cm long, 3–6 mm wide; basal leaves up to 10 (–15) cm

long, usually 4.5–6 mm wide; all leaves with distinctly acute tip, papillose-serrulate margins and sparse hairs near sheath. Inflorescence bracts straw-membranous or with reddish tinge; lower bracts up to 1.5 cm long, ciliate. Inflorescence up to 4–6 cm long, corymbose with 4–20 glomerules on capillary arcuate peduncles c. 0.2 mm in diam., each distally branched; glomerules usually 3–7-flowered. Bracteoles usually c. 1.5 cm long, ciliolate. Tepals equal, 1.7–2.1 mm long, 0.5–0.6 mm wide, ovate-lanceolate, acute, entire, dark brown. Stamens 6; anthers 0.3–0.6 mm long; filaments 0.5–0.7 mm long; style c. 0.3 mm long; stigmas c. 1.0 mm long. Capsule ovoid with subconical top, shorter than tepals; capsule segments dark brown, lustrous, 1.6–1.8 × 0.9–1.1 mm. Seeds narrowly ellipsoidal, 1.1–1.2 × 0.6 mm, medium brown, distally apiculate, with fibrillate base; appendage missing. $2n=24$ [BL], H.Nordenskiöld, *Hereditas* 37: 330–331, 1951. Fig. 19.

Endemic to California. 76: CAL. Gravelly stream and lake banks, grassy patches among rocks, usually at or above 3000 m. Map 75.

76: CALIFORNIA: Sierra Nevada, Tuolumne Co., head of Virginia Canyon, c. 3200 m, *C.W.Sharsmith 4148* (DS, K, S, UC); Tulare Co., Rock Ck, c. 3400 m, *J.T.Howell 25567* (CAS, S); *J.T.Howell 26216A* (UPS); Mono Co., Hall Natural Area, c. 3000 m, *A.R.Moldenke & H.N.Moldenke 24653* (AAU); Mono Co., Cascade Lake, NE of North Peak, 3300 m, *J.Clausen 1934 & A.R.Kruckeberg* (K); Shasta Co., Mt. Shasta, *W.H.Brewer 1378* (GH, UC, US); Placer Co., Donner Pass, c. 2400 m, *A.A.Heller 7135* (K).

Closely similar to species of the sect. *Diprophyllatae*, both in seed and leaf characters, but the inflorescence is composed of dense glomerules.

46. *Luzula kjellmaniana* Miyabe & Kudo, *Trans. Sapporo Nat. Hist. Soc.* 5: 38 (1913)

Luzula arcuata f. *latifolia* Kjellm., in A.E.Nordenskiöld, *Vega-Exped. Vetenskapl. Iagkttagelser* 1: 566 (1882), *nom. illeg., non Laest.*; *Luzula confusa* f. *latifolia* Buchenau, *Bot. Jahrb. Syst.* 12: 125 (1890); *Luzula arctica* var. *latifolia* (Buchenau) Nilsson ex Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 69 (1906); *Luzula multiflora* var. *kjellmaniana* (Miyabe & Kudo) Sam., in E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. III, 5(1): 227 (1927), *nom. illeg.*; *Luzula beeringiana* Gjaerev., *Kongel. Norske-Vidensk. Selsk. Skr. (Trondheim)* 1958 (5): 63 (1958), *nom. illeg.*; *Luzula multiflora* subsp. *kjellmaniana* (Miyabe & Kudo) Tolm., *Arctic Fl. SSSR* 4: 48 (1963); *Luzula hyperborea* var. *latifolia* (Buchenau) B.Boivin, *Naturaliste Canad.* 94: 526 (1967); *Luzula arctica* subsp. *latifolia* (Buchenau) Porsild, *Nat. Canad., Bot.* 4 [1974]: 15 (1975), *nom. illeg.* T: Russia, Chukotka, St. Lawrence Bay, 20–21 Jul 1879, *F.R.Kjellman*; lecto: S, *fide* L.Hämet-Ahti, in L.Hämet-Ahti & Virrankoski, *Ann. Bot. Fenn.* 8: 157 (1971).

Luzula tundricola Gorodkov ex V.N.Vassil., *Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR* 15: 40 (1953). T: Russia, Anadyr, Novomariinsk, 1932, *V. N. Vasilev 168*; holo: LE.

Illustrations: E.Hultén, *Fl. Alaska* 300 (1968); J.Coffey Swab, *Fl. North Amer.* 22: 264 (2000).

Maps: E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 170 (1986), as *L. tundricola*; E.Hultén, *Fl. Alaska* 300 (1968); N.K.Kovtonyuk, in L.I.Malyshev & G.A.Peshkova, *Fl. Sibiri* 4 (*Araceae – Orchidaceae*): map 43 (1987) [Siberia]; J.Coffey Swab, *Fl. North Amer.* 22: 267 (2000).

Perennials 8–20 cm tall; rhizome ascending, long, without stolons. Basal leaves 5–8 cm long, 3–4 mm wide; sheath bases straw-brown to dull brownish. Cauline leaves 2(–3), usually 2.5–4.0 cm long, up to 2.5 mm wide. All leaves ±flat with leaf tip subobtusate, often with a short acute mucro; margins papillose-serrulate. Lower bract short, membranous, brownish at base. Inflorescence composed of 1–2 sessile and 1–4 pedunculate clusters (these sometimes composed of a few smaller sessile subclusters, rarely whole inflorescence subcongested); clusters ellipsoidal, usually 6–7 × 4 mm, pale brown to straw-brown; peduncles capillary, erect to arcuate. Bracteoles usually 1.5–1.8 mm long, pale brownish to membranous, fimbriate-ciliate. Tepals subequal (outer longer by 0.2–0.4 mm), 2.0–2.6 mm long, medium brown with broad membranous to stramineous margin above, entire. Stamens 6; anthers 0.4–0.5 mm long; filaments 0.5–0.7 mm long; style 0.2–0.3 mm long; stigmas c. 0.8 mm long. Capsule subacuminate, usually shorter than tepals; capsule segments ellipsoidal, brown, 1.5–1.6 × 1.0 mm. Seeds narrowly ellipsoidal, 0.9–1.0 × 0.5–0.6 mm, brown; appendage minute, less than 0.1 mm long; base fibrillate. $2n=36$ [12'AL', 24'BL'], L.Hämet-Ahti & Virrankoski, *Ann. Bot. Fenn.* 8: 157, 1971. Fig. 20.

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Figure 19. *Luzula subcongesta*. A, habit; B, flower cluster; C, flower; D, tepal; E, seed. *L. confusa*. F, habit; G, inflorescence; H, flower; I, tepal and stamen; J, seed. (A-E, J.T.Howell 25567, S; J.T.Howell 26216A, UPS; F-I, N.S.Vodop'yanova 301, PRA; W.E.Parry s.n., BM). Scale bars: A = 5 cm; B = 2 mm; C = 1 mm; D = 1 mm; E, J = 0.5 mm; F = 5 cm; G = 1 cm; H, I = 1 mm. Drawn by © E.Smrčínová.

Northern regions of Siberia and the Russian Far East, Kamchatka, Alaska and NW Canada. 30: KRA, YAK. 31: KAM, KHA, KUR, MAG. 70: ALU, ASK, NWT, YUK. 71: BRC. In drier tundra, and on rocky slopes. Map 76.

30: KRASNOYARSK: Taymyr, Syndasko R., *N.S.Vodop'yanova* 412 (PRA). YAKUTIYA [SAKHA]: Bulkur, 1898, *H.Nilsson s.n.* (LD); Balganach, 1898, *H.Nilsson s.n.* (LD). 31: MAGADAN: Chukotka, 15 km SSW of Provideniya, 23 Jun 1992, *A.Svensson* (S). 70: ALEUTIAN IS.: Akutan, *Norberg* 71 (S); Amlia Is., *W.J.Eyerdam* 1234 (BM). ALASKA: Alaska Range Distr., Dry Ck, c. 1100 m, *A.Viereck & Jones* 5772 (S); Pribilof Is., St. Paul, *E.Hultén* 7459 (S); Brooks Range, De Long Mtns, Liberator Lake, *K.Holmen & O.Mårtensson* 61-1640 (UPS); Port Clarence, Teller Reindeer Station, *B.A.Walpole* 1963 (K). NORTHWEST TERRITORIES [Nunavut]: Mackenzie R. Delta, Kittigaznit Is., *A.E.Porsild & R.T.Porsild* 2333 (S); Tungsten, *Marris* 11225 (BM).

The accepted name has often been misinterpreted for plants of the sect. *Luzula*. For discussion, see L.Hämet-Ahti & Virrankoski, *Ann. Bot. Fenn.* 8: 157–158 (1971).

47. *Luzula arcuata* (Wahlenb.) Sw., *Summa Veg. Scand.* 13 (1814)

Juncus arcuatus Wahlenb., *Fl. Lapp.*, p. 87, tab. 4, 1812, *nom. conserv. propos.* [*nom. illeg.*, *Juncus pediformis* Chaix *in syn.*]; *Juncoides arcuata* (Wahlenb.) Druce, *Bot. Soc. Exch. Club Brit. Isles* 8: 85 (1929). T: Sweden, Piteå Lappmark på Örfjället, 6 Sep 1807, *G.Wahlenberg*; lecto: UPS, *fide* Moberg & Nilsson, *Nord. J. Bot.* 11: 293 (1991). [further authentic material: S, UPS, WU].

Map: E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 168 (1986).

Perennials, sparsely hairy, with ascending rhizomes and short stolons. Leaves subabruptly narrowing to acute tip. Basal leaves usually up to 4 mm wide. Stem usually 0.3–0.5 mm in diam. Lower bract membranous-brownish, usually 3–8 (–15) mm long. Inflorescence corymbose, composed of 3–17 few-flowered glomerules usually as long as wide or wider; peduncles with secondary branches, capillary, usually c. 0.2 mm in diam., arcuate or nodding. Stamens 6. Seeds narrowly ellipsoidal; appendage absent or up to 0.15 mm long; base fibrillate.

Arctic regions of Europe; the Arctic and mountains of N Asia; N America from Washington and British Columbia northwards; Japan, Korea and, probably, China. Rocky or gravelly places. Two subspecies are recognized.

Basal leaves up to 2 mm wide; seed appendage lacking

47a. subsp. *arcuata*

Basal leaves more than 3 mm wide; seed appendage developed, to 0.15 mm long

47b. subsp. *unalaschkensis*

47a. *Luzula arcuata* (Wahlenb.) Sw. subsp. *arcuata*

Luzula arcuata f. *capillaris* Laest., *Bot. Not.* 1858: 144 (1858). T: Sweden, Pite Lappmark, "Njepusurte i Piteå Lappmark", *L.L.Laestadius*; syn: *n.v.*; [Norway, Finnmark] Koutokeino, *L.L.Laestadius*; syn: *n.v.*

Illustration: J.Lid, *Norsk & Svensk Fl.* 203, fig. 100a (1963).

Perennials up to 15 cm long, sparsely hairy to glabrescent, loosely caespitose, with branched creeping or ascending thin rhizome and ascending stolons. Basal leaves canaliculate, up to 5–7 cm long, up to 1.5–2.0 mm wide, subabruptly narrowing to acute tip; plant base brownish to purplish, slightly lustrous; cauline leaves 1 (–2), usually 1.5–2.0 (–3.0) cm long, to 1.2 mm wide; stem thin, usually less than 0.5 mm in diam. below inflorescence. Lower bract membranous, often suffused brownish, 3–5 mm long, ciliate above. Inflorescence lax, corymbose, composed of (3–) 5–15 small glomerules; peduncles smooth, thin, c. 0.2 mm long, arcuate and nodding, up to 1.5–2 cm long, often branched (secondary branches usually 1–3); glomerules c. 4 × 3.5–6 mm, usually (1–) 2–5 (–8)-flowered, often with some flowers with visible peduncles. Bracteoles 1.0–1.2 mm long, ovate, brownish below, scarious and fimbriate-ciliolate above. Tepals ±equal; outer tepals acuminate; inner tepals ±mucronate or acute, deep brown, usually 2.0–2.2 mm long. Stamens 6; anthers 0.4–0.6 mm long; filaments c. 0.3 mm long; style 0.4–0.5 mm long; stigma 1.1–1.3 mm long. Capsule ovoid to ellipsoidal, slightly

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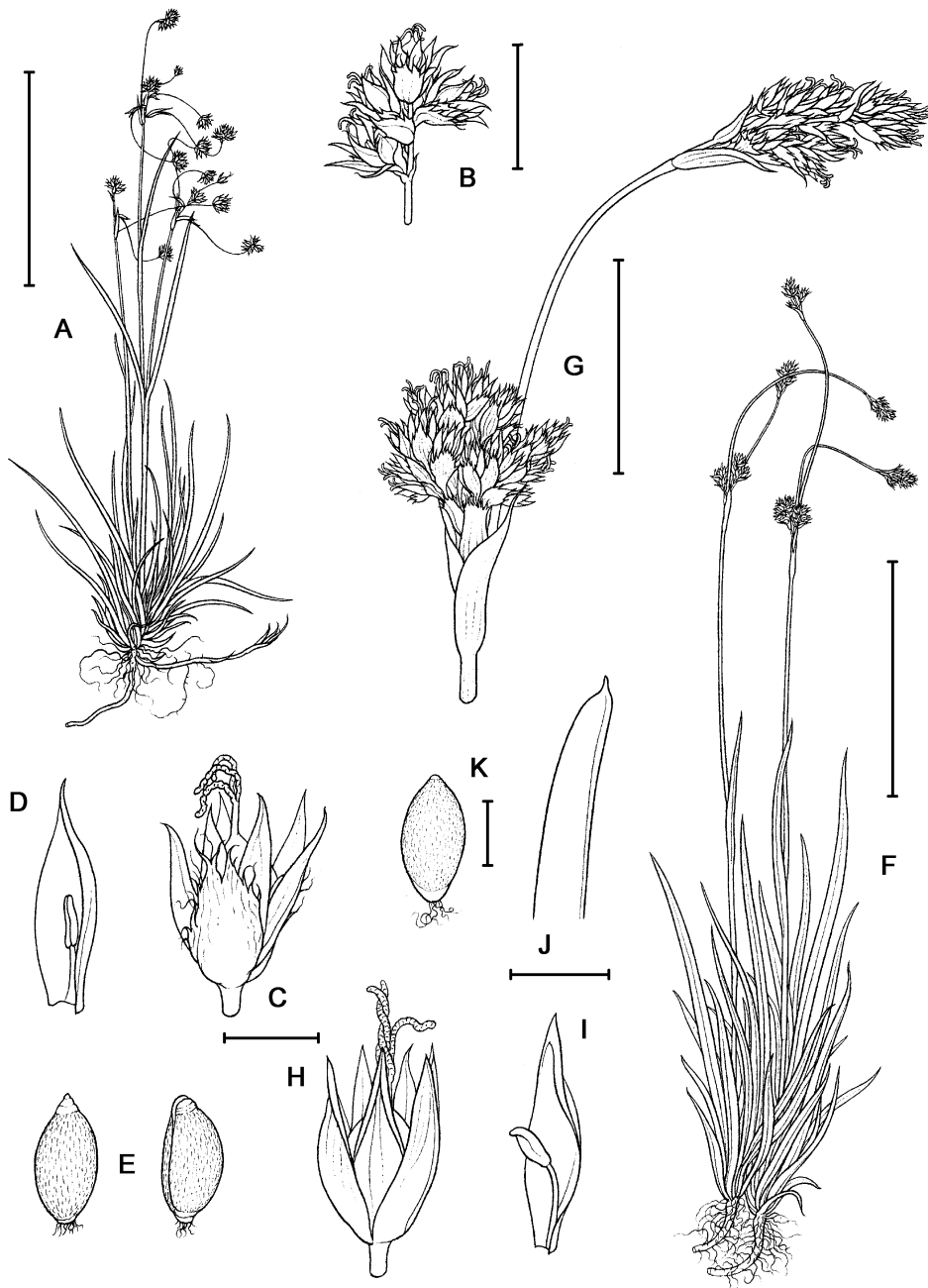


Figure 20. *Luzula arcuata* subsp. *arcuata*. A, habit; B, flower glomerule; C, flower; D, tepal and stamen; E, seeds. *Luzula kjellmaniana*. F, habit; G, inflorescence; H, flower; I, tepal and stamen; J, leaf apex; K, seed. (A–J, *J.Montell s.n.*, PR; F–K, *A.E.Porsild & R.T.Porsild 2333*, S; *E.Hultén 7459*, S). Scale bars: A = 5 cm; B = 4 mm; C, H = 1 mm; D, I = 1 mm; E, K = 0.5 mm; F = 5 cm; G = 1 cm; J = 4 mm. Drawn by © E.Smrčínová.

mucronate, shorter than or equalling tepals; capsule segments ovate, 1.7–1.9 × 1.1–1.2 mm, dark brown above. Seeds brown to pale brown, ellipsoidal, 1.0–1.1 × 0.6 mm, apically darker, apiculate, basally fibrillate. 2n=36, 42, 48, *cf.* Dawe & Murray, *Canad. J. Bot.* 59: 1373–1374 (1981); H.Nordenskiöld, *Bot. Not.* 1949: 85–86 (1949). Fig. 20.

Subarctic and mountain regions of northern Europe, with a NW limit in Iceland and reaching northern European Russia and Novaya Zemlya in the NE. Reported to occur in Greenland but material not seen. 10: FIN, FOR, GRB, ICE, NOR, SVA, SWE. 14: RUN. 30: WSB. Mountain and subarctic tundra and stony slopes. Map 77.

10: FØROYAR: Kunö Is., 24 Aug 1897, Hartz & C.E.Ostenfeld (LD, S). GREAT BRITAIN: Scotland, Easternness, Cairngorm, *A.Melderis* 425 (S). NORWAY: Dovre Fjeld, Fogstuen, 1000 m, 22 Jul 1889, K.G.Baenitz (W). SVALBARD: Safehaven, 30 Aug 1882, A.G.Nathorst *s.n.* (S); Jan Mayen, Wildberget, Lid [*Fl. Exs. Ins. J.Mayen*] 18 (LD). SWEDEN: Åsele Lappmark, Laxfjället, 12 Jul 1889, G.Halldin *s.n.* (LD); Lycksele Lappmark, Tärna socken, Brandsfjället, 24 Jul 1937, E.Asplund *s.n.* (LD); 'ex alpinis Lapponiae Pitensis' G.Wahlenberg *s.n.* (WU). 14: RUSSIA NORTH: Lapponia ponojensis, Ponoj, 27 Aug 1899, J.Montell *s.n.* (H).

Sometimes difficult to distinguish from *L. confusa* in Scandinavia because of frequent occurrence of intermediates of hybrid origin

47b. *Luzula arcuata* subsp. *unalaschkensis* (Buchenau) Hultén, *Ark. Bot.* 7(1): 32 (1968)

Luzula arcuata var. *unalaschkensis* Buchenau, *Bot. Jahrb. Syst.* 12: 124 (1890); *Luzula unalaschkensis* (Buchenau) Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 31 (1938) & *J. Jap. Bot.* 14: 7 (1938). T: Alaska, Unalaschka, Mertens; lecto: W, designated here. [*Unalaschka, J.F.G.Eschscholtz*; orig. syn: LE, *n.v.*].

Luzula arcuata var. *kamtschadalarum* Sam., in E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. III, 5(1): 223 (1927); *Luzula kamtschadalarum* (Sam.) Gorodkov ex Krylov, *Fl. Zap. Sibiri* 3: 551 (1929); *Luzula unalaschkensis* subsp. *kamtschadalarum* (Sam.) Tolm., *Arctic Fl. SSSR* 4: 40 (1963). T: Russia, Kamchatka, Avatcha volcano, 20 Aug 1920, E.Hultén 670; lecto: S, *fide* L.Hämet-Ahti, *Ann. Bot. Fenn.* 10: 123 (1973); isolecto: K.

Luzula beringensis Tolm., *Arctic Fl. SSSR* 4: 39 (1963). T: Russia, Terra Koriakorum, prope sinum Korffii maris Beringii, 19 Aug 1960, A.I.Tolmachev, Stepanova & Fedorova; holo: LE.

Illustrations: E.Hultén, *Fl. Alaska* 299 (1968); L.Hämet-Ahti, *Ann. Bot. Fenn.* 10: 126, fig. 3; 127, fig. 4 (1973); V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 83, plate vi (1985).

Maps: E.Hultén, *Fl. Alaska* 299 (1968); N.K.Kovtonyuk, in L.I.Malyshev & G.A.Peshkova, *Fl. Sibiri* 4 (*Araceae – Orchidaceae*): map 34 (1987) [Siberia]; J.Coffey Swab, *Fl. North Amer.* 22: 266 (2000).

Perennials 10–25 cm tall; rhizome ascending; stolons ascending, usually 2–3 cm long. Leaves ±flat, sparsely ciliate, subabruptly narrowing to an acute tip; basal leaves usually 8–12 cm long, 3–4 (–5) mm wide; sheath base brown to purplish; cauline leaves 1–3, to 3–5 (rarely 8) cm long, 1.5–3.0 mm wide; sheaths sparsely ciliate above. Stem 0.3–0.4 (–0.5) mm diam. below inflorescence. Lower bract usually 5–8 (–15) mm long, brownish-membranous. Inflorescence usually corymbose with (2–) 6–10 (–17) glomerules; glomerules usually of (1–) 3–6 flowers each; peduncles capillary, arcuate, often nodding, often branched, usually reddish. Bracteoles ±ovate-lanceolate, c. 1.5 mm long, brownish to membranous, ciliate. Tepals ±equal, usually 2.0–3.0 × 0.6–0.8 mm, ovate to lanceolate, acuminate, often ciliolate, medium to pale brown. Stamens 6; anthers 0.4–0.6 mm long; filaments 0.4–0.5 mm long; style 0.3–0.4 (–0.5) mm long; stigmas 1.1–1.5 mm long. Capsule ellipsoidal with a short beak, shorter than tepals; capsule segments pale brown to brown, 1.9–2.2 × 1.0–1.4 mm. Seeds brown, narrowly ellipsoidal, 1.0–1.1 × c. 0.6 mm; appendage very short, up to 0.15 mm long; base fibrillate (on the top of caruncle). 2n=36, G.S.Knaben, *Nytt Mag. Bot.* 15: 244 (1968).

Russian Far East, Japan, Baikal Lake region, northwestern America from Washington and British Columbia to Alaska and Nunavut [NW Territories]. Not confirmed but probably present in China and Mongolia. 30: BRY, CTA, IRK. 31: KAM, KUR, MAG. 38: JAP, KOR. 70: ALU, ASK, NWT, YUK. 71: ABT, BRC. 73: WAS. Rocky or gravelly snow-patches, heaths and slopes, often on bare ground. Map 78.

30: BURYATIYA: Baikal Range, sources of Kurkula R., T.V.Egorova & V.N.Siplivinsky *s.n.* (OULU). 31: MAGADAN: upper Main R., 12 Aug 1932, B.N.Gorodkov & B.A.Tikhomirov *s.n.* (S). KAMCHATKA: Natchika, Mt. Tschopotschka [Shapochka], 4 Aug 1908, V.L.Komarov *s.n.* (S). KURIL IS.: Shumushu,

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G.Koidzumi 39053 (TNS). 38: JAPAN: Nagano, Daitenjo-Lake, *J.Sugimoto 13437* (KYO). KOREA: Mt. Pai-tou-shan, *T.Nakai s.n.* (TI). 70: ALEUTIAN IS.: Unalaska, *E.Hultén 6671* (S). ALASKA: White Pass, 20 Aug 1929, *S.Enander s.n.* (UPS). YUKON: Canol Road, pass between Teslin R. and Nisutlin R., *A.E.Porsild & A.Breitung 10983* (S). 71: BRITISH COLUMBIA: Red Rose Tungsten Mine, 15 km E of Skeena Crossing, c. 1600 m, *J.A.Calder et al. 15173* (S).

A variable subspecies; in Asia, towards the southeast, a gradual increase in perianth and capsule size can be observed, and plants from Japan often have solitary flowers on peduncles. The Japanese plants have often been referred to as *L. wahlenbergii*; literature records under the latter name from NE China may also refer to subsp. *unalaschkensis*.

48. *Luzula confusa* Lindeb., *Bot. Not.* 1855: 9 (1855)

Luzula arcuata f. *confusa* (Lindeb.) Kjellm., *Vega-Exped. Vetenskapl. Iagttagelser* 2: 59 (1883), n.v.; *Luzula arcuata* subsp. *confusa* (Lindeb.) O.C.Dahl, in A.G.Blytt, *Handb. Norges Fl.* 201 (1906); *Juncooides confusa* (Lindeb.) A.Heller, *Cat. N. Amer. Pl.*, 3rd edn, 70 (1910). T: [Norway] Dovre, 1854, *C.J.Lindeberg*; lecto: S, designated here.

Luzula spicata var. *kjellmanii* Nath., *Kongl. Vetensk. Akad. Handl.* 30: 28 (1884). T: N Greenland, Kap York, Insugisok, 26 Jul 1883, *A.G.Nathorst*; syn: W.

Luzula hyperborea R. Br., *Chlor. Melvill. [Parry's 1st Voyage App.]* 283 (1823), nom. rejic. prop.; *Luzula arcuata* var. *hyperborea* (R.Br.) Rink, in J.Reinhardt et al., *Naturhist. Bidr. Grøn.* 119 (1857); *Juncooides hyperborea* (R.Br.) Coville, *Mem. Torrey Bot. Club* 5: 107 (1894). T: Spitzbergen, *W.Scoresby*; syn: BM; Greenland, *W.Scoresby*; syn: BM; Melville Island, *W.E.Parry*; syn: BM, PH. [covering both *Luzula confusa* and *Luzula nivalis*].

Luzula confusa var. *subspicata* Lange, *Consp. Fl. Groenland.* 127 (1880); *Luzula confusa* f. *subspicata* (Lange) Krylov, *Fl. Zap. Sibiri* 3: 552 (1929). T: [Greenland] numerous syn: C.

Luzula hyperborea var. *extensa* Scheutz, *Kongl. Svenska Vetenskapskad. Handl.* 22: 169 (1888). T: [Russia, Taymyr] Nikandroviskij ostrov et Briochovskij ostrov; syn: n.v.

Luzula confusa f. *normalis* Krylov, *Fl. Zap. Sibiri* 3: 552 (1929). T: [not indicated].

Illustrations: J.Lid, *Norsk & Svensk Fl.* 203, fig. 100b (1963); E.Hultén, *Fl. Alaska* 301 (1968).

Maps: E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 169 (1986); E.Hultén, *Fl. Alaska* 301 (1968); N.K.Kovtonyuk, in L.I.Malyshev & G.A.Peshkova, *Fl. Sibiri* 4 (*Araceae – Orchidaceae*): map 35 (1987) [Siberia].

Perennials, usually 10–15 (–20) cm tall, sparsely hairy, loosely to densely caespitose with ascending densely branched to simple rhizome, sometimes with short ascending vegetative shoots; plant base usually deep purple-brown, shiny. Basal leaves up to 6–9 cm long, ±subcanaliculate to ±flat, 1.5–2.5 mm wide; tip acuminate; cauline leaves 1–2, usually 2–4 cm long, 1.0–1.5 mm wide. Stem 0.5–0.9 mm in diam. below inflorescence. Lower bract membranous, less often brownish-membranous, usually 4–9 mm long. Inflorescence composed of one sessile and often 1–2 pedunculate clusters; peduncles without secondary branches, erect, straight, less often arcuate or recurved, c. 0.3 mm in diam.; sessile cluster bigger (sometimes with a discernible basal subcluster), usually more than 10-flowered, 7–10 × 6–7 (–9) mm; pedunculate clusters smaller, 5–12 (–14)-flowered, 5–6 (–7) × 4–5 (–6) mm. Bracteoles ±ovate, brownish, c. 1 mm long; membranous apex fimbriate-ciliate. Tepals ±equal, usually 2.0–2.3 mm long, ±acuminate to acute, dark brown. Stamens 6; anthers 0.4–0.5 mm long; filaments 0.5–0.7 mm long; style c. 0.2 mm long; stigmas 0.8–1.0 mm long. Capsule ±ovate, with top rounded, ±not mucronate, shorter than or equalling tepals, blackish brown to dark castaneous brown; capsule segments ovate, 1.8–2.0 × c. 1.3–1.4 mm. Seeds narrowly ellipsoidal, 1.0–1.1 × 0.6 mm, ±pale brown, distally dark apiculate; base fibrillate; appendage not visible. 2n=36, Å.Löve & D.Löve, *Univ. Colorado Stud. Ser. Biol.* 24: 26 (1966). Fig. 19.

Northernmost regions of Eurasia and North America, mountains of northern Asia. 10: FIN, ICE, NOR, SVA, SWE. 14: RUN. 30: ALT, BRY, CTA, IRK, KRA, TVA, WSB, YAK. 31: MAG. 37: MON. 70: ASK, GNL, NWT, YUK. 71: ABT, BRC. 72: QUE, NFL. 75: MAI, NWH, VER. Wet, exposed rocky and sandy hillsides, and mountain summits, tundra. Map 79.

10: NORWAY: Dovre, Knudshoe [Knutshøa], Aug 1875, *H.G.Falk s.n.* (LD). SVALBARD: Lina Red Bay, 14 Jul 1899, *T.Wulff s.n.* (W). SWEDEN: Torne Lappmark, Kiruna, 700 m, *G.Simmons 121* (LD). 14: RUSSIA NORTH: Lapponia ponojensis, Orlov, *A.O.Kihlman 907* (H). 30: WEST SIBERIA: Novaya Zemlya,

Karmakola, 18 Jul 1891, *O.J.Ekstam s.n.* (LD). KRASNOYARSK: Taymyr, Syndasko R., *N.S.Vodop'yanova 301* (PRA). 70: ALASKA: Monument Ck Road, Teller Road, *Williams 1798* (K). GREENLAND: Foulke Fjord, Etah, *G.Simmons 1481* (LD). NORTHWEST TERRITORIES [Nunavut]: Franklin District, Frobisher Bay, Eskimo village, *H.A.Senn & J.A.Calder 3941* (LD). 72: QUEBEC: Gaspé, Table-top Mtn, *M.L.Fernald & J.F.Collins, Pl. East Quebec 195* (LD).

In some areas of N Europe difficult to distinguish from *L. arcuata*; in other regions either not in contact with the latter, or distinct from it (with occasional, rare hybridization).

49. *Luzula nivalis* (Laest.) Spreng., *Syst. Veg.*, 16th edn, 2: 111 (1825)

Luzula campestris var. *nivalis* Laest., *Kongl. Vetensk.-Akad. Handl.* 1822: 334 (1822); *Juncus campestris* var. *nivalis* (Laest.) Sommerf., *Suppl. Fl. Lapon.* 16 (1826), n.v.; *Juncoides nivalis* (Laest.) Coville, *Contr. U. S. Natl. Herb.* 4: 209 (1893). T: Sweden, Lule Lappmark, [lit.: in rupibus occultis Alpium rarissime. In latere boreali alpis Jegraapo], norra branten af Jegra-apo-Jalle, 1821, *L.L.Laestadius*; lecto: S, *designated here*; isolecto: S, UPS [further authentic material: S, UPS, W].

Luzula arctica Blytt, *Norges Fl.* 1: 299 (1861); *Luzula arcuata* var. *hookeriana* Trautv., *Trudy Imp. S.-Peterburgsk. Bot. Sada* 1: 80 (1871); *Luzula arctica* var. *typica* Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 69 (1906), *nom. inval.* T: Norway, Dovre, *M.Blytt* [*Fries, Herb. Norm. Fasc. 10*] 65; lecto: UPS, *designated here*.

Luzula tolmatchewii Kuvaev, *Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol.* 99(1): 118 (1994). T: Russia, W Siberia, Novaya Zemlya, Insula borealis, inter maris Karskoe [more] et radiostatio Matoczkin Schar, 240 m, *Tolmatchew 495*; holo: LE.

Illustrations: J.Lid, *Norsk & Svensk Fl.* 202, fig. 99b (1963); E.Hultén, *Fl. Alaska* 300 (1968).

Maps: E.Hultén, *Fl. Alaska* 300 (1968); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 170 (1986), as *L. arctica*; N.K.Kovtonyuk, in L.I.Malyshv & G.A.Peshkova, *Fl. Sibiri 4 (Araceae – Orchidaceae)*: map 36 (1987) [Siberia].

Perennials, usually 8–18 cm tall, caespitose, subglabrous; rhizome ascending; plant base straw-brownish or pale castaneous brown. Basal leaves numerous, crowded, ±flat, usually up to 5 cm long, (2–) 3–4 mm wide; cauline leaves (1–) 2, 1–2 (–3) cm long, 1–2 mm wide; all leaves with obtuse slightly swollen tip with spinuliform mucro (caducous). Inflorescence congested in a single dark many-flowered head 0.8–1.0 × 0.6–0.9 cm, composed of 1–3 clusters; basal cluster sometimes on erecto-patent peduncle up to 3 cm long. Lower bract usually scarious to straw-brown, subglabrous, linear-lanceolate, 4–9 mm long, much shorter than inflorescence. Bracteoles ±ovate, ±obtuse, sparsely ciliate above, up to 1.2 mm long, dark brown. Tepals subequal, 1.6–1.9 (–2.0) mm long, acute, dark castaneous to blackish brown. Stamens 6; anthers 0.3–0.6 mm long; filaments 0.4–0.5 mm long; style 0.1–0.2 mm long; stigmas 0.8–1.0 mm long. Capsule ovoid-trigonal, exceeding tepals; capsule segments 2.1–2.3 × c. 1.2 mm, blackish brown. Seeds ellipsoidal, 1.0–1.2 × 0.6–0.7 mm, brown, distally with a greyish tip; basal appendage up to 0.2 mm long, fibrillate. 2n=24, *fide* G.Knaben & T.Engelskjøn, *Acta Borealia, A. Sci.*, 21: 4 (1967).

Arctic regions of Eurasia and North America, mountains of S Siberia. 10: FIN, NOR, SVA, SWE. 14: RUN. 30: BRY, CTA, IRK, KRA, TVA, WSB, YAK. 31: MAG. 70: ASK, GNL, NWT, YUK. 71: BRC. 72: NFL, QUE. Moist places in arctic and mountain tundra. Map 80.

10: NORWAY: Follidal, between Råtåsjø and Råtåsjøhø, *T.Karlén 211* (LD). SVALBARD: Isfjorden, Green Harbour, 5 Jul 1925, *Lagerkrantz s.n.* (S). SWEDEN: Torne Lappmark, Jukkasjärvi, Mt Nissontjärro, 1300–1400 m, *C.G.Alm & H.Smith 139* (LD); Torne Lappmark, Jukkasjärvi, Torneträsk Lake, *K.H.Rechinger S-230* (W). 30: WEST SIBERIA: Novaya Zemlya, Krestovaya Guba, 10 Aug 1926, *H.Steffen s.n.* (LD). KRASNOYARSK: E Sayan Mtns, Udinskiy Range, *L.I.Malyshv 376* (PRA). 70: GREENLAND: Heilprin Land, Brønlundhus, 31 Jul 1963, *Fredskild* [*Pl. Vasc. Groenl. Exs. 268*] (UPS); Melville Bugt, Tugtulgissuaq, 350 m, 16 Aug 1979, *Fredskild* [*Pl. Vasc. Groenl. Exs.*] 671 (S). NORTHWEST TERRITORIES [Nunavut]: Franklin, Southampton Is., Coral Harbour, *O.Hedberg 3315* (UPS); Franklin, Corwallis Is., Resolute, *O.Hedberg 3248* (UPS).

JUNCACEAE (*Luzula*)

Presumed hybrids

Luzula arcuata (Wahlenb.) Sw. subsp. *unalaschkensis* (Buchenau) Hultén × *L. confusa* Lindeb.

Intermediate plants are found at sites with both presumed parents. Up to now known only from Alaska [L.Hämet-Ahti, *Ann. Bot. Fenn.* 10: 128 (1973)]. They usually exhibit a partial seed-sterility.

Luzula arcuata (Wahlenb.) Sw. subsp. *arcuata* × *L. confusa* Lindeb.

Plants intermediate between the two taxa are quite common in Greenland, Scandinavia, Finland and W North Russia. The presumed hybrid plants set normal seeds and require further study.

Unclear Names

Luzula arcuata f. *subnivalis* Laest., *Bot. Not.* 1858: 144 (1858).

T: Sweden, Qvickjock [Kvikkjokk], *L.L.Laestadius*; syn: *n.v.*

Luzula arcuata f. *latifolia* Laest., *Bot. Not.* 1858: 144 (1858).

T: Sweden, Åreskutan, 1819, *L.L.Laestadius*; syn: *n.v.*

Luzula hyperborea var. *minor* Hook., *Fl. Bor. Amer.* 2: 188 (1840)

Juncoides hyperborea var. *minor* (Hook.) E.Sheld., *Bull. Geol. Nat. Hist. Surv.* 9: 64 (1894), *n.v.* T: *n.v.*

Sect. 7. LUZULA

Luzula sect. *Gymnodes* Griseb., *Spic. Fl. Rumel.* 2: 405 (1846); *Gymnodes* (Griseb.) Fourr., *Ann. Soc. Linn. Lyon*, sér. 2, 17: 172 (1869); *Luzula* subg. *Gymnodes* (Griseb.) Buchenau, *Bot. Jahrb. Syst.* 1: 114 (1880); *Luzula* sect. *Apterodes* Rouy, *Fl. France* 13: 256 (1912), *nom. illeg.* T: not designated.

Luzula subsect. *Ulea* Novikov, *Byull. Moskovsk. Obshch. Isp. Prir., Odt. Biol.* 95(6): 68 (1990). T: *Luzula ulei* Buchenau

Luzula subsect. *Caricinae* Novikov, *Byull. Moskovsk. Obshch. Isp. Prir., Odt. Biol.* 95(6): 68 (1990). T: *Luzula caricina* E.Mey.

Luzula subsect. *Pumilae* Novikov, *Byull. Moskovsk. Obshch. Isp. Prir., Odt. Biol.* 95(6): 69 (1990). T: *Luzula pumila* Hook.f.

Luzula subsect. *Sibiricae* Novikov, *Byull. Moskovsk. Obshch. Isp. Prir., Odt. Biol.* 95(6): 69 (1990). T: *Luzula sibirica* (V.I.Krecz.) V.I.Krecz.

Luzula ser. *Inaeuales* K.F.Wu, *J. E. China Norm. Univ., Nat. Sci. Ed.*, 1992(3): 97 (1992)

Perennials. Leaves with obtuse, usually slightly swollen tips. Lower bract herbaceous. Inflorescence wholly congested or umbelloid, decompound, of one to numerous spike- or head-like clusters each usually 3–many-flowered. Seed appendage basal, usually conspicuous, 0.1–0.8 mm long, fibrillate or not so. Diploids, true polyploids and complete or partial agmatoploids.

A section of 57 species with several diversity centres in Europe, the Far East, Australia, New Zealand, W North America and S America, grouped in this treatment by their regions of predominant occurrence. There is a very low level of major structural differentiation within the section, and many taxa are difficult to distinguish from one another. In some regions (W North America, China) the section is in need of taxonomic revision.

Successful identification by means of the following key requires careful measurement of well developed material, preferably of more than a single plant. Method of measurement, as given in the introductory part to the genus, should be observed.

- 1 Stamens 3 **74. *L. leptophylla***
- 1: Stamens 6
- 2 Most flowers in an inflorescence borne singly, some in few-flowered spike-like clusters **102. *L. hawaiiensis***
- 2: Most flowers in pedunculate clusters, or inflorescence wholly congested
- 3 Plants in dense compact cushions
- 4 Flowering stems abbreviated, hidden in leaf rosettes, not elongating as fruits mature; seeds broadly ovoid, 0.7–0.9 mm wide **79. *L. colensoi***
- 4: Flowering stems at least slightly overtopping leaves, elongation during fruit ripening; seeds \pm ellipsoid, 0.5–0.6 mm wide
- 5 Leaves inserted (imbricate) along proximal $\frac{2}{3}$ – $\frac{3}{4}$ of stem, 0.4–0.7 mm wide; inflorescence 1–5-flowered **76. *L. crenulata***
- 5: Leaves mostly basal to subbasal, 0.7–1.3 mm wide; inflorescence 4–10 (–20)-flowered **78. *L. pumila***
- 3: Plants caespitose to loosely caespitose, with or without creeping rhizomes, sometimes forming mats but never dense compact cushions
- 6 Capsule top or upper part mostly densely papillose
- 7 Densely caespitose; rhizome short or oblique-ascending; stolons absent
- 8 Seed appendage 0.4–0.6 mm
- 9 Tepals with margins indistinct or absent **83. *L. meridionalis***
- 9: Tepals with distinct broad whitish-scarious margins **84. *L. flaccida***
- 8: Seed appendage 0.3 mm or less
- 10 Leaf margin usually smooth, rarely sparsely papillose-serrulate **88. *L. novae-cambriae***
- 10: Leaf margin densely to sparsely papillose-serrulate
- 11 Basal leaves usually 4–7 (–10) mm wide **86. *L. australasica***
- 11: Basal leaves up to 3.5 mm wide
- 12 Seeds 0.5–0.6 mm wide; appendage c. 0.1 mm long **90. *L. alpestris***
- 12: Seeds c. 0.8 mm wide; appendage 0.2–0.3 mm long **93. *L. poimena***
- 7: Loosely caespitose; rhizomatous plants with stolons
- 13 Style abbreviated, to 0.2 mm long; inflorescence a single dark head 0.7–1.0 cm in diam. **92. *L. atrata***
- 13: Style 0.3–0.5 mm long; inflorescence composed of (1–) 2–4 (–5) subsessile subcylindrical clusters each 5–12-flowered and c. 6–9 mm long; proximal cluster often \pm remote; other clusters approximated, forming elongated lobulate head 1–2 (–3) cm long **89. *L. modesta***
- 6: Capsule smooth in most flowers, rarely with sparse papillae
- 14 Peduncles \pm densely papillose in the middle part (under magnification of at least 80 \times)
- 15 Tepals \pm equal; seeds 0.7–0.8 mm wide; clusters variable, often less than 10-flowered
- 16 Clusters (5–) 6–11 (–13), usually 8–11-flowered; peduncles frequently with secondary branches; style 0.3–0.4 mm long **59. *L. multiflora***
- 16: Clusters 3–5 (–7), usually 3–7-flowered; peduncles without secondary branches; style 0.7–1.0 mm long **53. *L. fallax***
- 15: Outer tepals conspicuously longer; seeds 0.5–0.6 mm wide; clusters usually more than 10-flowered **50. *L. pallescens***

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- 14:** Peduncles smooth in the middle part
- 17** Flower clusters loose at base and/or some flowers ±remote
- 18** Capsule segments 1.9–2.1 mm long; seeds 0.6–0.7 mm wide [S Italy] **52. *L. calabra***
- 18:** Capsule segments longer than 2.3 mm, seeds usually wider than 0.7 mm [NW and C America]
- 19** Style 0.6–1.2 mm long; seeds 0.9–1.1 mm wide **98. *L. subsessilis***
- 19:** Style up to 0.6 mm long; seeds 0.7–0.9 mm wide
- 20** Tepals dark to blackish brown, 2.0–2.8 mm long **103. *L. caricina***
- 20:** Tepals pale straw-brown to pale brown, (2.5–) 3.0–4.0 mm long **99. *L. comosa***
- 17:** Flower clusters (evenly) dense, without remote flowers
- 21** Seed appendage usually 0.5 mm or more
- 22** Inflorescence wholly congested, or sometimes some of the clusters on erect peduncles
- 23** Anther/filament length ratio c. 1.0; basal leaves usually 3.5–6.0 mm wide **58. *L. congesta***
- 23:** Anther/filament length ratio c. 2.0; basal leaves usually 2.0–3.5 mm wide **68. *L. capitata***
- 22:** Inflorescence of pedunculate clusters; if partly congested then some of the peduncles flexuose or recurved and nodding
- 24** Plants with long creeping rhizomes and frequent ascending stolons **56. *L. campestris***
- 24:** Plants densely to loosely caespitose; rhizomes short or short-ascending; stolons absent
- 25** Rhizome short-ascending, short-noded, usually with a few pale swollen reduced leaves; flower clusters cylindric to ±ovoid **101. *L. bulbosa***
- 25:** Rhizome short, vertical, without swollen reduced leaves; flower clusters broadly ovoid to hemispherical
- 26** Capsule distinctly exceeding perianth **71. *L. lutescens***
- 26:** Capsule shorter than perianth
- 27** Seeds 0.9–1.0 mm wide; anthers usually longer than 2.0 mm [C and SC Europe] **55. *L. divulgata***
- 27:** Seeds 0.6–0.8 mm wide; anthers up to 1.5 mm long [E North America] **100. *L. echinata***
- 21:** Seed appendage usually 0.4 mm or less (very rarely to 0.5 mm)
- 28** Leaf margins ±smooth, without dense papillose serrulation, rarely with solitary, often reddish papillae
- 29** Leaf tip acute to subobtuse with an acute mucro **91. *L. acutifolia***
- 29:** Leaf tip obtuse, often ±swollen
- 30** Rhizome creeping-ascending, branched, plants therefore very loosely caespitose; stolons present or absent
- 31** Stem reduced, to 2 cm long; inflorescence usually 2–10-flowered **80. *L. decipiens***
- 31:** Stem longer than (10–) 15 cm; inflorescence usually many-flowered

- 32 Inflorescence usually of 1–2 (–4) elongated heads
c. 5–20 × 5–10 mm, each composed of 3–7 (–10) spike-
like, subcylindrical, shortly pedunculate to sessile
clusters [Papua-New Guinea] **72. *L. papuana***
- 32: Inflorescence ±umbelloid, of one to several sessile
and several pedunculate clusters [New Zealand] **81. *L. picta***
- 30: Rhizome short, indistinct or ascending, unbranched, plants
therefore densely caespitose; stolons absent
- 33 All but 1–2 (–3) clusters pedunculate
- 34 Style 0.5–0.9 mm long; stigmas 1.5–2.5 mm long
[Hawaiian Is.] **102. *L. hawaiiensis***
- 34: Style usually 0.9–1.5 mm long; stigmas 2.0–3.5 mm
long [New Zealand] **82. *L. banksiana***
- 33: All or most clusters congested, forming a single head;
occasionally, some clusters may be pedunculate
- 35 Seed appendage 0.2–0.3 mm long **87. *L. ovata***
- 35: Seed appendage 0.1 (–0.2) mm long
- 36 Tepals dark brown to blackish; margins dark
castaneous, narrow; seeds 0.5–0.6 mm wide **75. *L. crinita***
- 36: Tepals pale brown to deep castaneous-brown;
margins distinct, broad, pale brownish to scarious;
seeds 0.6–0.8 mm wide
- 37 Tepals usually 1.7–2.5 mm long **77. *L. rufa***
- 37: Tepals usually 2.6–4.0 mm long
- 38 Basal leaves usually 3–8 mm wide **82. *L. banksiana***
- 38: Basal leaves usually 1.5–4 mm wide
- 39 Basal leaves stiff, canaliculate, with margins sub-
glabrous to sparsely ciliate; seeds 0.6–0.7 mm
wide [New South Wales] **86. *L. australasica***
- 39: Basal leaves ±flaccid, not distinctly stiff,
with margins densely to sparsely ciliate; seeds
c. 0.8 mm wide [Chile] **104. *L. tristachya***
- 28: Leaf margin ±densely papillose-serrulate
- 40 Capsule distinctly exceeding perianth; tepals to 1.8 mm long **69. *L. oligantha***
- 40: Capsule as long as perianth or shorter; tepals longer than 1.8 mm
- 41 Inflorescence of 1–5 (–6)–flowered clusters; clusters
numerous, more than 15 [Hawaiian Is.] **102. *L. hawaiiensis***
- 41: Inflorescence of (5–) 6–many-flowered clusters; clusters
few, rarely to 15
- 42 Anther/filament length ratio 3–5 **73. *L. philippinensis***
- 42: Anther/filament length ratio 0.5–3
- 43 Tepals usually 4.5–6.0 mm long [Lord Howe Is.] **94. *L. longiflora***
- 43: Tepals usually up to 4.2 mm long
- 44 Seeds usually 0.9–1.0 mm wide; seed appendage
0.4–0.6 mm long; seeds 1.2–1.5 mm long; tepals
straw-brown to mid-brown **58. *L. congesta***
- 44: Seeds up to 0.8 mm wide; seed appendage to 0.4 mm
long; seeds 0.8–1.2 mm long, if seeds up to 1.3 mm
then tepals dark castaneous-brown to blackish-brown

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- 45 Plant base usually bulbous; seed appendage usually 0.3–0.4 mm long; seeds 0.8–0.9 mm long [Australia] **85. *L. densiflora***
- 45: Plant base not bulbous; seed appendage 0.1–0.3 mm long; if appendages 0.3–0.4 mm long then seeds 1.0 mm or longer
- 46 Tepals up to 2.4–2.5 mm long
- 47 Seeds 0.5–0.6 mm wide
- 48 Plants with long, branched, oblique or ascending rhizomes; stolons present or absent
- 49 Anthers c. twice as long as filaments; seed appendage c. 0.2 mm long **65. *L. abchasica***
- 49: Anthers ± as long as filaments; seed appendage to 0.1 mm long **57. *L. sudetica***
- 48: Plants densely caespitose; rhizome short; stolons absent
- 50 Style 0.4–0.6 mm long [Caucasus and NE Anatolia] **64. *L. stenophylla***
- 50: Style 0.1–0.3 mm long
- 51 Inflorescence with 1–3 pedunculate clusters (in addition to subsessile ones); peduncles 1.5–4.0 cm long [Japan] **71. *L. nipponica***
- 51: Inflorescence wholly congested, or rarely one cluster on peduncle to 1.5 cm long [North America or Greenland]
- 52: Tepals dark, usually blackish brown; seed appendage c. 0.2 mm long; seeds 0.8–0.9 (–1.0) mm long [California] **97. *L. orestera***
- 52: Tepals brown to castaneous-brown; seed appendage c. 0.1 mm long; seed 1.0–1.1 mm long [arctic and subarctic North America and Greenland] **96. *L. groenlandica***
- 47: Seeds 0.7–0.8 mm wide
- 53 Plants with long, branched stoloniferous rhizomes [Tropical Africa] **60. *L. mannii***
- 53: Plants with short rhizomes; stolons absent [outside Africa]
- 54 Pedunculate clusters 5–30; peduncles with numerous secondary branches; clusters 2–7-flowered; leaves 4.5–11 mm wide [South America] **106. *L. ulei***
- 54: Pedunculate clusters 1–3; secondary branches usually absent; clusters more than 5-flowered; leaves to 3.5 mm wide [outside South America]
- 55 Inflorescence with 1–3 pedunculate clusters **71. *L. nipponica***
- 55: Inflorescence usually wholly contracted (or basal cluster remote)
- 56 Seed appendage 0.2–0.3 mm long **87. *L. ovata***
- 56: Seed appendage 0.1 mm long
- 57 Lower bract tip acute-mucronate to acute; basal cluster usually remote [Taiwan] **67. *L. taiwaniana***

- 57: Lower bract tip obtuse, ±swollen; basal cluster is a part of the wholly congested inflorescence [North America or Greenland] **96. *L. groenlandica***
- 46: Tepals longer than 2.6 mm
- 58 Seed appendage c. 0.1 mm long
- 59 Outer tepals distinctly aristate [S India] **63. *L. indica***
- 59: Outer tepals usually acute to acuminate, not aristate [outside India]
- 60 Anther/filament length ratio 2.0 (–3.0) [South America] **105. *L. ostenii***
- 60: Anther/filament length ratio up to 1.5
- 61 Seeds 0.5–0.6 mm wide
- 62 Style 0.1–0.3 mm long
- 63 Plants with long branched ascending rhizomes; tepals with indistinct narrow margins; tepals often unequal (outer longer) [Europe] **57. *L. sudetica***
- 63: Plants densely caespitose; rhizome short, unbranched; tepals with distinct broad margins; tepals ±equal [California] **97. *L. orestera***
- 62: Style 0.4–0.6 mm long
- 64 Inflorescence almost completely contracted, elongated, 2–5 cm long, often interrupted at base; basal leaves usually 5–6 mm wide; tepals castaneous-brown [E Africa] **61. *L. abyssinica***
- 64: Inflorescence contracted, subglobose, to 1.8 cm long, compact; basal leaves usually to 3–4 mm wide; tepals dark to blackish brown [Caucasus and NE Anatolia] **64. *L. stenophylla***
- 61: Seeds 0.7–0.8 mm wide
- 65 Inflorescence ±wholly contracted, sometimes with 1–3 pedunculate clusters; peduncles without secondary branches
- 66 Style 0.4–0.6 mm long; inflorescence elongated, 2–5 cm long [E Africa] **61. *L. abyssinica***
- 66: Style 0.3–0.4 mm long, congested part of inflorescence to 1.5 cm long [China and Tibet] **66. *L. bomiensis***
- 65: Inflorescence of 1–4 subsessile and 3–many pedunculate clusters (if subsessile clusters 3 or 4 then peduncles with secondary branches)
- 67 Style 0.4–0.5 mm long; tepals 2.3–3.0 mm long [Tropical Africa] **60. *L. mannii***
- 67: Style 0.5–0.9 mm long; tepals 2.8–4.4 mm long [Hawaiian Is.] **102. *L. hawaiiensis***
- 58: Seed appendage 0.2 mm or longer
- 68 Seeds 0.5–0.6 mm wide

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- | | |
|--|-----------------------------------|
| 69 Plants with creeping-ascending branched rhizomes and stolons | 65. <i>L. abchasica</i> |
| 69: Plants densely caespitose; rhizome short; stolons absent | 97. <i>L. orestera</i> |
| 68: Seeds usually 0.7–0.8 mm wide | |
| 70 Cauline leaves conspicuously broad, (4.5–) 5.0–8.0 (–12.0) mm wide | |
| 71 Seed appendage 0.1–0.2 mm long [Hawaiian Is.] | 102. <i>L. hawaiiensis</i> |
| 71: Seed appendage 0.2–0.4 mm long [Beringian region] | 95. <i>L. kobayasii</i> |
| 70: Cauline leaves not conspicuously broad, usually to 4 mm wide | |
| 72 Inflorescence wholly or almost completely congested | |
| 73 Style 0.3–0.4 mm long [China and Tibet] | 66. <i>L. bomiensis</i> |
| 73: Style 0.6 mm or more long | |
| 74 Capsule segments usually 2.2–2.4 mm long; tepals straw-brown to brown; seeds 0.7–1.0 mm long [South Africa] | 62. <i>L. africana</i> |
| 74: Capsule segments usually 2.5–2.8 mm long; tepals dark brown; seeds 1.0–1.2 mm long [European Alps] | 51. <i>L. alpina</i> |
| 72: Inflorescence of mostly pedunculate clusters | |
| 75 Style usually 0.8–1.0 mm long; anther/filament length ratio usually (1.5–) 2.0 (–3.0) | |
| 76 Seed appendage 0.1–0.2 mm long [South America] | 105. <i>L. ostenii</i> |
| 76: Seed appendage usually 0.3–0.4 mm long [S Europe] | 54. <i>L. taurica</i> |
| 75: Style usually 0.3–0.8 mm long; anther/filament length ratio usually 1.0–2.0 | 59. <i>L. multiflora</i> |

The species of this large Section are grouped below, for convenience, by their regions of predominant occurrence.

PREDOMINANTLY EUROPEAN SPECIES

50. *Luzula pallescens* Sw., *Summa Veg. Scand.* 13 (1814)

Juncus campestris var. *lapponicus* Retz., *Fl. Scand. Prodr.*, 2nd edn, 82 (1795); *Juncus pallescens* Wahlenb., *Fl. Lapp.* 87 (1812), *nom. illeg., non* Lam. (1789); *Luzula campestris* subvar. *pallescens* (Sw.) E.Mey., *Syn. Luzul.* 18 (1823); *Luzula campestris* var. *pallescens* (Sw.) Wahlenb., *Fl. Suec.* 1: 218 (1824), *nom. illeg.*; *Luzula multiflora* var. *pallescens* (Sw.) W.D.J.Koch, *Syn. Fl. Germ. Helv.*, 2nd edn 2, 847 (1844); *Luzula erecta* var. *pallescens* (Sw.) Nolte ex Sond., *Fl. Hamburg.* 200 (1851); *Luzula campestris* subsp. *pulchella* Čelak., *Prodr. Fl. Böhmen* 1: 85 (1867); *Luzula erecta* subsp. *pallescens* (Sw.) Nym., *Consp. Fl. Eur.* 752 (1882); *Luzula sudetica* [Rasse] *pallescens* (Sw.) Asch. & Graebn., *Syn. Fl. Mitteleur.* 2(2): 519 (1904); *Luzula campestris* subsp. *pallescens* (Sw.) Čelak., *Prodr. Fl. Böhmen* 4: 749 (1881);

Juncoides pallescens (Sw.) Druce, *Bot. Soc. Exch. Club Brit. Isles* 7: 899 (1926); *Luzula multiflora* subsp. *pallescens* (Sw.) Reichg., *Fl. Neerl.* 1: 208 (1964). T: [Sweden, Lapland]; lecto: LINN449.47, *designated here*.

Luzula erecta var. *micrantha* Schldtl., *Fl. Berol.* 1: 204 (1823). T: Germany, [Berlin], *D.F.L. Schlechtendal*. syn: B, destroyed; syn: HAL69172.

Luzula pallescens var. *umbrosa* Čelak., *Oesterr. Bot. Z.* 11: 312 (1861). T: [Czech Republic] *Johannisbad* [Jánské Lázně], *J. Kablik*; lecto: PR, *designated here*.

Luzula multiflora var. *minor* Bluff & Fingerh., *Comp. Fl. German.* 1: 444 (1825). T: [Germany, otherwise not indicated]

Luzula pallescens var. *umbrosa* V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 491 (1928). T: not designated.

Luzula pallescens var. *communis* V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 491 (1928). T: not designated.

Luzula pallescens var. *arenaria* V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 491 (1928). T: not designated.

Luzula pallescens var. *ruderalis* V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 491 (1928). T: not designated.

Luzula pallidula Kirschner, *Taxon* 39: 110 (1990). T: Czech Republic, Moravia, Hodonín, in silva Dúbrava, 10 Jul 1987, *R. Řepka & J. Kirschner*; holo: PR.

Illustrations: T. Szynal & J. Mađalski, *Atlas Fl. Polsk.* 2(2): 147 (1931); J. Kirschner, *Folia Geobot. Phytotax.* 28: 168, fig. 8 (1993).

Maps: H. Meusel, E. Jäger & E. Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 88 (1965); E. Hultén & M. Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 176 (1986); N. K. Kovtonyuk, in L. I. Malyshev & G. A. Peshkova, *Fl. Sibiri* 4 (*Araceae – Orchidaceae*): map 37 (1987) [Siberia].

Perennials, 9–15 (–30) cm tall, densely caespitose; without stolons; rhizome short; stems erect. Basal leaves densely to subsparately ciliate, 2.0–3.5 mm wide; cauline leaves usually 2 or 3, with densely papillose-serrulate margin, upper cauline leaves 3.0–5.5 cm long, 2.0–3.0 mm wide. Lower bract usually 3.0–4.0 cm long, overtopping or rarely shorter than inflorescence. Inflorescence composed of 1–2 subsessile and (5–) 7–12 (–18) pedunculate clusters; clusters ±cylindrical, 4–7 × 3–4 mm long, usually (9–) 11–14 (–20)-flowered. Peduncles straight, densely papillose, often with secondary branches, with longest peduncles (including clusters) 2.0–5.5 cm long. Bracteoles 0.8–1.2 mm long, ciliate. Tepals pale greenish to membranous to straw-brown; outer tepals conspicuously longer than inner, 2.0–2.8 mm long, subacuminate. Anthers 0.5–0.6 mm long, ±as long as c. 0.5 mm long filaments; ovary 0.5–0.6 mm long; style 0.2–0.3 mm long; stigma early deciduous, 0.6–0.7 mm long. Capsules obovoid to subglobose, equalling or shorter than perianth; capsule segments 1.6–1.9 mm long. Seeds ovoid, 0.7–0.8 mm long, 0.5–0.6 mm wide; appendage 0.2–0.3 mm long. 2n=12 [12AL], *vide* J. Kirschner, *Thaiszia* 2: 28–29 (1992). Fig. 21.

Widely distributed in N Eurasia, from Great Britain and Scandinavia to the Russian Far East and China. 10: DEN, FIN, GRB, NOR, SWE. 11: AUT, CZE, GER, HUN, POL. 13: ROM, YUC. 14: BLR, BLT, KRY, RUC, RUE, RUN, RUS, RUW, UKR. 30: ALT, BRY, CTA, IRK, KRA, TVA, WSB, YAK. 31: AMU, KAM, KHA, KUR, MAG, PRM, SAK. 32: KAZ, KGZ, TKM, TZK, UZB. 33: NCS, TCS. 36: CHC, CHI, CHM, CHN, CHX. 37: MON. 38: JAP, KOR. 40: JMK. 72: nfl, que. Wood clearings and tracks, and disturbed meadows on sandy or gravelly substrates. Map 81.

10: NORWAY: Hallingdal, Nesbyen, *G. Samuelsson 401* (UPS). SWEDEN: Sala, Heby, Huddunge, *J. Kirschner L300* (PRA). 11: CZECH REPUBLIC: N Moravia, Vidnava, *J. Hruby [in F. Petrak, Fl. Bohem. Morav. Exs. 513]* (LD). 13: BOSNIA: Fojnica, 600 m, 18 Sep 1889, *S. Murbeck* (LD). 14: MOLDOVA: Iași, Uricani, *C. Dobrescu & E. Eftimie [Fl. Mold. Dobrog. Exs. 189]* (PR). 30: WEST SIBERIA: Novosibirsk, Klyuchi, *D. Shaulo, cult. no. JK154* (PRA). 31: RUSSIA: Kamchatka, Petropavlovsk, *E. Hultén 192* (S). 32: KIRGIZISTAN: Tian-Shan, Kirgizski Range, NE of Pishpek, valley of R. Ala Archa, 1700–200 m, 28 May 1974, *V. Vašák* (W). 33: NORTH CAUCASUS: Mt Elbrus region, Adyrso Valley, 1600–2000 m, 24 Jun 1980, *V. Vašák* (W). 36: CHINA: Jilin, Wo-chin-kow, O-muh Hsien, 800 m, *H. W. Kung 1891* (S). 37: MONGOLIA: E Mongolia, W part of Great Khingan, 19 Aug 1973, *N. Dorofeyuk* (MW). 38: KOREA: Cham-gion Province, Tumin-gan R., *V. L. Komarov 356* (BM). 40: WEST HIMALAYA, KASHMIR: Gulmarg, 1600–1700 m, 16 Apr 1948, *J. J. Thomson* (K). 72: QUEBEC: Bonaventura Co., Giroux Station, Maria, 11 Jul 1905, *Williams, J. F. Collins & M. L. Fernald* (UPS).

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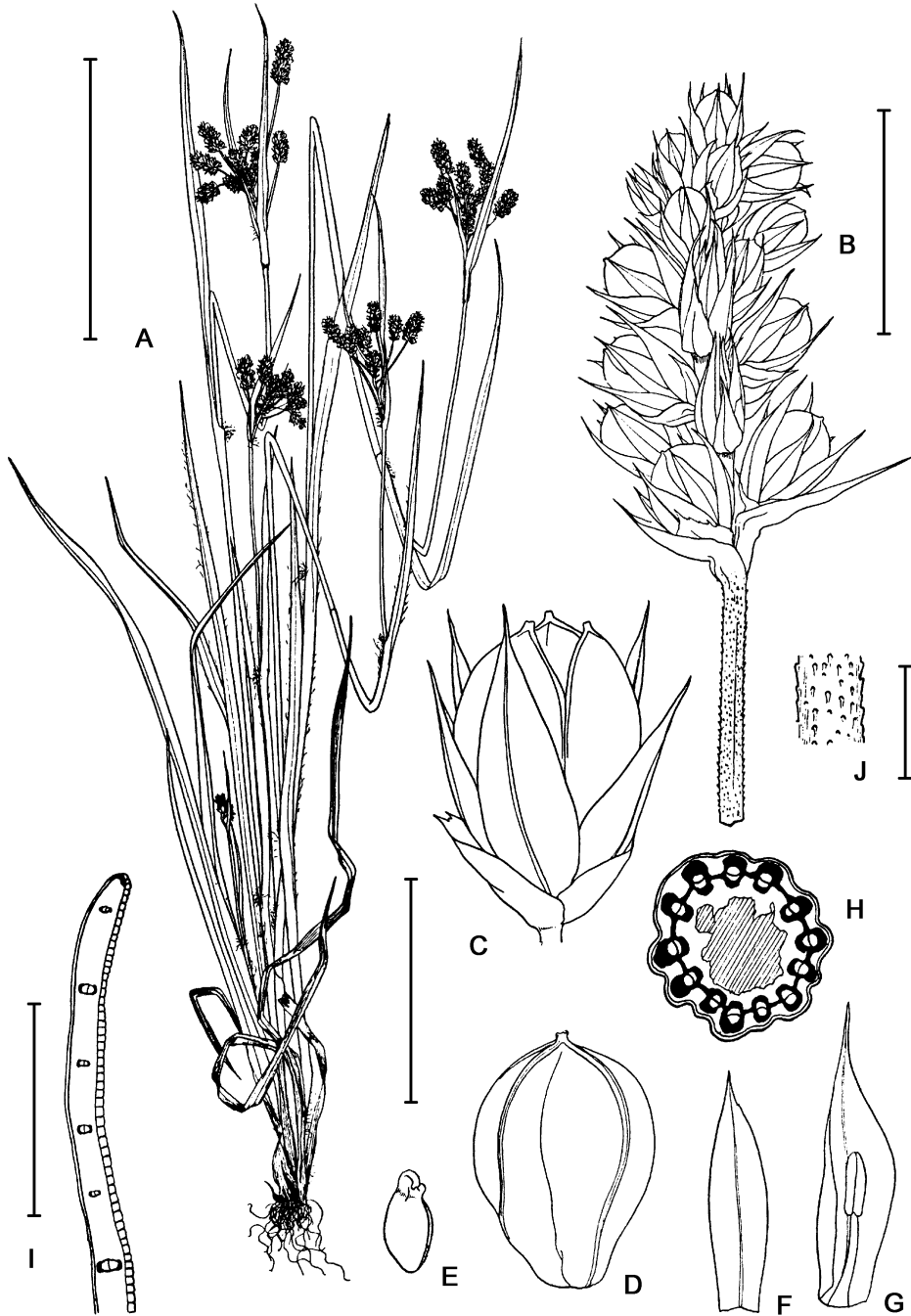


Figure 21. *Luzula pallescens*. **A**, habit; **B**, flower cluster on papillose peduncle; **C**, flower; **D**, capsule; **E**, seed; **F**, **G**, tepals; **H**, stem T.S.; **I**, leaf T.S.; **J**, detail of peduncle. (A–J, *B. Blocki*, 9 Jun 1891, KRA). Scale bars: **A** = 5 cm; **B** = 5 mm; **C–G** = 2 mm; **H**, **I** = 1 mm; **J** = 0.5 mm. Drawn by T. Szynal. Reproduced with permission, from T. Szynal & J. Małowski, *Atlas Fl. Pol.* 2/2: 147 (1931).

Characterized by numerous small flowers with unequal tepals, and densely papillose peduncles (under the microscope). Sometimes confused with pale-flowered forms of *L. multiflora*.

51. *Luzula alpina* Hoppe, in J.W.Sturm, *Deutschl. Fl.* 18 (77): no. 6 (1839)

Luzula multiflora var. *alpina* (Hoppe) Willk., *Führer deut. Pfl.*, 2nd edn, 282 (1882); *Luzula sudetica* proles *alpina* (Hoppe) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 518 (1904). T: Austria, Heiligenblut, *D.H.Hoppe [Herb. Viv. Pl. Gram.]* 108; lecto: BRNM, *fide* J.Kirschner, T.Engelskjøn & G.S.Knaben, *Preslia* 60: 98 (1988); isolecto: LI, HAL.

Luzula campestris β *latifolia* Gaudin, *Fl. Helv.* 2: 572 (1828). T: [Swiss Alps] in M. Gemmii, *N.C.Seringe*; holo: *n.v.*

Luzula multiflora var. *alpestris* Beyer, *Verh. Bot. Vereins Prov. Brandenburg.* 41: xxii (1900); *Luzula campestris* var. *alpestris* (Beyer) Vollm., *Fl. Bayern* 138 (1914), *nom. illeg., non* G.Mey. (1836); *Luzula campestris* subsp. *alpestris* (Beyer) Kožuharov, *Izv. Bot. Inst. (Sofia)* 11: 132 (1963), *nom. illeg., non* G.Mey. (1836) T: [numerous syntypes from the Alps, mostly B, destroyed].

Luzula campestris var. *vallesiaca* Beauverd, *Bull. Soc. Bot. Genève*, ser. 2, 10: 285 (1918). T: Switzerland, Valais, Zeneggen, c. 1330 m, *G.Beauverd*; holo: G.

Illustrations: J.Kirschner, T.Engelskjøn & G.S.Knaben, *Preslia* 60: 99, fig. 2, Plate 1, 2, 3 (1988); J.Kirschner, *Folia Geobot. Phytotax.* 28: 149, fig. 1 (1993).

Map: J.Kirschner, T.Engelskjøn & G.S.Knaben, *Preslia* 60: 104, fig. 4 (1988).

Perennials, (8–) 10–20 (35) cm tall, densely caespitose, without stolons, sparsely ciliate; stems erect, ±stout. Upper cauline leaves 4–5 cm long, 3–4 mm wide; basal leaves 3–5(–7) mm wide. Leaf margin remotely papillose-serrulate. Basal bract usually spreading, overtopping inflorescence. Inflorescence congested, composed of (3–) 5–6 (–8) sessile to subsessile (rarely some pedunculate) clusters; peduncles smooth; clusters usually of 7–10 flowers. Tepals ±lanceolate, gradually tapering to long narrow sharp pointed tips, usually dark brown; outer tepals (2.7–) 3.0–3.5 (–3.7) mm long, ±equalling the inner ones. Anthers (0.8–) 0.9–1.1 mm long, at most 1.5 times longer than the 0.5–0.8 mm long filaments. Style c. 0.6 mm long, shorter than the ovary. Capsule segments usually 2.5–2.8 mm long, shorter than the perianth, ±obovate. Seeds narrowly ovoid, 1.0–1.2 mm long, 0.7–0.8 mm wide; appendages 0.3–0.4 mm long. $2n=36$ [12AL + 24BL], *fide* J.Kirschner, T.Engelskjøn & G.S.Knaben, *Preslia* 60: 100–101 (1988).

Endemic to the Alps and E Pyrenees, from Switzerland, Italy and Slovenia northwards to S Germany (Bavaria). 11: AUT, GER, SWI. 12: FRA, SPA. 13: ITA, YUC-SL. Map 82.

11: AUSTRIA: Lechtal, Elpigenalp, Bernhardseck, 2200 m, *O.Sebald 8235* (M); Carinthia, Greifenburg, Embergeralm, 1790 m, 21 Jul 1949, *Eggler* (GZU); Carinthia, Gailtaler Alpen, N of St. Jakob, 'Auf der Mussen', 19 Jul 1998, *L.Kirschnerová* (PRA); Tirol, Stubaital, *D.Podlech [Soc. Éch. Pl. Vasc. Eur. Occid, no 8876]* (G). GERMANY: Bavaria, Berchtesgaden, Mittereis-Alm, *W.Lippert 25854 & D.Podlech* (M); Oberstdorf, Fallhorn, 1650 m, 10 Jul 1923, *Hirth* (W). SWITZERLAND: St. Gallen, Vältis, Brändlisberg, 1908, *H.Schinz* (Z). 12: SPAIN: Huesca, Torla, Ordesa, Gradas Soaso, 1850 m, *P.Montserrat* (JACA 478371). ANDORRA: Coll Blanch d'Envalira, 2500 m, 18 May 1948, *T.M.Losa* (BCF 4077). 13: ITALY: Dolomiti, Vigo di Fassa, 30 Jul 1956, *E.Werdermann & Meyer* (K).

Close to *Luzula multiflora* but usually with a congested dark inflorescence and broad basal leaves. In the Alps, *L. alpina* is the only member of the genus with the peculiar mixed karyotype.

52. *Luzula calabra* Ten., *Fl. Napol.* 3: 386 (1829)

Luzula multiflora var. *calabra* (Ten.) Parl., *Fl. Ital.* 2: 307 (1852); *Luzula multiflora* subsp. *calabra* (Ten.) Arcang., *Comp. Fl. Ital.* 713 (1882); *Luzula campestris* var. *calabra* (Ten.) Buchenau, *Bot. Jahrb. Syst.* 12: 163 (1890). T: [Italy, Calabria] Paludi della Sila, *Thomas*; lecto: NAP, *fide* J.Kirschner, *Folia Geobot. Phytotax.* 28: 148 (1993).

Illustrations: Miggiaccio, *Giorn. Bot. Ital.* 71: 334, fig. 1, 2 (1964); S.Pignatti, *Fl. Ital.* 3: 446 (1982); J.Kirschner, *Folia Geobot. Phytotax.* 28: 151, fig. 2 (1993).

Perennials, 25–45 cm tall, densely caespitose, without stolons; rhizome short; stems erect. Basal leaves densely to subsparingly ciliate, 1.7–2.2 mm wide; cauline leaves usually 1 or 2, with densely papillose-serrate margins; upper cauline leaves 5–7 cm long, 2.0–2.8 mm wide.

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Lower bract usually 2.0–4.0 cm long, shorter than inflorescence. Inflorescence with one subsessile and 1–6 pedunculate clusters; peduncles straight, smooth, usually without secondary branches; longest peduncles (including clusters) 2.0–9.5 cm long. Clusters ±cylindrical, 8–25-flowered; basal flowers of the pedunculate clusters often slightly remote. Bracteoles 1.6–1.9 mm long, ciliate or fimbriate-ciliate. Tepals pale brown; outer tepals ±equalling or slightly longer than inner ones, 2.4–2.8 mm long, subabruptly narrowing at the apex. Anthers 0.8–0.9 mm long; filaments c. 0.4 mm long; ovary 0.7–0.8 mm long; style 0.3–0.4 mm long; stigma early deciduous, 0.8–1.0 mm long. Capsules subacuminate, equalling or shorter than perianth; capsule segments 1.9–2.1 mm long. Seeds oblong-ovoid, c. 0.9 mm long, 0.6–0.7 mm wide; appendage 0.2–0.3 mm long. $2n=24$ [probably 24BL], *vide* Virzo & Migliaccio, *Delpinoa* 6–7: 81 (1965).

Endemic to S Italy. 13: ITA. Grassy slopes, stream banks, meadows. Map 83.

13: ITALY: Calabria, Magna Sila, Botte Donato, c. 1800 m, 16 Aug 1909, *Cavara & Grande 28* (BM, P); Catanzaro, Sila Piccola, from Taverna Villagio Mancusa to Butoro, c. 1200 m, 16 Jun 1979, *P.H.Davis & D.A.Sutton* (BM); Sila, W of Lorica, Sila, Mt Sorbello, c. 1850 m, 18 Jun 1979, *P.H.Davis & D.A.Sutton* (BM); Calabria, E ridge of Montenero, 1400–1600 m, *S.Snogerup & B.Snogerup 2081* (LD).

Rare endemic distinct in having slightly loose clusters at the base of the inflorescence; in general habit it is similar to *L. pallescens*.

53. *Luzula fallax* Kirschner, *Preslia* 63: 84 (1991)

T: N Greece, Mt. Pangeon, 1800–1850 m. *S.Snogerup & A.Strid 4934*, *cult. no. L134*; holotype: PR, isotype: LD, PR.

Illustration: J.Kirschner, *Preslia* 63: 85, fig. 1 (1991).

Perennials usually 15–20 cm tall, densely caespitose; stolons absent; rhizome short; stems erect, slender. Basal leaves densely to subsparingly ciliate, 2–4 mm wide. Cauline leaves usually 2, with densely papillose-serrate margin; upper cauline leaves 1.5–4.5 cm long, 2.0–3.0 mm wide. Lower bract usually 1.2–2.5 cm long, shorter than inflorescence. Inflorescence composed of 1–2 subsessile and 2–5 pedunculate clusters; peduncles straight or flexuose, papillose in upper half or papillose throughout, usually without secondary branches; longest peduncles (including clusters) 2.0–5.5 cm long. Clusters ovoid to hemispherical, 4.5–7.5 × 5.0–6.5 mm, usually (2–) 4–6 (–8)-flowered; basal flowers of the pedunculate clusters not remote. Bracteoles 1.0–1.5 mm long, ciliate above. Tepals pale to dark brown; outer tepals ±equalling inner ones, 2.6–3.0 mm long. Stamens 6; anthers (0.5–) 0.7–0.9 mm long; filaments 0.4–0.6 mm long; ovary 0.7–0.8 mm long; style 0.7–1.0 mm long; stigma 1.7–2.2 mm long. Capsules obovoid to subglobular, equalling or shorter than perianth; capsule segments brown, 2.0–2.4 mm long, c. 1.3 mm wide. Seeds ovoid, (0.9–)1.0 mm long, 0.7–0.8 mm wide; appendage c. 0.3 mm long. $2n=24$ [24BL], *vide* J.Kirschner, *Preslia* 63: 86 (1991).

Balkan Peninsula from Bulgaria to European Turkey. 13: ALB, BUL, GRC, TUE. Slopes of hills and lower mountains and meadows on naturally or artificially disturbed acid soils. Map 84.

13: ALBANIA: Kiri near Skutari, *I.Dörfler 43* (LD). BULGARIA: Pirin [Mtns], Melnik, slopes above Rozhen, Vlashkia Put, *J.Kirschner & B.Kuzmanov L116* (PRA); Sofia, Lyulin Planina, 22 Jun 1919, *Akhtaroff* (SOM). GREECE: Mt Pangeon, 0.5 km E of summit, *S.Snogerup & A.Strid 4934* (LD). Pierias, NW foothills of Mt Olympos, *A.Strid & Andersen 8440* (LD); Phocis, Mt Giona, c. 2000 m, *L.-Å.Gustavsson 6909* (LD); Trikala, SW of Pirra, Mt Augo, *B.G.Aldén 2312* (LD); Evritania, Gardikion, Mt Oxia, 1750–1850 m, *L.-Å.Gustavsson 6380* (LD); Macedonia, Pindos Mtns, Perivoli, Mt Aphantia, 1700–2100 m, *K.H.Rechinger 18516* (W). TURKEY-in-EUROPE: Istanbul, Silivri, Sinekli, *Delice & Bulut* (LD, ISTF 30535).

Characterized by small, few-flowered, usually hemispherical clusters, papillose peduncles and relatively short seed appendages. Plants from E Bulgaria and the Sofia vicinity are ±variable in the diagnostic characters, perhaps due to hybridization. In the S Pirin Mtns, introgression with *L. campestris* subsp. *campestris* was observed (J.Kirschner, *Preslia* 63: 81–112, 1991). The distribution is imperfectly known.

54. *Luzula taurica* (V.I.Krecz.) Novikov, *Nov. Sist. Vyssh. Rast.* 27: 20 (1990)

Luzula campestris subsp. *taurica* V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 490 (1928); *Luzula multiflora* subsp. *taurica* (V.I.Krecz.) Novikov, in *Fl. Evr. Casti SSSR* 2: 83 (1976). T: Crimea, Demerdzhi Yaila, 25 May 1905, *N.A.Busch*; lecto: LE, *fide* J.Kirschner, *Taxon* 39: 113 (1990).

Luzula multiflora subsp. *caucasica* V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 490 (1928). T: [Georgia, Ahaleihe] ad fines inter Transcaucasiam rossicam et Turciae districtum Achalzich, 7 Jul 1874, *G.F.Radde*; syn: LE; [Georgia] Cartalinia, prope Turam [?], *A.J.Szovits* 25; syn: LE.

Luzula campestris var. *debilis* Velen., *Fl. Bulg.* 572 (1891). T: Bulgaria, Mt Kom above Berkovica, Jul 1889, *J.Velenovský*, syn: PRC, W.

Luzula campestris var. *atrofusca* Maly, *Glasn. Zemaljsk. Muz. Bosni Hercegovini* 32: 141 (1920). T: Bosnia, Sarajevo, Mt Gola Jahorina, *K.Maly*; syn: SARA.

Perennials, usually 15–25 cm tall, densely or rarely loosely caespitose; rhizome short, without stolons. Basal leaves usually up to 8–10 cm long, (2.5–) 3.0–4.0 (–5.0) mm wide; cauline leaves 1–2, usually 2.5–4.0 cm long, 2–3 mm wide; all leaves with obtuse tip and densely papillose-serrulate margins. Inflorescence composed of 1 (–3) subsessile and 2–6 (–7) pedunculate ovoid to hemispherical (5–) 7–9 (–11)-flowered clusters; peduncles straight, rarely slightly flexuose, ±smooth, without secondary branches; longest peduncles up to 2–4 cm long. Lower bract usually 1–3 cm long, shorter than inflorescence. Bracteoles membranous, 1.5–2.5 mm long, ovate, fimbriate-ciliate above. Tepals ±equal, entire, acuminate, usually 2.9–3.5 mm long, dark to blackish brown, with indistinct paler brownish margins. Stamens 6; anthers (0.8–) 1.1–1.3 (–1.4) mm long; filaments c. 0.5–0.6 mm long; style 0.7–1.1 mm long; stigmas 1.8–3.0 mm long, subsistent. Capsule ±obovoid, ±shorter than perianth, pale brown to dark brown; capsule segments 2.4–3.0 mm long. Seeds 1.0–1.2 mm long, 0.7–0.8 mm wide; appendage (0.2–) 0.3–0.4 (–0.5) mm long. $2n=12$ [12AL], *fide* J.Kirschner, *Thaiszia* 2: 30–31 (1992). Fig. 22.

Balkan Peninsula and Crimea in S Europe, Turkey, and Georgia and Armenia in the Caucasus. 13: ALB, BUL, GRC, ROM, TUE, YUC. 14: KRY. 33: NCS, TCS. 34: TUR. Subalpine meadows and grasslands. Map 85.

13: ALBANIA: Skutari, Zukali, 15 Jul 1897, *A.Baldacci* [*It. Alban.* 5] 47 (K); Vermoshe, 'Gipfelregion von Grebeni Selces', 1700 m, *I.Dörfler* 283 (G, K, M, WU). BULGARIA: Rila Mtns, Rilski Monastyr, Dolgia Rid, *J.Štěpánková s.n.* (PRA). GREECE: Serrai, Mt Vrontous, 1750–1849 m, *S.Snoogerup & A.Strid* 5004 (LD, PRA). ROMANIA: Hunedoara, Retezat, Mt Boreescu, 12 Jul 1924, *E.J.Nyárády et al.* [*Fl. Rom. Exs.*] 933 (K). F.Y.R. MACEDONIA: Vodno, 2 May 1972, *R.Bělohávková* (PRA); Shar Planina, Kobilica, 2520 m, 27 Aug 1938, *B.Pawłowski* (KRAM). 14: CRIMEA, Yalta, Nikitsky Yaila, 1350 m, *P.H.Davis* 33387 (K); Romak-Kosh, Babugan-Yaila, 20 Jul 1948, *S.V.Yuzepshuk* (LE); Alushta, Luchistoe, Mt Demerdzhi, 1100–1200 m, *J.Kirschner* L189 (PRA). 34: TURKEY: Trabzon, Karakö, N side of Pontus Pass, 2100 m, *E.Hennipman et al.* 1718 (K).

Similar to *L. abchasica* and *L. campestris*. From the latter it differs in caespitose growth and seed characters. A very variable species (*fide* J.Kirschner, 1993: 170–172); the isolated populations differ from one another in a number of minor quantitative traits.

55. *Luzula divulgata* Kirschner, *Folia Geobot. Phytotax.* 14 [1979]: 431 (1980)

T: Czech Republic, Moravia, between Sobůlky and Věteřov, 6 May 1978, *J.Kirschner s.n.*; holo: PRC539.

Illustration: J.Kirschner, *Folia Geobot. Phytotax.* 28: 159, fig. 6 (1993).

Perennials, (10–) 15–25 (35) cm tall, densely caespitose, hairy; stolons absent; rhizome short. Basal leaves usually 10–15 cm long, 3.0–5.5 mm wide; cauline leaves usually 2 or 3, usually 3.5–6.5 cm long, 3–5 mm wide; all leaves with obtuse tip and sparsely papillose-serrate margin. Lower bract usually 1.6–3.0 cm long, shorter than inflorescence. Inflorescence composed of one subsessile and 2–8 pedunculate clusters; clusters broadly ovoid to hemispherical, 6–11-flowered. Peduncles straight or flexuose, smooth, without secondary branches. Longest peduncles (including clusters) 2.1–5.0 cm long. Bracteoles 1.8–2.4 mm long, fimbriate-ciliate above. Tepals ±equal, entire, ±acuminate, usually 3.5–4.7 mm long, castaneous brown to dark brown. Stamens 6; anthers usually 2.3–3.3 mm long; filaments 0.5–0.7 mm long; ovary 1.0–1.7 mm long; style usually 1.7–1.9 mm long; stigmas subsistent, 2.5–4.5 mm long, conspicuously exerted. Capsule brown, oblong-ovoid, not

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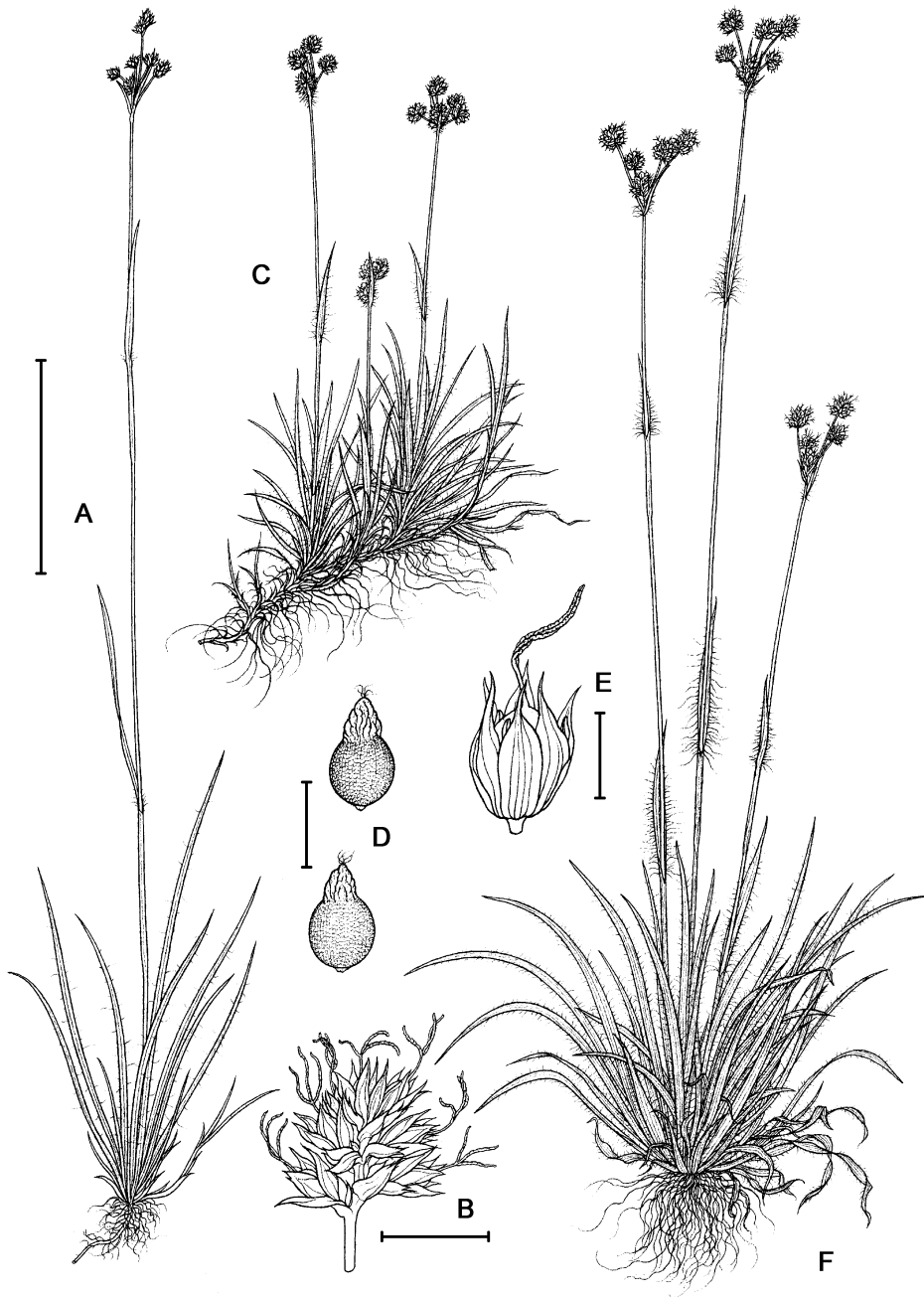


Figure 22. *Luzula multiflora* subsp. *multiflora*. **A**, habit; **B**, flower cluster. *Luzula campestris* subsp. *campestris*. **C**, habit; **D**, seeds; **E**, perianth. *Luzula taurica*. **F**, habit. (**A**, **B**, Z.Skála & H.Skálová L338, PRA; **C**–**E**, J.Kirscher L501, PRA; **F**, J.Kirschner L189, PRA). Scale bars: **A**, **C**, **F** = 5 cm; **B** = 5 mm; **D** = 1 mm; **E** = 2 mm. Drawn by © E.Smrčinová.

mucronate, shorter than perianth; capsule segments (2.6–) 2.8–3.0 (–3.3) mm long. Seeds subglobose, 1.0–1.2 mm long, 0.9–1.0 mm wide; appendage 0.5–0.8 mm long. $2n=24$ [24AL], *vide* J.Kirschner, *Folia Geobot. Phytotax.* 14: 434 (1980); J.Kirschner, *Thaiszia* 2: 20–22 (1992); J.Kirschner, *Ann. Bot. Fenn.* 29: 238 (1992).

Europe, from E Sweden and N Poland, and Central Europe, to Bulgaria and Bosnia. 10: SWE. 11: AUT, CZE, GER, HUN, POL. 13: BUL, ROM, YUC. 14: UKR. Open dry woodlands, clearings, forest paths. Map 86.

10: SWEDEN: Uppland, Vaddö, Edeby, *H.Smith 3213* (K, KRA, LD, MA, W). 11: AUSTRIA: Wien, Neuwaldegg, 11 May 1905, *J.Vetter* (W). CZECH REPUBLIC: Bohemia, Rakovník, Nový Mlýn, Brabečka forest, *J.Hašková, J.Kirschner & F.Krahulec JK222/89* (PRA). SLOVAKIA: Šahy, Dolné Turovce, 180 m, 23 May 1959, *J.Chrtěk* (LD). GERMANY: Bavaria, Regensburg, Irlbach, 20 Apr 1913, *Schelling* (M, PR). HUNGARY: Budapest, Mt Fazekashegy, 11 May 1919, *A.Boros* (BP). POLAND: Wolin Is., Międzyzdroje, *L.Kirschnerová & J.Kirschner L324* (PRA); Krakow, Tynec, 8 May 1923, *K.Piech* (KRAM). 13: BULGARIA: Sofia, Gorni Lozen, Lozenska Planina Mtns, c. 1000 m, *J.Kirschner L507, L508* (PRA). 14: UKRAINE: Kharkov, Krasnokutsk, *N.Tzvelev 8* (LE).

Similar to *L. multiflora* subsp. *multiflora* in its ±robust caespitose growth but seeds ±globose; appendage much longer and floral characters much closer to *L. campestris*.

56. *Luzula campestris* (L.) DC., in J.B.A.P. de M. de Lamarck & A.P. de Candolle *Fl. Franç.*, 3rd edn, 3: 161 (1805)

Juncus campestris L., *Sp. Pl.* 329 (1753); *Luzula campestris* var. *minor* Bluff & Fingerh., *Comp. Fl. German.* 1: 444 (1825); *Luzula campestris* α [unranked] *vulgaris* Gaudin, *Fl. Helv.* 2: 572 (1828), *nom. inval.*; *Luzula campestris* α [unranked] *genuina* Asch., *Fl. Brandenburg* 740 (1864), *nom. inval.*; *Gymnodes campestris* (L.) Fourr., *Ann. Soc. Linn. Lyon*, sér. 2, 17: 172 (1869); *Luzula vulgaris* Buchenau, *Bot. Jahrb. Syst.* 7: 175 (1885), *nom. illeg.*; *Juncoides campestris* (L.) Kuntze, *Revis. Gen. Pl.* 2: 724 (1891); *Juncoides campestris* var. *vulgaris* E.Sheld., *Bull. Geol. Nat. Hist. Surv.* 9: 64 (1894), *nom. inval.*; *Luzula campestris* subsp. *vulgaris* P.Fourn., *Quatre Fl. France* 153 (1935), *nom. inval.*; *Luzula subpilosa* [Gilib. ex] V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 571 (1935), *nom. illeg.*; *Luzula campestris* f. *vulgaris* I.Grint., *Fl. Rep. Soc. Roman.* 11: 603 (1966), *nom. inval.* T: citation: 'in pascuis Europae siccioribus'; lecto: LINN449.44, *vide* Carter, in *Fl. Trop. E. Afr.*, Juncaceae, 8 (1966).

Map: E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 171 (1986).

Perennials with creeping rhizome and short stolons. Cauline leaves 2–3; all leaves with obtuse tip and margins papillose-serrulate. Inflorescence of 2–6 ovoid to hemispherical clusters; peduncles smooth, without secondary branches; longest peduncles usually 1.5–3.5 cm long (including clusters). Bracteoles 2–3 mm long, fimbriate-ciliate above. Tepals brown, castaneous brown or dark brown, equal, entire, acuminate, 2.8–4.2 mm long. Stamens 6; anthers 1.3–1.8 mm long; filaments 0.3–0.6 mm long; stigma subsistent, 1.8–3.0 mm long. Capsules obovoid, equalling or ±shorter than perianth; capsule segments 2.1–3.2 mm long. Seeds 1.0–1.2 mm long, 0.8–1.0 mm wide; appendage 0.4–0.7 mm long.

In most of its geographical range, *L. campestris* varies within very narrow limits. In the Iberian Peninsula, two subspecies are recognized.

At least some peduncles nodding or flexuose

56a. subsp. **campestris**

Peduncles straight, rigid

56b. subsp. **nevadensis**

56a. *Luzula campestris* (L.) DC. subsp. *campestris*

Luzula campestris var. *elata* Schldtl., *Fl. Berol.* 1: 203 (1823). T: [Germany, Berlin area], 1821, *D.F.L.Schlechtendal*; lecto: HAL69139, *designated here*.

Luzula campestris var. *pumila* Schldtl., *Fl. Berol.* 203 (1823). T: [Germany, Berlin area], 1821, *D.F.L.Schlechtendal* [ut var. *nana*]; lecto: HAL69140, *designated here*.

Luzula campestris var. *collina* G.Mey., *Fl. Hanov. Excurs.* 582 (1849); *Luzula campestris* f. *collina* (G.Mey.) Buchenau, in A.Kneucker, *Cyper. Junc. Exs.*, no 60, c. 1899; *Allg. Bot. Z. Syst.* 6: 228 (1900). T: [Germany, Hannover, otherwise not designated; the common form]

Luzula campestris subsp. *longistyla* Čelak., *Prodr. Fl. Böhmen* 1: 85 (1867). T: not designated.

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Luzula campestris A.H.a.2. [unranked] *luteola* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2: 522 (1904); *Luzula campestris* var. *luteola* (Asch. & Graebner) V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 490 (1928). T: not designated.

Luzula campestris var. *insularis* Briq., *Prodr. Fl. Corse* 1: 246 (1910); *Luzula campestris* proles *insularis* (Briq.) Rouy, *Fl. France* 13: 265 (1912); *Luzula insularis* (Briq.) Prain, *Ind. Kew.*, suppl. 5: 157 (1921). T: Corse, entre Ste. Lucie et La Trinité, 50 m, 7 May 1907, J.I.Briquet; lecto: G, designated here.

Luzula chabertii Rouy, *Fl. France* 13: 266 (1912); *Luzula campestroides* H.Lév., *Bull. Acad. Int. Géogr. Bot.*, ser. 4, 25: 48 (1917), *nom. illeg.* T: [France] Forêt d'Fontainebleau dans les Ventes Bourbon, 16 May 1871, A.C.Chabert; lecto: FI, *fide* J.Kirschner, *Taxon* 39: 112 (1990).

Luzula campestris var. *rectirama* Murr, *Neue Übers. Bl-Pfl. Vorarlberg* 46 (1923). T: [Austria] Nofels, Gisingen und Letzebühel b. Feldkirch, J.Murr; syn: *n.v.*

Luzula campestris var. *terana* P.Monts., *Anales Inst. Bot. Cavanilles* 21(2): 492 (1964). T: Zamora, Sanabria, Tera R., Furnio de Lacillos, 1600 m, Jun 1945, T.M.Losa; holo: BCF.

Luzula campestris subsp. *iberica* P.Monts., *Anales Inst. Bot. Cavanilles* 21(2): 492 (1964). T: Madrid, Sierra de Guadarrama, Peñalara, 25 May 1912, C.Vicioso; holo: BC63308.

Illustrations: H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 1: 521 (1967); J.Kirschner, *Folia Geobot. Phytotax.* 28: 153, fig. 3 (1993).

Map: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 88 (1965).

Perennial, 5–25 cm tall, ±densely ciliate, with creeping rhizome and short stolons. Stem with numerous basal and 2–3 cauline ±flat leaves; upper leaves 2–4 cm × 1.7–3.3 mm, with sparsely papillose-serrulate margins. Clusters 3–9-flowered; peduncles erect, often ±flexuose, usually at least one nodding. Lower bract 1–3 cm long, shorter than inflorescence. Bracteoles 2.0–2.5 mm long, whitish-membranous, ciliate-fimbriate. Tepals 2.8–4.1 mm long, castaneous brown to dark brown. Anthers 1.3–1.8 mm long, 3.0–4.5 times longer than the 0.3–0.6 mm long filaments; style 1.0–1.5 mm long; stigma 1.8–3.0 mm long, ±persistent. Capsule ±equalling tepals; capsule segments 2.1–3.0 mm long, dark brown. Seeds subglobular, 1.0–1.1 × 0.8–1.0 mm; basal appendage 0.4–0.7 mm long. Mean length of middle stomata in upper cauline leaves 30–35 µm. 2n=12 [12AL], *fide* H.Nordenskiöld, *Hereditas* 37: 336–337 (1951); J.Kirschner, *Pl. Syst. Evol.* 200: 5 (1996). Fig. 22.

Europe, except for the eastern part, and North Africa. Introduced to North America, New Zealand, Australia, Macaronesia, Falkland Is. 10: DEN, FIN, FOR, GRB, IRE, NOR, SWE. 11: All. 12: BAL, COR, FRA, POR, SAR, SPA. 13: ALB, BUL, GRC, ITA, ROM, TUE, YUC. 14: BLR, BLT, RUC, RUN, RUW, UKR. 20: ALG, MOR. 21: azo, mdr. 50: nsw, tas, vic. 51: nzn, nzs. 72: nfl. 75: mas. 90: fal. Map. 87 [secondary occurrence not shown]

11. GERMANY: Berlin, Jungfernhaide, 120 m, Lackowitz [*A.Kneucker, Cyp. Junc. Exs.*] 60 (GZU, PR). POLAND: Chrzanów, Płaza, A.Jasiewicz & Palkowa [*Fl. Polon. Exs.*] 390 (WRSL). SWITZERLAND: Chur, Campodels, C.Coaz [*J.Braun-Blanquet, Fl. Raet. Exs.*] 611 (BC, G, GZU). 12. FRANCE: Seine-et-Oise, Forêt de Sénart, De Baire [*Duffour, Soc. Franc.*] 2242 (BC, P). PORTUGAL: Algarve, Sierra Monchique, 600 m, P.Montserrat *et al.* (JACA590668). SPAIN: Madrid, El Escorial de Guadarrama, 15 May 1966, M.Mayor (MAF87300); Burgos, Lunada, Portillo de Lunada, 1500–1600 m, P.Montserrat (JACA173783). 14. BELORUSSIA: Minsk, 12 May 1986, Tzvelev (LE). RUSSIA NORTHWEST: Pskov, V.Andreev 1683 (LE). 90. FALKLAND IS.: East Falklands, Port Stanley, Beatrice Cove, 10 Nov 1945, Hamilton 12 (BM).

Numerous literature records under the name *L. campestris* from outside Europe mostly refer to other species in the sect. *Luzula*. In Spain and Portugal, subsp. *campestris* is rather variable, particularly in the flower size, inflorescence appearance and length of stolons; in other regions, the variation is very limited.

56b. *Luzula campestris* subsp. *nevadensis* P.Monts., *Anales Inst. Bot. Cavanilles* 21(2): 492 (1964)

T: Spain, Sierra Nevada, Puerto Lobo, 2100 m, 14 Jul 1923, P.Font Quer; holo: BC150865.

Map: P.Montserrat, *Anales Inst. Bot. Cavanilles* 21(2): map 8 (1964).

Perennial, usually 20–32 cm tall; rhizome long, creeping; stolons present. Basal leaves sparsely ciliate, c. 3.0–4.5 mm wide; cauline leaves 2–3, with upper ones 3.5–5.0 cm long, 2.0–2.8 mm wide. Lower bract usually 1.2–2.0 cm long, shorter than inflorescence. Clusters

5–8-flowered; peduncles straight. Bracteoles 2.4–3.0 mm long. Tepals 3.5–4.2 mm long, brown to dark brown. Anthers 1.4–1.8 mm long; filaments 0.4–0.5 mm long; ovary 1.2 mm long; style 1.4–2.2 mm long; stigmas 2–3 mm long, subpersistent. Capsule segments 2.8–3.2 mm long. Seeds oblong-ovoid, 1.1–1.2 mm long, c. 0.9 mm wide; appendage 0.5–0.6 mm long. Mean length of middle stomata in upper cauline leaves 44–45 μ m. Polyploid, *vide* J.Kirschner, *Pl. Syst. Evol.* 200: 5 (1996).

Endemic to Spain. 12: SPA. Mountain grasslands and open woodlands. Map 88.

12. SPAIN: Barcelona, Vallgorguina, 'ad Torrentem Can Gras', 250 m, *P.Monserrat* (JACA2347).

An imperfectly known taxon, presumed to be a polyploid derivative of subsp. *campestris*. In addition to the holotype gathering, only a single additional specimen is known. However, its location, rather far from Sierra Nevada and in a different ecological situation, raises some doubts about its identity.

57. *Luzula sudetica* (Willd.) Schult., *Oesterr. Fl.*, 2nd edn, 1: 573 (1814)

Juncus sudeticus Willd., *Sp. Pl.* 2: 221 (1799); *Luzula nigricans* Desv., *J. Bot. (Desvaux)* 1: 158 (1809), *nom. illeg.*; *Luzula campestris* γ [unranked] *nigricans* [Desv.] Gaudin, *Fl. Helv.* 2: 572 (1828); *Luzula multiflora* var. *nigricans* (Gaudin) W.D.J.Koch, *Syn. Fl. Germ. Helv.* 734 (1837); *Luzula campestris* c. [Spielart] *alpestris* G.Mey., *Chloris Han.* 572 (1836); *Luzula campestris* d. [Spielart] *sudetica* G.Mey., *Fl. Hanov. Excurs.* 582 (1849); *Luzula multiflora* var. *sudetica* (Willd.) Parl., *Fl. Ital.* 2: 307 (1852), *nom. illeg.*; *Luzula campestris* subsp. *alpestris* (G.Mey.) Čelak., *Prodr. Fl. Böhmen* 1: 85 (1867); *Gymnodes sudetica* (Willd.) Fourr., *Ann. Soc. Linn. Lyon*, sér. 2, 17: 173 (1869); *Luzula campestris* subsp. *sudetica* (Willd.) Čelak., *Prodr. Fl. Böhmen* 3: 749 (1881), *nom. illeg.*; *Luzula multiflora* subsp. *sudetica* (Willd.) Arcang., *Comp. Fl. Ital.* 713 (1882), *nom. illeg.*; *Juncoides campestris* var. *sudetica* (Willd.) Coville, *Contr. U. S. Natl. Herb.* 4: 208 (1893), *nom. illeg.*; *Luzula erecta* subsp. *nigricans* (Gaudin) Berher, in L.Louis, *Fl. Vosges*, 2nd edn, 216 (1887), *nom. illeg.*; *Luzula multiflora* subsp. *nigricans* (Gaudin) Neuman, *Sveriges Fl.* 665 (1901), *nom. illeg.*; *Luzula erecta* proles *nigricans* (Gaudin) Rouy, *Fl. France* 13: 266 (1912). T: [Czech Republic/Poland], 'in Sudetis' [the Krkonoše Mts.]; lecto: B-WILLD 6837, *vide* J.Kirschner, *Taxon* 39: 113 (1990).

Luzula campestris var. *alpina* Gaudin, *Agrost. Helv.* 2: 247 (1811) [doubtfully valid, probably validated later]. T: [Swiss Alps, otherwise not designated].

Luzula althii Herbich, *Select. Pl. Galic.* 12 (1836); *Luzula campestris* f. *althii* (Herbich) I.Grint., *Fl. Rep. Soc. Roman.* 11: 603 (1966). T: Ukraine, 'prope Putila, in alpe Ploska prope Seletin, in Luczina', *F.Herbich*; lecto: CZERN21173. [in herb. W authentic material with *Juncus triglumis* and another sheet with *Luzula multiflora* and the same label].

Illustrations: T.Szynal & J. Mađalski, *Atlas Fl. Polsk.* 2(2): 148 (1931); J.Kirschner & Lippert, *Ber. Bayer. Bot. Ges.* 65: Plate 4 (1995); J.Kirschner, *Folia Geobot. Phytotax.* 28: 169, fig. 9 (1993).

Map: E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 175 (1986).

Perennials, 10–25 (–35) cm tall, loosely caespitose; rhizome ascending to oblique, branched; stolons absent. Basal leaves sparsely ciliate, 1.5–4.0 mm wide; cauline leaves 2–3; upper leaves 4.5–6.0 cm long, 1.4–3.0 mm wide; all leaves with densely papillose-serrate margin and apex obtuse. Lower bract usually 1.5–3.5 cm long, overtopping inflorescence. Inflorescence usually partly congested, of 3–10 ellipsoidal to ovoid clusters; clusters (5–) 7–11 (–15)-flowered, with some or most clusters pedunculate; peduncles straight, smooth, usually without secondary branches, up to 1.0–3.5 cm long. Bracteoles 1.2–1.5 mm long, ciliate. Tepals unequal to \pm equal, \pm lanceolate, blackish brown, narrowly paler bordered above; outer tepals (1.9–) 2.1–2.5 (–2.7) mm long. Stamens 6; anthers (0.4–) 0.5–0.7 (–0.8) mm long; filaments 0.4–0.5 mm long; ovary 0.8–1.0 mm long; style 0.1–0.3 mm long; stigma early deciduous, 0.8–1.4 mm long. Capsules narrowly obovoid, subacute, indistinctly mucronate, equalling or shorter than perianth; capsule segments 1.7–2.0 \times c. 1.0 mm. Seeds narrowly ellipsoidal, 0.9–1.0 mm long, 0.5–0.6 mm wide; appendage c. 0.1 mm long, fibrillate. $2n=48$ [48CL], *vide* J.Kirschner, *Thaiszia, J. Bot.* 2: 29–30 (1992); J.Kirschner & Lippert, *Ber. Bayer. Bot. Ges.* 65: 18 (1995); J.Kirschner, *Pl. Syst. Evol.* 200: 6 (1996). Fig. 23.

Europe, from Iceland, Scandinavia and C European mountains to the Pyrenees, N Italy and the Balkans. 10: FIN, ICE, NOR, SWE. 11: AUT, CZE, GER, POL, SWI. 12: COR, FRA, SPA. 13: ALB, BUL, GRC, ITA, ROM, YUC. 14: RUN, UKR. Recorded from the Caucasus and Turkey but further study is needed. Montane and alpine moist meadows on peaty soils. Map 89.

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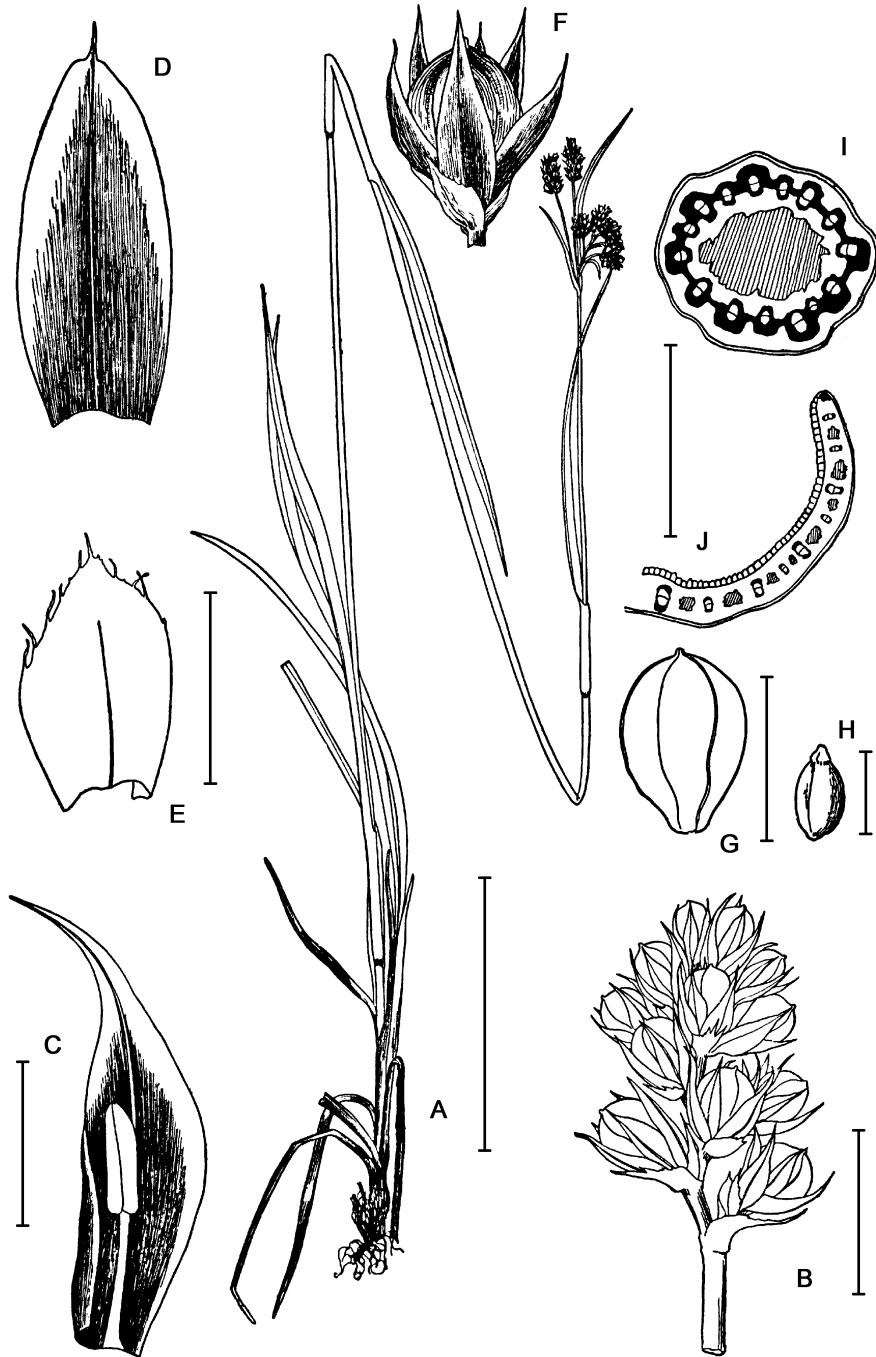


Figure 23. *Luzula sudetica*. **A**, habit; **B**, flower cluster; **C**, **D**, outer and inner tepals; **E**, bracteole; **F**, flower; **G**, capsule; **H**, seed; **I**, stem T.S.; **J**, leaf T.S. (A-J, *B. Blocki*, 31 Jul 1905, KRA). Scale bars: **A** = 5 cm; **B** = 5 mm; **C**, **D** = 1 mm; **E** = 1 mm; **F**, **G** = 2 mm; **H** = 1 mm; **I**, **J** = 1 mm. Drawn by T. Szynal. Reproduced with permission, from T. Szynal & J. Małowski, *Atlas Fl. Pol.* 2/2: 148 (1931).

10. FINLAND: Savonia borealis, Lapinmäki, *H.Lindberg [Pl. Finl. Exs.] 157* (H, LD, S, UPS, WRSL).
 11. CZECH REPUBLIC: the Krkonoše Mtns, Harrachov, Vosecká bouda, 1100–1130 m, 15 Jul 1998, *L.Kirschnerová & J.Kirschner 4468* (PRA). GERMANY: Bayerischer Wald, summit of Mt Gr. Arber, 28 Jul 1909, *F.Vollmann* (M). SLOVAKIA: Belianske Tatry, Kežmarská chata, *J.Kirschner L301* (PRA).
 12. FRANCE: Ht. Pyrénées, Passades d'Aumur, Neouvielle, 2180 m, *P.Montserrat* (JACA275480). SPAIN: Huesca, Tramacastilla de Tena, El Bujicar, 1600 m, 27 Jul 1982, *L.Villar* (JACA129282).
 13. BULGARIA: Rila Mtns, Samokov, between 'Komplex Maljovica' and Maljovica chalet, 1900 m, 8 Aug 1990, *J.Štěpánek [K 409]* (PRA). GREECE: Nom. Serrai, Mt Vrontous, 1400–1450 m, *S.Snogerup & A.Strid 5015* (LD). ITALY: Piemont, Valli di Lanzo, Lac Falin, 1600 m, 21 Jul 1987, *A.Pistarino* (BM). ROMANIA: Retezat Mtns, Lake Zanova, 7 Aug 1896, *Wagner* (LD). 14. UKRAINE: the Carpathians, Vorokhta, 1430 m, *V.M.Vinogradova & Stankova [Gerb. Fl. SSSR] 5910* (LE).

Towards the south, most plants have inner and outer tepals \pm of the same length, otherwise the variation limits are narrow. The loosely caespitose growth with oblique/ascending branched rhizome is an important diagnostic character.

58. *Luzula congesta* (Thuill.) Lej., *Fl. Spa* 1: 169 (1811)

Juncus congestus Thuill., *Fl. Env. Paris*, 2nd edn, 178 (1800); *Luzula erecta* var. *congesta* (Thuill.) Desv., *J. Bot. (Desvaux)* 1: 156 (1809); *Luzula campestris* var. *congesta* (Thuill.) Bicheno, *Trans. Linn. Soc. London* 12: 334 (1819); E.Mey., *Syn. Luzul.* 18 (1823); *Luzula intermedia* var. *congesta* (Thuill.) Spenn., *Fl. Friburg.* 1: 178 (1825); *Luzula multiflora* var. *congesta* (Thuill.) W.D.J.Koch, *Syn. Fl. Germ. Helv.* 734 (1837); *Luzula campestris* subsp. *congesta* (Thuill.) K.Richt., *Pl. Eur.* 1: 186 (1890); *Luzula multiflora* subsp. *congesta* (Thuill.) Arcang., *Comp. Fl. Ital.* 713 (1882); *Luzula multiflora* f. *congesta* (Thuill.) Neuman, *Sveriges Fl.* 665 (1901); *Luzula erecta* proles *congesta* (Thuill.) Rouy, *Fl. France* 13: 265 (1912). T: [France, Paris], *J.L.Thuillier*; lecto: G-DEL, *fide* J.Kirschner, *Taxon* 39: 110 (1990); isolecto [or other authentic material]: K.

Juncus campestris var. *strictus* Retz., *Fl. Scand. Prodr.*, 2nd edn, 82 (1795). T: 'Gramen hirsutum capitulo globoso. Mor. 3. s. 8. t. 9'; R.Morison, *Pl. Hist. Univ. Oxon.* 3: 224–225, sect. 8, tab. 9 [unnumbered figure, first in upper left hand corner] (1715); holo. not located [no material in herb. Retzius, LD].

Juncus liniger With., *Syst. Arr. Brit. Pl.*, 4th edn, 2: 343 (1801). T: England, 'Shortwood near Pucklechurch, Swayne'; holo: not extant.

Luzula spicata var. *latifolia* Losa, *Contrib. Est. Fl. Alava, Vitoria* 1946: 43 (1946), *n.v.* T: Spain, Sierra de Cantabria, Alava, Lagrán, Bujumendia, Jul 1928, *T.M.Losa*; syn: BCF, Jun 1933, *T.M.Losa*; syn: BCF, *n.v.*

Luzula campestris var. *pallens* Merino, *Mem. Real Soc. Esp. Hist. Nat.* 2: 472 (1904), *nom. illeg., non* Asch. & Graebn. (1904). T: Spain, Galicia, Galdo, *Rodríguez Franco*; holo, *n.v.*, *fide* P.Montserrat, *Anales Inst. Bot. Cavanilles* 21: 507 (1964).

Illustrations: F.G.P.Buchenau, *in* H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 91, fig. 54 (1906); J.Kirschner, *Folia Geobot. Phytotax.* 28: 156, 157, fig. 4, 5 (1993).

Map: E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 174 (1986).

Perennials, 25–55 cm tall, densely caespitose; rhizome \pm short, vertical; stolons absent. Basal leaves densely ciliate, 3.5–6.0 mm wide; cauline leaves usually 3; upper leaves 2.5–6.5 cm long, 1.5–4.0 mm wide; all leaves with obtuse tip and margins papillose-serrulate. Lower bract usually 1.5–3.0 cm long, overtopping or less often shorter than inflorescence. Inflorescence usually a congested compact, ovoid to \pm pyramidal head, of 4–8 clusters; clusters usually 7–10-flowered, sometimes some clusters pedunculate; peduncles straight, up to 0.9–3.0 cm long, \pm smooth. Bracteoles 2.5–2.8 mm long, fimbriate-ciliate. Tepals \pm equal, glabrous, \pm lanceolate, acuminate, pale straw-brown or brown; margins paler to membranous above, usually 2.9–3.5 mm long. Stamens 6; anthers (0.6–) 0.7–0.9 mm long; filaments 0.6–0.8 mm long; ovary 1.0–1.2 mm long; style 0.5–0.8 mm long; stigmas 2.0–2.4 mm long. Capsules obovoid to subglobular, pale brown, \pm obtuse, equalling or shorter than perianth; capsule segments 2.3–3.0 \times 1.5–1.8 mm. Seeds ovoid or oblong-ovoid, 1.2–1.5 mm long, (0.8–) 0.9–1.0 mm wide; appendage 0.4–0.6 mm long, usually fibrillate. $2n=48$ [48AL], *fide* H.Nordenskiöld, *Hereditas* 42: 10–11 (1956); J.Kirschner, *Thaiszia, J. Bot.* 2: 19–20 (1992); J.Kirschner, *Pl. Syst. Evol.* 200: 8 (1996).

Western Europe, from W and S Scandinavia and Germany to Spain and Portugal. Introduced to Madeira, Azores, New Zealand and Australia. 10: DEN, FOR, GRB, ICE, IRE, NOR, SWE. 11: BGM, GER, NET, POL. 12: FRA, POR, SPA. 21: azo, mdr. 50: nsw, tas. 51: nzn, nzs. Peat-bogs, wet meadows on peaty soils, from sea level to c. 1800 m. Map 90.

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10. DENMARK: Jylland, Varde, 29 Jul 1951, *H.Nordenskiöld 51-74* (UPS). GREAT BRITAIN: Isle of Man, W of Ballaweanagh, S of Sarwick, 25 Jun 1950, *V.S.Summerhayes* (K). IRELAND: Co. Carlow, Bagnelstown, *T. C. G. Rich 4 [L256]* (PRA). NORWAY: Hordaland, Eldøyane, 16 Aug 1955, *J.Ericson* (LD). 11. BELGIUM: Flandre, Wingene, 8 Jun 1979, *Stieperaere [Soc. Éch. Pl. Vascul. Eur. Occid.] 9906* (LD, LG). GERMANY: Niedersachsen, Oldenburg, Jaderberg, 3 Jul 1920, *F.Müller* (LD). POLAND: Kołobrzeg, Dogowo, *J.Mądalski 13729* (WRSL, herb. Mądalski). 12. SPAIN: Navarra, Selva de Irati, Ochagavia, 950 m, *G.Montserrat et al.* (JACA121187). PORTUGAL: Coimbra, Carregas d'Eiras, May 1896, *M.Ferreira [Fl. Lusit. Exs.] 1417* (LD). 21. AZORES: São Miguel, Ribeira Grande, Lagoa do Fogo, 14 May 2000, *J.Kirschner* (PRA).

59. *Luzula multiflora* (Ehrh.) Lej., *Fl. Spa* 1: 169 (1811), *nom. cons. prop.*

Juncus campestris var. *multiflorus* Ehrh., *Beitr. Naturk.* 5: 14 (1790); *Juncus multiflorus* (Ehrh.) Hoffm., *Deutschl. Fl., Dritter Jahrg.*, 1: 169 (v-xii 1800), *nom. illeg., non Retz.* (1795), *nec Desf.* (1799); *Luzula intermedia* var. *multiflora* (Ehrh.) Spenn., *Fl. Friburg.* 1: 178 (1825); *Luzula campestris* subsp. *multiflora* (Ehrh.) Schübl. & M.Martens, *Fl. Württemberg* 230 (1834); *Gymnodes multiflora* (Ehrh.) Fourr., *Ann. Soc. Linn. Lyon*, sér. 2, 17: 173 (1869); *Juncooides campestris* var. *multiflora* (Ehrh.) E.Sheld., *Bull. Geol. Nat. Hist. Surv.* 9: 64 (1894); *Juncooides multiflora* (Ehrh.) Druce, *Ann. Scott. Nat. Hist.* 1904: 42 (1904). T: Italy, S Tirol, Mendelgebirge, between St Pauls and Perdonig, 46°29'N 11°15'E, *I.Hertel & H.Hertel*; *typus cons. prop.*: M33725; iso: PRA (2n=36, karyotype 36AL).

Luzula campestris subsp. *carpetana* Rivas Mart., *Anales Inst. Bot. Cavanilles* 21/1: 288 (1963). T: [Spain, Sierras de Guadarrama y Gredos], *S.Rivas Martínez*; *holo*: MAF, *n.v.*

Luzula jilongensis K.F.Wu, *J. E. China Norm. Univ., Nat. Sci. Ed.*, 1992(3): 95 (1992). T: Tibet, Jilong Xian, 3400–3800 m, 5 Jul 1975, *Cheng-yih Wu & Shu-kun Chen 75-612* (KUN).

Luzula multiflora var. *intermedia* Koidz., *Pl. Sachal. Nak.* 32, fig. 1 (1910), *n.v.*; *Luzula multiflora* var. *tenuis* Satake, in *T.Nakai & M.Honda, Nov. Fl. Jap.* 1: 36 (1938). T: [Russia] Sakhalin, Dobky, 24 Jun 1906, *G.Nakahara*; *lecto*: TI [as *L. campestris* var. *intermedia*], *designated here*.

Map: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 8(5): map 64 (1962).

Perennials, ±densely caespitose; rhizome short; stolons absent. Basal leaves densely ciliate to subglabrous, 2.5–4.0 (–6.0) mm wide; cauline leaves 1–3 (–4), with densely papillose-serrulate margins. Lower bract leaf-like, usually longer than or equalling inflorescence (less often shorter). Inflorescence usually composed of pedunculate clusters, or less often clusters subcongested; peduncles smooth or papillose. Bracteoles scarious, to 2 mm long, subtentive to ciliate-fimbriate. Tepals ±equal to subequal, acuminate to subaristate, 2.4–3.5 (–3.9) mm long, straw, straw-brown, castaneous-brown to dark brown, rarely blackish, usually with a distinct paler margin. Stamens 6; anthers usually 0.6–1.0 (–1.4) mm long, anther/filament ratio usually 1.0–1.5 (–2.5); style 0.3–0.7 (–0.8) mm long; stigmas early deciduous, 1.1–2.0 (–3.1) mm long. Capsule obovoid, smooth, shorter to slightly longer than perianth, pale brownish to dark brown; capsule segments 1.9–2.8 mm long. Seeds oblong-ovoid to ellipsoid-ovoid, 0.8–1.2 mm long, 0.6–0.9 mm wide; appendage 0.2–0.4 (–0.5) mm long.

An extremely widespread and variable polyploid, rarely (partially) agmatoploid, species. In some regions (China, USA, the Far East) it is not known satisfactorily, and additional taxa may be revealed. Six subspecies are recognized.

- | | | |
|----|---|--------------------------------------|
| 1 | Peduncles ±densely papillose throughout | 59d. subsp. snogerupii |
| 1: | Peduncles smooth, rarely with scattered papillae just below clusters | |
| 2 | Peduncles sometimes (usually one or more in a plant) recurved | 59e. subsp. hibernica |
| 2: | Peduncles straight to (rarely) flexuose, not recurved | |
| 3 | Seeds (excluding appendage) (0.8–) 0.9 mm long; tepals to 2.7 mm long; capsule often longer than perianth; seed appendage (0.3–) 0.4 mm long | 59f. subsp. monticola |
| 3: | Seeds (0.9–) 1.0–1.1 (–1.2) mm long; tepals usually longer than 2.7 mm, or if tepals to 2.7 mm long and capsule exceeding perianth, then seed appendage 0.2–0.3 mm long | |

- 4 Capsule subacuminate, usually distinctly exceeding perianth; style 0.3–0.5 mm long **59b. subsp. frigida**
- 4: Capsule subobtusate, usually shorter than perianth; style (0.4–) 0.5–0.8 mm long
- 5 Seed appendage c. 0.3 mm long; capsule segments 1.9–2.2 mm long **59c. subsp. sibirica**
- 5: Seed appendage usually 0.4 mm long; capsule segments (2.0–) 2.3–2.6 (–2.8) mm long **59a. subsp. multiflora**

59a. *Luzula multiflora* (Ehrh.) Lej. subsp. **multiflora**

Juncus intermedius Thuill., *Fl. Env. Paris*, 2nd edn, 178 (1800); *Juncus erectus* Pers., *Syn. Pl.* 1: 386 (1805), *nom. illeg.*; *Luzula erecta* Desv., *J. Bot. (Desvaux)* 1: 156 (1808), *nom. illeg.*; *Luzula intermedia* (Thuill.) Spenn., *Fl. Friburg.* 1: 177 (1825), *nom. illeg., non* Nocca & Balb. (1816); *Juncoides erecta* Boulger, in C.A. Johns, *Flowers of Field*, 29th edn, 755 (1899); *Juncoides intermedia* (Thuill.) Rydb., *Bull. Torrey Bot. Club* 32: 610 (1905); *Luzula campestris* subsp. *erecta* [Desv.] P.Fourn., *Quatre Fl. France* 153 (1935). T: [France, Paris], J.L. Thuillier; lecto: G-DEL, *fide* J.Kirschner, *Taxon* 39: 110 (1990).

Juncus campestris var. *tenuis* Retz., *Fasc. Obs. Bot.* 12 (1774). T: [without locality and collector] *herb. Retzius*; *holo*: LD.

Juncus nemorosus Host, *Icon. Descr. Gram. Austriac.* 3: 64 (1805), *nom. illeg., non* Pollich (1776); *Luzula nemorosa* Hornem., *Hort. Bot. Hafn.* 962 (1815); *Luzula campestris* δ [unranked] *nemorosa* (Hornem.) Gaudin, *Fl. Helv.* 2: 572 (1828); *Luzula campestris* var. *nemorosa* (Hornem.) Neilr., *Nachtr. Fl. Wien* 101 (1851). T: icon in N.T. Host, *Icon. Descr. Gram. Austriac.* tab. 97, fig. 5 (1805); lecto, *fide* J.Kirschner, *Taxon* 39: 111 (1990).

Luzula spicata var. *tenella* [Miel. ex] E.Mey., *Linnaea* 22: 415 (1849); *Luzula tenella* ([Miel. ex] E.Mey.) R.Hinterh. & J.Hinterh., *Prodr. Fl. Salzburg* 223 (1851); *Luzula multiflora* subsp. *tenella* (E.Mey.) Kožuharov, *Izv. Bot. Inst. (Sofia)* 11: 135 (1963). T: [Austria] Schattbachalpen in Grossarl, *M. Mielichhofer*; lecto: REG85873, *fide* J.Kirschner, *Folia Geobot. Phytotax.* 28: 160 (1993).

Luzula multiflora var. *uliginosa* Greml., *Excursionsfl. Schweiz*, 3rd edn, 377 (1878). T: [Switzerland, otherwise not designated].

Luzula intermedia Figert, *Deutsche Bot. Monatsschr.* 15: 12 (1897), *nom. illeg., non* Thuill. (1800); *Luzula ambigua* Sóo, *Acta Bot. Acad. Sci. Hung.* 16: 367 (1971), *pro hybr.* T: [Poland, Legnica] Schlesien, Liegnitz [several specimens from the vicinity of the town cited, material not found].

Luzula multiflora var. *flexuosa* Beyer, *Verh. Bot. Vereins Prov. Brandenburg.* 41: xxiii (1900). T: [Switzerland] Graische Alpen, Beauregard, Val Grisanche, 18 Jul 1889, *R. Beyer*; lecto: W, *designated here*.

Luzula campestris [Rasse] *pallens* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 524 (1904), *an nom. illeg., non* Merino (1904); *Luzula campestris* var. *pallens* Husn., *Joncées* 26 (1908), *nom. illeg.*; *Luzula multiflora* f. *umbrosa* Neuman, *Sveriges Fl.* 665 (1901); *Luzula erecta* var. *pallens* (Asch. & Graebn.) Rouy, *Fl. France* 13: 265 (1912). T: icon in D.H. Hoppe, *Deutschl. Fl.* 1/77: *sine no.* (1839); lecto: *designated here*.

Luzula erecta proles *pyrenaica* Sennen, *Bull. Soc. Bot. France* 63: 135 (1916); *Luzula multiflora* subsp. *pyrenaica* (Sennen) P.Monts., *Anales Inst. Bot. Cavanilles* 21(2): 501 (1964) [uncertain validity]. T: France, Cerdagne au Cambredase, *E.M. Sennen [Pl. Esp.]* 2359; *syn*: BC, BM, W.

Luzula campestris var. *acadiensis* Fernald, *Rhodora* 19: 38 (1917); *Luzula multiflora* var. *acadiensis* (Fernald) Fernald, *Rhodora* 47: 267 (1945). T: Canada, Prince Edward Is., Charlottetown, W side of St Peters Bay, 30 Jun 1914, *M.L. Fernald & H. St. John [Pl. Exs. Gray.]* 190; *syn*: GH, S.

Luzula multiflora subsp. *occidentalis* V.I. Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 490 (1928). T: not designated (not located at LE).

Illustrations: T. Szydal & J. Mądalski, *Atlas Fl. Polsk.* 2(2): 149 (1931); H.E. Hess, E. Landolt & R. Hirzel, *Fl. Schweiz* 1: 521 (1967); J. Kirschner, *Folia Geobot. Phytotax.* 28: 163, fig. 7 (1993).

Map: E. Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 8(5): map 64 (1962).

Stems 15–38 cm tall. Basal leaves densely to sparsely ciliate, 3–6 mm wide; cauline leaves usually 2–4, 3.7–12 cm long, 1.8–5 mm wide. Lower bract usually 2.5–6.5 cm long, exceeding inflorescence or shorter. Inflorescence usually of (4–) 5–12 (–17) pedunculate clusters; clusters ellipsoid to ovoid, usually (6–) 8–14 (–18)-flowered; peduncles to 1.5–5.2 cm long, straight, \pm smooth, rarely with secondary branches. Bracteoles 1.5–2.5 mm long, subentire. Tepals pale yellowish-greenish to dark brown, 2.5 to 3.9 mm long. Anthers 0.7–1.4 mm long, anther/filament length ratio 1.0–2.0 (–2.5); style 0.4–0.8 mm long; stigma

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1.3–3.1 mm long. Capsule obovoid to subglobular, equalling perianth or shorter; capsule segments (2.0–) 2.2–2.6 (–2.8) mm long. Seeds ovoid to ellipsoid, 0.9–1.2 mm long, (0.6–) 0.7–0.8 (–0.9) mm wide; appendage 0.3–0.4 (–0.5) mm long. $2n=24$ [24AL], 36 [36AL], *fide* J.Kirschner, *Thaiszia* 2: 23–27 (1992). Fig. 22, 24.

An extremely variable subspecies occurring very frequently in innumerable forms in most of Europe, many regions of West Asia, in North America (partly introduced), and introduced in a number of regions (more frequently in Australia, New Zealand, rarely in many additional regions). Many literature records refer to other taxa (particularly from W North America, SE Asia etc.). Only regions where the occurrence was safely confirmed on the basis of good herbarium material are listed here. It is difficult to distinguish the secondary occurrence from native distribution. 10: DEN, FIN, FOR, GRB, ICE, IRE, NOR, SWE. 11: All. 12: COR, FRA, POR, SPA. 13: ALB, BUL, GRC, ITA, ROM, TUE, YUC. 14: All. 20: ALG, MOR. 21: azo, cny, mdr. 30: WSB. 31: KHA, SAK. 32: KAZ, KGZ, TKM, TZK, UZB. 33: NCS, TCS. 34: IRN, TUR. 36: CHC, CHT. 38: JAP, KOR, tai. 40: WHM, EHM. 50: tas. 51: nzn, nzs. 70: GNL. 71: ABT, BRC, MAN. 72: LAB, NBR, NFL, NSC, ONT, PEI, QUE. 73: MNT, ORE. 74: IOW, MIN, NDA, SDA. 75: CNT, INI, MAI, MAS, MIC, NWH, NWJ, NWY, OHI, PEN, VER, WVA. 78: DEL, VRG. 80: COS. 85: AGE. 90: FAL. In a variety of habitats, most often in meadows (usually wet) and montane to subalpine grasslands, open woodlands, usually disturbed, road verges etc. from sea level to subalpine altitudes. Map 91 (primary and secondary distributions not distinguished on the map).

11. GERMANY: Westfalen, Hagen, Philipshöhe, 16 May 1871, *P.E.E.Sintenis* (LD). 12. FRANCE: Loir-et-Cher, La Ferté-Imbault, 22 May 1924, *L.Segret* [*Duffour, Soc. Franc.*] 4815 (P); Gorges de Bitet, Laruns, Ossau, 1400 m, 5 Aug 1980, *P.Montserrat & L.Villar* (JACA330180). SPAIN: Andorra, Val del Riu, 1948, *T.M.Losa* (BCF4093); León, Las Omanas, 12 May 1973, *M.Pérez* (MA488994). 14. RUSSIA CENTRAL: Moscow, Pushkino, Komyagino, 10 Jul 1974, *G.M.Proskuryakova* (W). RUSSIA NORTH: Komi, Ust-Kulomskyi Distr., B. Soplea R., 1 Aug 1928, *S.Naumova* 344 (MW). 21. AZORES: Fayal, Falca, 13 Apr 1962, *M.L.Gonçalves* 297 (BM). 72. QUÉBEC: Sherbrooke, 10 Jun 1976, *S.Brisson* 76234 (LD). 30. WEST SIBERIA: Arctic Urals, 4 Aug 1926, *V.B.Sochava* 402 (LE).

59b. *Luzula multiflora* subsp. *frigida* (Buchen.) V.I.Krecz., *Žurn. Russk. Bot. Obsch. Akad. Nauk S.S.S.R.* 12: 490 (1928)

Luzula campestris var. *frigida* Buchenau, *Oesterr. Bot. Z.* 48: 184 (1898); *Luzula frigida* (Buchenau) Sam., in C.A.M.Lindman, *Sv. Fanerogamfl.* 161 (1918); *Luzula sudetica* var. *frigida* (Buchenau) Fernald, *Rhodora* 47: 265 (1945); *Luzula kjellmaniana* subsp. *frigida* (Buchenau) Schljakov, *Novosti Sist. Vyssh. Rast.* 16: 85 (1979). T: Norway, Kongsvold, Dovre Fjeld, Drivathal, 3 Aug 1892, *K.G.Baenitz* [*Herb. Eur.*] 7120; lecto: PR, *fide* J.Kirschner, *Taxon* 39: 113 (1990); isolecto: W.

Luzula multiflora var. *contracta* Böcher, *Meddel. Grønland* 147(7): 17 (1950), *nom. inval.* [interpreted according to authentic material in C]

Illustrations: J.Lid, *Norsk & Svensk Fl.* 199, fig. 98f, 203, fig. 100g (1963).

Maps: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 8(5): map 64 (1962); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: map 173 (1986).

Stems 13–30 cm tall. Basal leaves sparsely ciliate or subglabrous, 2.0–3.5 mm wide; cauline leaves usually 1–3, with upper ones 2.0–4.5 cm long and 1.0–2.8 mm wide. Lower bract usually 1.0–2.5 cm long. Inflorescence congested, of 2–6 clusters; clusters ellipsoid–ovoid or ovoid, 6–10-flowered, mostly pedunculate. Peduncles straight, smooth, rarely with secondary branches, to 0.8–2.5 cm long. Bracteoles 1.2–1.6 mm long, ciliate. Tepals dark brown, 2.4–2.9 mm long. Anthers 0.6–0.9 mm long, anther/filament length ratio 0.8–1.2; ovary 0.8–0.9 mm long; style 0.3–0.5 mm long; stigma 1.2–1.3 mm long. Capsules subacuminate, equalling or overtopping the perianth; capsule segments 2.0–2.4 mm long. Seeds \pm ellipsoid, 1.0–1.1 mm long, 0.7 mm wide; appendage 0.2–0.3 mm long. $2n=36$ [36AL], *fide* J.Kirschner, *Thaiszia* 2: 27 (1992).

Northern Europe, Iceland, Greenland, distribution in North America imperfectly known, but certainly from Alaska and Canada, and probably also in the mountains of NE USA. Very similar plants from the Far East require further investigation. 10: FIN, ICE, NOR, SWE. 14:

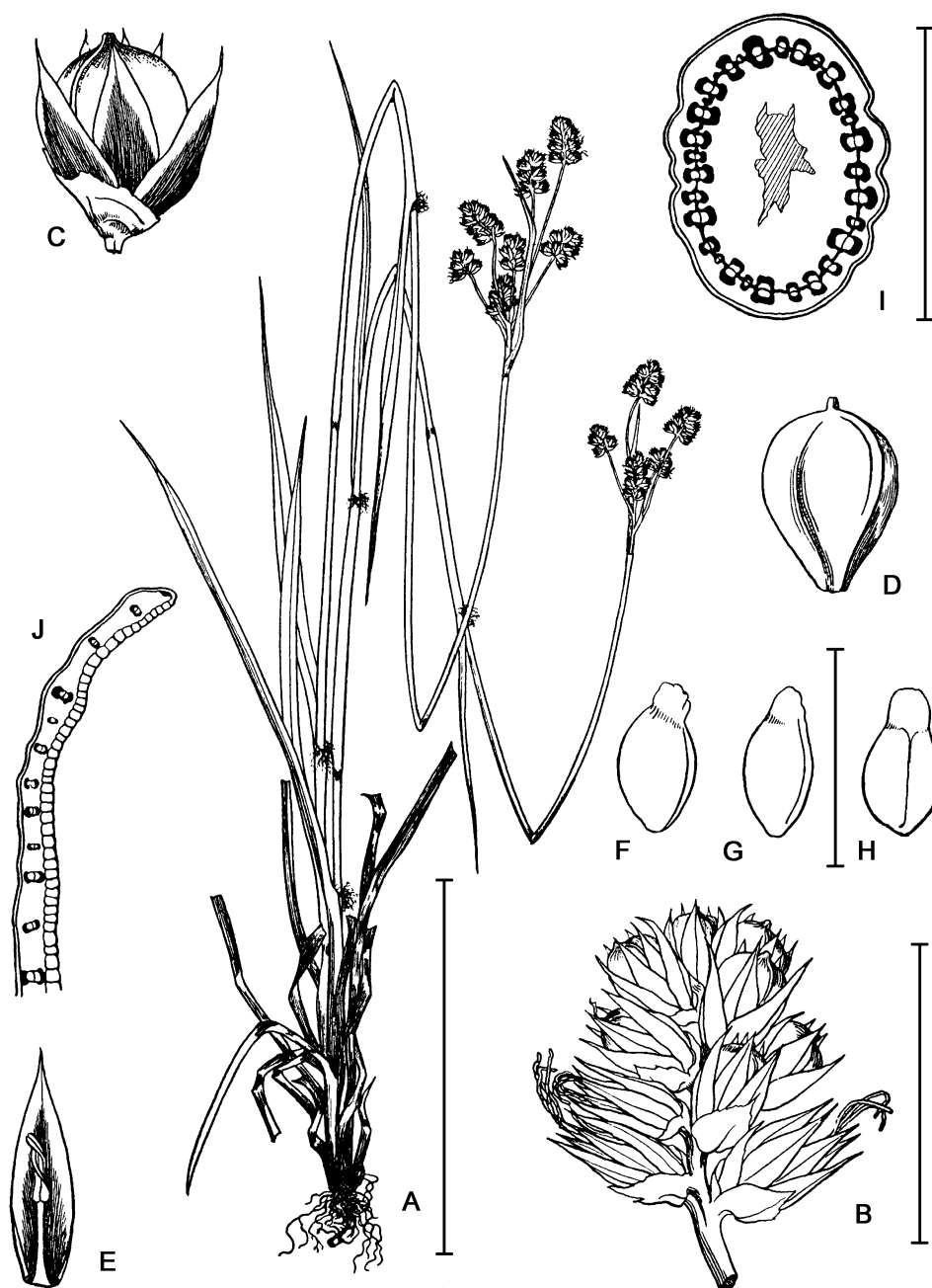


Figure 24. *Luzula multiflora* subsp. *multiflora*. A common lowland form. A, habit; B, flower cluster; C, flower; D, capsule; E, tepal; F–H, seeds; I, stem T.S.; J, leaf T.S. (A–F, I, J, *B. Blocki*, 28 May 1898, KRA; G, *J. Mądalski s.n.*, 1928, KRA). Scale bars: A = 5 cm; B = 5 mm; C–H = 2 mm; I, J = 1 mm. Drawn by T. Szynal. Reproduced with permission, from T. Szynal & J. Mądalski, *Atlas Fl. Pol.* 2/2: 149 (1931).

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RUN, RUW. 30: WSB. 70: ASK, GNL, NWT, YUK. 71: ABT, BRC, MAN, SAS. 72: LAB, NFL, NSC, ONT, QUE. 75: MAI, MAS, NWH, VER. Subarctic and mountain tundra, peat-bog margins, meadows. Map 92.

10. FINLAND: Inari, Angeli Station, 13 Jul 1970, *Kause & Seikula* (M). NORWAY: Hedmark, Follidal, 840–900 m, 19 Aug 1965, *K.P. Buttler & Gauhl* (M); Lyngenfjord, Lyngseidet, 26 Jul 1988, *K.G. Baenitz* (M). SWEDEN: Karesuando, Gunnarin Korva, *S.O. Björkman 3010* (UPS, 2n=36); Lule Lappmark, Avvako, 550 m, 21 Jul 1967, *H. Hertel* (M); Härjedalen, Tännäs, Funäsdalen, 21 Jul 1916, *M. Östman* (BRNU). 14. RUSSIA NORTH: Murmansk, Poyakonda, *M. Šourková 6871* (PRA). 71. MANITOBA: Churchill, *K.H. Rechinger 1375* (W). 72. QUEBEC: Great Whale R., Poste-de-la-Baleine, 30 Jul 1969, *S. Brisson & Forest* (LD).

Intermediates are known between subsp. *frigida* and subsp. *multiflora*. Plants apparently close to *L. multiflora* subsp. *frigida* are sometimes recorded in Asia (China, Mongolia); similar plants are occasionally found in C Europe [J. Kirschner, *Preslia* 67: 219–223 (1996)]; they are treated as a part of the variation range of subsp. *sibirica* (Chinese plants) and subsp. *multiflora* (C European plants).

59c. *Luzula multiflora* subsp. *sibirica* V.I. Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 490 (1928)

Luzula sibirica (V.I. Krecz.) V.I. Krecz., in B.A. Fedtschenko, *Fl. Transbaik.* 2: 144 (1931); *Luzula kjellmaniana* subsp. *sibirica* (V.I. Krecz.) Schljakov, *Novosti Sist. Vyssh. Rast.* 16: 85 (1979). T: Russia, Siberia, Kitoi, Osna R., *Cherski & Hartung 494*; lecto: LE, *fide* J. Kirschner, *Taxon* 39: 113 (1990).

Luzula multiflora subsp. *asiatica* Krylov & Serg., in P.N. Krylov, *Fl. Zap. Sibiri* 3: 556 (1929). T: not designated.

Luzula multiflora f. *conglobata* Krylov & Serg., in P.N. Krylov, *Fl. Zap. Sibiri* 3: 556 (1929). T: not designated.

Luzula multiflora f. *umbelliformis* Krylov & Serg., in P.N. Krylov, *Fl. Zap. Sibiri* 3: 556 (1929). T: not designated.

Luzula multiflora var. *minuta* Krylov & Serg., in P.N. Krylov, *Fl. Zap. Sibiri* 3: 556 (1929). T: numerous syntypes from the Altai and Semipalatinsk alpine regions, otherwise not indicated.

Luzula vinogradovii Sipliv., *Novosti Sist. Vyssh. Rast.* 12: 290 (1975). T: Russia, Chita Region, Kyra, Sokhondo, 3 Jul 1972, *A.B. Vinogradov & V.K. Siplivinski*; holotype: LE.

Luzula multiflora var. *kjellmannioides* R.L. Taylor & MacBryde, *Canad. J. Bot.* 56(2): 191 (1978). T: Russia, S Kamchatka, 3 Jul 1921, *E. Hultén 1924*; holotype: S.

Luzula badia K.F. Wu, *J. E. China Norm. Univ., Nat. Sci. Ed.*, 1992(3): 99 (1992). T: China, Xinjiang, 7 Jul 1967, *anonymus 6275*; holotype: XJBRI.

Map: N.K. Kovtonyuk, in L.I. Malyshev & G.A. Peshkova, *Fl. Sibiri*. 4 (*Araceae – Orchidaceae*): map 41 (1987) [Siberia].

Plants 12–35 cm tall. Basal leaves sparsely ciliate or subglabrous, 2.5–4.0 mm wide; cauline leaves usually 1 or 2; upper cauline leaves 3.5–7.0 cm long, 2.0–3.0 mm wide. Lower bract usually 2.5–4.5 cm long, overtopping inflorescence. Inflorescence subcongested with some pedunculate clusters or with most clusters pedunculate; clusters 3–7, ellipsoid-ovoid or ovoid, 7–10-flowered. Peduncles straight, smooth, rarely with secondary branches, to 1.5–4.5 cm long. Bracteoles 1.5 mm long, subtire or ciliate. Tepals brown or dark brown, 2.4–2.8 mm long. Anthers 0.6–0.9 mm long, anther/filament length ratio 1.0–1.3; ovary 0.9 mm long; style 0.5–0.8 mm long; stigmas 1.2–1.5 mm long. Capsules obovoid to subglobular, equalling perianth or shorter; capsule segments 1.9–2.2 mm long. Seeds oblong-ovoid or ellipsoid, 1.0–1.1 mm long, 0.7 mm wide; appendages 0.3 mm long. 2n=36 [36AL] or 2n=24 [24AL], *fide* J. Kirschner, *Thaisia* 2: 27 (1992).

Siberia and the Russian Far East, from the Urals to Kamchatka, parts of Middle Asia, N China and Mongolia. Probably also in Kazakhstan. 30: ALT, BRY, CTA, IRK, KRA, TVA, WSB, YAK. 31: AMU, KAM, KHA, KUR, MAG, PRM, SAK. 32: KAZ, KGZ. 36: CHI, CHN, CHX. 37: MON. Mountain grasslands, tundra, along streams and paths. Map 93.

30. ALTAY: Usk-Koksu, Multa R., 1900 m, *I.M. Krasnoborov 245* (NS); Yabogan, Yaboganskiy Pereval, 1850 m, *J. Kirschner 22* (PRA). CHITA: Borstshovochnyi Khrebet, Malaya Ashinga R., 12 Jul 1966, *M. Maximova [Gerb. Fl. SSSR] 5053* (BRNU, LE). YAKUTIYA: Kolyma R. basin, Cherskii, 10 Aug 1983, *S. Bubnova* (NS, PRA); Neryunginsk, Nagornyi, *N.K. Kovtonyuk 1030* (NS, PRA). 31. MAGADAN:

Chukotka, E coast of Chaynskaya Guba, *V.Petrovskiy & P.Zhukova 434* (LE, 2n=24); Chukotka, Bezimyannyi, 3 Aug 1974, *V.Petrovskiy et al.* (LE, 2n=36). KHABAROVSK: Sofiisk, Bureika R., 1500 m, 10 Jul 1978, *A.Nechaev* (NS, PRA).

Populations from Kamchatka and the Kuriles have an intermediate appearance between subsp. *frigida* and subsp. *sibirica*. In addition, plants close to the type subspecies are found in the southern part of the range of subsp. *sibirica*.

59d. *Luzula multiflora* subsp. *snogerupii* Kirschner, *Ann. Bot. Fenn.* 29: 239 (1992)

T: Greece, Nom. Serrai, Mt Vrontous, 2 km SW of the summit, 1250–1300 m, 14 Jul 1987, *S.Snogerup*, cultivated as L132; holotype: PR; isotype: LD, PRA.

Plants 10–32 cm tall. Basal leaves sparsely ciliate, 2.5–4.0 mm wide; cauline leaves usually 2 or 3, with upper ones 3.0–6.5 cm long and 2.0–3.5 mm wide. Lower bract usually 2.0–3.0 cm long, overtopping inflorescence. Inflorescence composed of one subsessile and 6–13 ellipsoid-ovoid to ovoid-hemispherical 6–12-flowered pedunculate clusters. Peduncles straight, 2.0–3.5 cm long, densely papillose, often with secondary branches. Bractlets 1.2–1.7 mm long, subtentire. Tepals pale straw-brown, 2.4–3.1 mm long. Anthers 0.5–0.8 mm long, anther/filament length ratio 1.0–1.6; ovary 0.8–1.0 mm long; style 0.3–0.4 mm long; stigma 1.1–1.5 mm long. Capsule obovoid to subglobular, equalling perianth or shorter; capsule segments 1.9–2.1 mm long. Seeds ovoid to subglobular, 0.9–1.0 mm long, 0.75–0.8 mm wide; appendage 0.4 mm long. 2n=36 [12AL+24BL], *vide* J.Kirschner, *Ann. Bot. Fenn.* 29: 238, 240 (1992).

Known from Bulgaria and Greece. 13: BUL, GRC. Grassy mountain slopes, above 1000 m. Map 94.

13. BULGARIA: Sofia, Gorni Lozen, 950–1050 m, 29 May 1988, *J.Kirschner L110* (PRA); Sofia, Gorni Lozen, 950–1050 m, 17 Jun 1991, *J.Kirschner L512, L513, L524* (PRA). GREECE: Serrai, Mt Vrontous, *S.Snogerup 5052* (LD).

59e. *Luzula multiflora* subsp. *hibernica* Kirschner & T.C.G.Rich, *Watsonia* 21: 92 (1996)

T: Ireland, Mayo (Vice county H27, West Mayo), Cluddnaun (grid reference G/018.285), Jul 1989, *T.C.G. Rich L254*; holotype: PR; isotype: BEL, BM, DBN, E, K, LD, PRA, TCD.

Illustration: J.Kirschner & T.C.G.Rich, *Watsonia* 21: 93, fig. 2 (1996)

Stems 12–27 (–35) cm tall, usually slender. Basal leaves ±densely to subsparingly ciliate, 2.2–2.8 (–3.5) mm wide. Cauline leaves usually 2–3. Upper cauline leaves 4.0–8.5 cm long, 1.5–2.2 (–2.5) mm wide. Lower bract usually 1.7–4.3 (–5.5) cm long, shorter than or overtopping inflorescence, often reddish. Inflorescence with pedunculate clusters; peduncles mostly straight, some flexuose, usually at least one in a plant recurved, sometimes with secondary branches, smooth. Clusters 5–9 (–18); subsessile clusters 1–2, ellipsoidal-ovoid to ovoid, rarely hemispherical; flowers in pedunculate clusters 5–8 (–10); bractlets 1.5–1.8 mm long, ciliate. Tepals pale straw-brown or brown; outer sepals ±equalling inner ones or often up to 0.4–0.6 mm longer, 2.6–3.2 mm long, acuminate. Anthers 0.6–0.7 mm long, with anther-filament length ratio 1.0–1.2; ovary 0.9–1.0 mm long; style 0.6–0.7 mm long; stigma 1.2–1.4 mm long. Capsules equalling perianth or shorter; capsule segments 1.9–2.2 mm long; seeds ovoid, 0.8–0.9 (–1.0) mm long, 0.7 mm wide; appendage 0.2–0.3 mm long. 2n=24 [24AL], *vide* J.Kirschner, *Folia Geobot. Phytotax.* 30: 392 (1995). Fig. 25.

Probably endemic in Ireland; in the west probably the only subspecies of *L. multiflora*. 10: IRE. Mesotrophic grasslands along streams, track and road verges, wood clearings, usually at low altitudes. Map 95.

10. IRELAND: North Kerry, Ross Castle, *J.Kirschner, T.C.G.Rich & G.Kay* (PRA); West Galway, Connemara, Kilmeelickin, *J.Kirschner, T.C.G.Rich & G.Kay* (PRA); West Mayo, Ballinglen, Keerglen R., *J.Kirschner, T.C.G.Rich & G.Kay* (PRA); Kerry, Killarney, Upper Lake, *B.Welch 295* (UPS).

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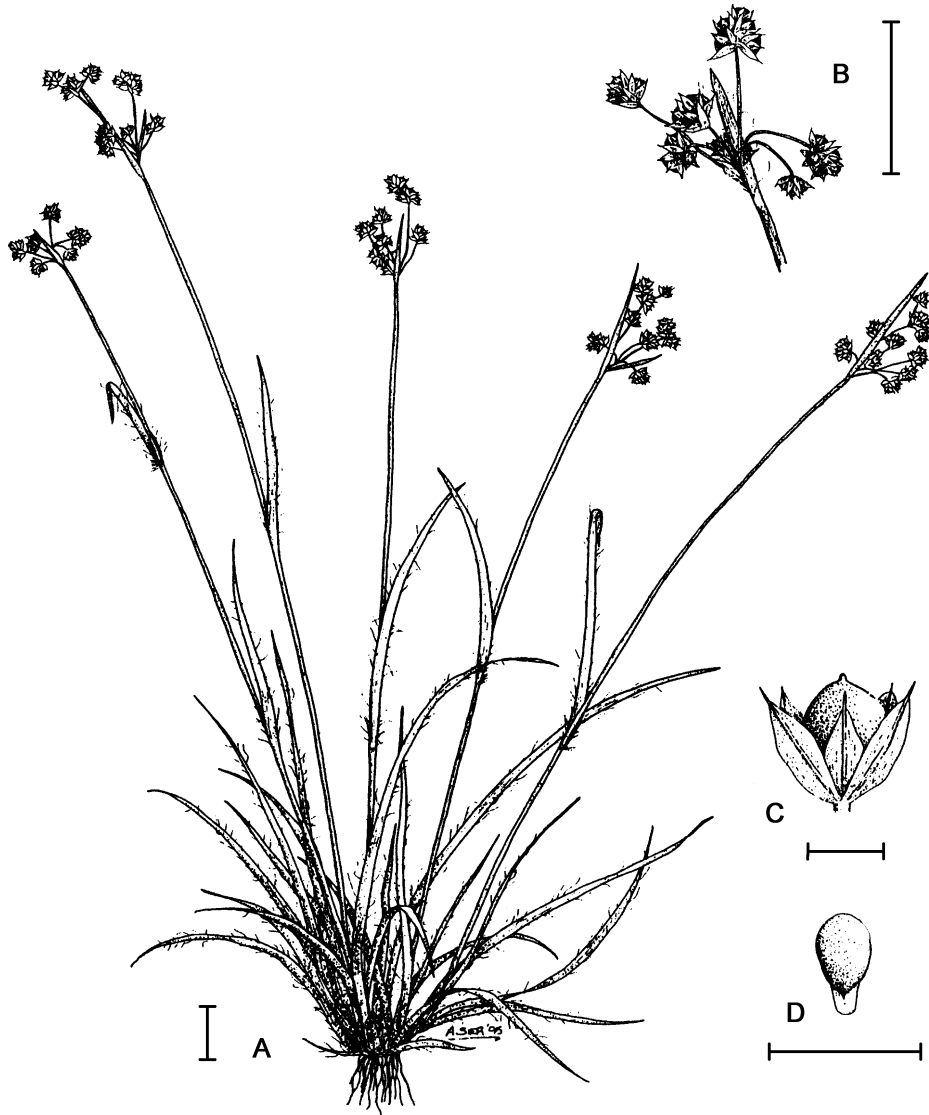


Figure 25. *Luzula multiflora* subsp. *hibernica*. **A**, habit; **B**, inflorescence; **C**, perianth and capsule; **D**, seed. (A–D, *J. Kirschner & T.C.G. Rich L254*, BM, PR). Scale bars: **A**, **B** = 1 cm; **C**, **D** = 1 mm. Drawn by A.Sier. Reproduced from Kirschner & Rich, *Watsonia* 21: 92, fig. 2 (1996).

There is evidence pointing to an allopolyploid origin of subsp. *hibernica* following hybridisation between *L. pallescens* and *L. campestris*; see J.Kirschner, *Folia Geobot. Phytotax.* 30: 283–290 (1995).

59f. *Luzula multiflora* subsp. *monticola* Kirschner, *Pl. Syst. Evol.* 200: 6 (1996)

T: Spain, Huesca, Bisaurri, de la Fuente de la Muria a la Fabosa de la Muria, 1370–1540 m, 5 Jul 1988, *Sesé et al.*, cultivated as L305; holo: PR; iso: PRA, JACA.

Plants 13–26 cm tall. Basal leaves sparsely ciliate, 2–6 mm wide; cauline leaves 1 or 2, 3.5–7.0 cm long, 2–3 mm wide. Lower bract c. 2.5–4.2 cm long, usually longer than inflorescence. Inflorescence composed of 3–8 usually short-peduncled narrowly ovoid c. 6–9-flowered clusters, at least partly subcongested. Peduncles ±straight, smooth, usually to 3.5 cm long (rarely to 8 cm). Tepals straw-brown to pale brown, (2.5–) 2.6–2.7 (–2.8) mm long. Anthers 0.6–0.7 mm long, anther/filament length ratio 1.2–1.4; ovary 0.7–0.8 mm long; style 0.3–0.4 mm long; stigmas 1.1–1.4 mm long. Capsule obovoid to subglobose, equalling to exceeding perianth; capsule segments 2.1–2.6 mm long. Seeds (0.8–) 0.9 mm long, (0.6–) 0.7 mm wide; appendage (0.3–) 0.4 mm long. $2n=24$ [24BL], *vide* J.Kirschner, *Pl. Syst. Evol.* 200: 7 (1996).

Known from the southern part of the Pyrenees in Spain. 12: SPA. Wet grasslands in the mountains. Map 96.

12. SPAIN: Lérida, Sorpe, Puerto de la Bonaigua, 5 Aug 1986, *P.Montserrat & L.Villar* (JACA, PRA).

Hybrids

Luzula alpina Hoppe × *L. multiflora* (Ehrh.) Lej.

A hybrid, sterile plant between a partially agmatoploid and a tetraploid parent ($2n=28=20AL+8BL$) was observed and collected in Austria [Hohe Tauern, Grossglockner, 15 Jun 1953, *M.Palm*, cultivated by *H.Nordenskiöld HI-1* (UPS)], and studied by *H.Nordenskiöld* (unpubl.).

Luzula × *danica* H.Nordensk. & Kirschner, *Preslia* 63: 109 (1991) = *Luzula congesta* (Thuill.) Lej. × *L. multiflora* (Ehrh.) Lej.

T: Denmark, between Gram and Ribe, *H.Nordenskiöld MT-3*, holo: UPS.

A hybrid known from Great Britain, Denmark and Sweden; seldom among parental plants. Fertile.

Luzula campestris (L.) DC. × *L. pallescens* Sw.

Hybrid plants rarely found between parents, up until now observed in Sweden only. Probably fertile.

Luzula × *bogdanii* Kirschner, *Preslia* 63: 105 (1991) = *Luzula campestris* (L.) DC. × *L. fallax* Kirschner

T: Bulgaria, the Pirin Mtns, Rozhen, Vlashkija Put, *J.Kirschner L117*; holo: PR; iso: LD, PRA.

At the places of contact between the parental species, the hybrid may form large populations. Up to now known from S Bulgaria. It is almost normally fertile and includes a number of hybrid karyotypes with mixed AL and BL chromosomes.

Luzula × *media* Kirschner, *Preslia* 63: 107 (1991) = *Luzula divulgata* Kirschner × *L. multiflora* (Ehrh.) Lej.

T: [Czech Republic] Bohemia, Rakovník, Nový Mlýn, silva Brabečka, 16 Jun 1987, *J.Hašková, J.Kirschner & F.Krahulec*; holo: PR; iso: PRA

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Found once between parents in the Czech Republic; documented karyologically [see J.Kirschner, *Preslia* 63: 107 (1991)]. At least partially fertile.

Luzula × *heddae* Kirschner, *Preslia* 63: 93 (1991) = *Luzula campestris* (L.) DC. × *L. sudetica* (Willd.) Schult.

T: [Czech Republic] Bohemia, Hlinsko, Rváčov, 9 Jul 1990, *L.Kirschnerová* & *J.Kirschner*; holo: PR; iso: PRA.

Found occasionally at the contact of parental species. Known from Sweden, Czech Republic, Switzerland and Spain, e.g., Sweden, Västmanland, Ramsberg, 29 Jun 1935, *G.Samuelsson* (LD); Dalsland, Edsleskog, 12 Jun 1918, *G.Samuelsson* (LD). A totally seed-sterile hybrid.

Luzula × *hybrida* H.Lindb. ex Kirschner, *Preslia* 63: 93 (1991) = *Luzula pallescens* Sw. × *L. sudetica* (Willd.) Schult.

T: Finland, Savonia borealis, Jorois [Joroinen], Lapinmäki, 2 Jul 1904, *H.Lindberg*; holo: LD; iso: [*Pl. Finl. Exs.*] 158, e.g. BP, H, K, P, PRC, S

A rare, sterile hybrid known from the Czech Republic, Sweden, Finland and N Russia, e.g., Sweden, Torne Lappmark, Vittangi, 28 Jul 1929, *O.Holmberg* (LD); Finland, Posio, Keski-Posio, Salmela, 4 Jul 1949, *G.Marklund* (H, LD).

Doubtful taxa

Luzula campestris var. *major* Bluff & Fingerh., *Comp. Fl. German.* 1: 444 (1825).

T: [Germany, otherwise not designated]

Luzula multiflora var. *pallescens* Bluff & Fingerh., *Comp. Fl. German.* 1: 444 (1825).

T: [Germany, otherwise not designated]

Luzula campestris var. *groenlandica* Laest., *Bot. Not.* 1858: 144 (1858).

T: Grönland, *J.Vahl*; holo: *n.v.* [possible duplicate: Igalico, Aug 1828, *J.Vahl* (W)].

Luzula campestris var. *subspicata* Laest., *Bot. Not.* 1858: 144 (1858).

T: [Sweden] Karesuando, *L.L.Laestadius*; holo: *n.v.*

Luzula campestris [?] f. *hornemannii* Blytt, *Norges Fl.* 1: 297 (1861).

T: 'Juncus congestus *Fl. D. tab. 1692*'; syn; [Norway] 'paa Tørvgrund i de lavere, isaer vestlige Kystegne', *M.Blytt*; syn: *n.v.*

Luzula campestris a. [unranked] *pseudonemorosa* Schur, *Enum. Pl. Transsilv.* 682 (1866).

T: [Romania] 'Götzenberg, Preschbe, oberhalb Resinar', *F.Schur*; syn: *n.v.*

Luzula multiflora var. *colchica* V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 490 (1928).

T: not indicated.

Luzula multiflora subsp. *thianschanica* V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 490 (1928).

T: Tian Shan [Mtns], otherwise not designated.

Luzula multiflora subsp. *incrassata* V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 490 (1928).

T: Sakhalin, Okhotsk region, Kamchatka [otherwise not designated].

Luzula multiflora var. *gracilis* Buchenau ex V.I.Krecz., *Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R.* 12: 490 (1928).

T: Russian Far East, Ayan, Avacha R. basin [not located at LE].

Doubtful Hybrid

Luzula × *winderiae* Murr, *Magyar Bot. Lapok* 28: 67 (1930).

T: [Austria] Vorarlberg, supra lacum Spullersee montis Arlberg, c. 1900 m, 7 Aug 1916, *J.Murr*; holo: *n.v.*

The name was reported to belong to a hybrid between *L. multiflora* var. *alpestris* [= *L. alpina*] and *L. spicata*. The existence of the hybrid is very doubtful.

PREDOMINANTLY AFRICAN SPECIES

60. *Luzula mannii* (Buchenau) Kirschner & Cheek, *Kew Bull.* 55: 900 (2000)

Luzula campestris var. *mannii* Buchenau, *Bot. Jahrb. Syst.* 12: 159 (1890); *Luzula campestris* subsp. *mannii* (Buchenau) Weim., *Svensk Bot. Tidskr.* 40: 173 (1946); isonyms: S6o, *Acta Bot. Acad. Sci. Hung.* 16: 367 (1971); Fern.Casas, *Fontqueria* 33: 41 (1992). T: [Cameroon] Kamerun-Gebirge, 10000–13500 ft, *Mann 2108*; lecto: K; iso (fragment): W; Fernando Po, 8500', *Mann 658, 1467*; para K; Cameroons, *H.H.Johnston 48* [the latter erroneously cited as *Mann 48* by F.G.P.Buchenau]; para: K.

Perennials 25–60 cm tall; rhizome horizontal or ascending; stolons short, ascending. Leaves with obtuse tip and densely papillose-serrulate margins, hairy to densely hairy. Lower bract leaf-like, usually shorter than inflorescence. Inflorescence of mostly pedunculate clusters. Peduncles smooth, usually with short secondary branches. Capsule shorter than perianth. Seeds ovoid-subglobular, 0.6–0.8 mm wide; appendage almost invisible, less than 0.1 mm, hyaline.

A rare endemic with three disjunct populations in tropical Africa (Equatorial Guinea, Cameroon and the Uganda/Kenya border). Two subspecies are recognized.

Anther/filament length ratio c. 1.5; peduncles ±straight and rigid, 0.3–0.5 mm in diam.; tepals blackish castaneous brown

60a. subsp. *mannii*

Anther/filament length ratio 0.3–0.6; peduncles flexuose to arcuate, 0.2–0.3 mm in diam.; tepals pale castaneous brown to dark brown, usually with a narrow pale margin and often with a pale yellowish-stramineous middle part

60b. subsp. *gracilis*

60a. *Luzula mannii* (Buchenau) Kirschner & Cheek subsp. *mannii*

Plants 25–60 cm tall. Basal leaves usually 7–9 (–13) cm long, (4–) 5–6 (–8) mm wide; cauline leaves 2–3, usually 3.5–7.0 cm long and 2.5–4.5 mm wide. Stem rigid, erect, c. 1.7 mm in diam. Lower bract 2.0–6.5 cm long. Inflorescence composed of 3–4 ±sessile and 2–7 pedunculate clusters; peduncles usually with secondary branches and 1–3 sessile clusters on each branch; peduncles straight, rigid, erect and patent (very rarely one of them ±nodding), 0.3–0.5 mm in diam., 2–3 (rarely up to 11) cm long; clusters ±echinate, ±globular, 0.6–0.9 (–1.2) cm in diam., usually with more than 13 flowers. Bracteoles long acuminate, membranous, often with cupreous middle part, up to 3 mm long, equalling perianth or shorter, densely ciliate. Tepals long acuminate, blackish castaneous brown, subequal, sometimes one or two outermost ones distinctly longer than inner ones, 2.6–3.0 mm long. Anthers usually 0.8–1.2 mm long; filaments 0.5–0.9 mm long; style 0.5 mm long; stigmas 1.5–1.8 mm long. Capsule ±globular, rounded above with an indistinct mucro; capsule segments 1.8–2.0 mm long and c. 1.5 mm wide, dark brown. Seeds 0.9–1.1 mm long, 0.7–0.8 mm wide. 2n=42, *fide* J.K.Morton, *Opera Bot.* 121: 159–172 (1993), *n.v.* Fig. 26.

JUNCACEAE (*Luzula*)

Restricted to the Cameroons Mts. in Cameroon, and to Bioco in Equatorial Guinea. 23: CMN, EQG. Mountain grasslands, along tracks. Map 97.

23: CAMEROON: 'Region der Grassteppe am grossen Kamerunberg', 3400–3700 m, 17 Oct 1906, *Wederbauer 50* (WRSL); Cameroons Mts., N of Hut 2, 10500 ft, *J.K.Morton K780* (K, S); Cameroons Mts., N of Hut 2, 10500 ft, *J.K.Morton 6904* (K); Cameroons Mountain, 'beyond the second ridge', 10000 ft, *T.D.Maitland 1248* (K); Cameroons Mt., 'shallow volcanic soil, 11500 ft, *Hinds C17* (K); 'supra Beam pagum 2850 m supra mare', 21 Jul 1891, *P.Dusén s.n.* (S). EQUATORIAL GUINEA: Bioco, 'pico Basilé', 2950 m, *Fernández Casas 10176a* (K); Bioco, 'pico Basilé', 2870 m, *Fernández Casas 11201* (K); *Carvalho 2534* (K); Fernando Po [Bioco], Pico St. Isabel, 3000 m, *E.Guinea 2868* (K).

60b. *Luzula mannii* subsp. *gracilis* (S.Carter) Kirschner & Cheek, *Kew Bull.* 55: 901 (2000)

Luzula campestris var. *gracilis* S.Carter, *Kew Bull.* 17: 179 (1963). T: Uganda, Mbale District, Mt Elgon, Jan 1918, *Drummer 3545*; holotype: K; isotype: BM, NBG, P.

Illustration: S.Carter, in *Fl. Trop. E. Afr., Juncaceae* 9, fig. 2 (1966).

Plants up to 65 cm tall. Basal leaves usually 6–15 cm long, 3–4 mm wide; cauline leaves 3–4, 5.5–12 cm long, usually 2–4 mm wide. Lower bract 1.0–1.5 cm long, usually 0.7–1.0 mm wide. Inflorescence composed of 1–2 subsessile and (4–) 6–10 (rarely to 12) pedunculate clusters; peduncles often with secondary branches and 1–3 clusters on up to 1 cm long secondary peduncles; peduncles flexuose to arcuate, 0.2–0.3 mm in diam., 2.0–2.5 (–4.5) cm long, ±smooth to ±sparsely papillose. Clusters oblong-cylindrical, 0.5–0.8 cm long and up to 0.5 cm wide, 5–15-flowered. Bracteoles lanceolate-ovate, with outer ones long acuminate, 1.5–2.0 mm long, shorter than perianth, sparsely ciliate. Tepals equal, 2.3–2.8 (–3.0) mm long, narrowly lanceolate, acute to acuminate, pale castaneous brown to dark brown, usually with a narrow pale margin and often with a pale yellowish-stramineous middle part. Anthers usually 0.3–0.6 mm long; filaments usually 0.9–1.1 mm long; style c. 0.4 mm long; stigmas less than 1 mm long. Capsule ±globular, obtuse, not mucronate; capsule segments castaneous brown, usually (1.4–)1.5–1.8 mm long and 1.1–1.2 mm wide. Seeds 0.8–1.0 mm long, 0.6–0.8 mm wide. $2n=24$, $c.30$, *fide* I.Hedberg & O.Hedberg, *Bot. Not.* 130: 11 (1977). Fig. 27.

Restricted to Kenya/Uganda boundary range of the Mt. Elgon group. 25: KEN, UGA. Mountain grasslands and open woodlands, along paths. Map 98.

25: KENYA: Mt. Elgon, E slope above Japata Estate, c. 3000 m, *O.Hedberg 186* (K, S, UPS); Mt. Elgon, Mbere R. valley S of Koitcut, 3120 m, *Gillett 18433* (K); Mt. Elgon, ridge W of Suam R., 3350 m, *S.W.Bie 66340* (UPS). UGANDA: Mt. Elgon, W slope above Butadiri, 3000 m, *O.Hedberg 4450* (K, UPS); Mt. Elgon, by Sala stream, 10500 ft, *Wood 126* (K); Mt. Elgon, *Liebenberg 1704* (K); Mt. Elgon, *Haines 4162* (K); Mt. Elgon, *F.Rose 10145 & 10146* (K).

61. *Luzula abyssinica* Parl., *Fl. Ital.* 2: 310 (1852)

Luzula spicata var. *simensis* Hochst., in G.H.W.Schimper, *It. Abyssin.*, no. 1154, (c. 1842); *Luzula spicata* var. *erecta* E.Mey., *Linnaea* 22: 415 (1849), *nom. illeg.*; *Luzula macrotricha* Steud., *Syn. Pl. Glumac.* 2: 294 (1855), *nom. illeg.*; *Luzula abyssinica* var. *simensis* (Hochst.) Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 40 (1906), *nom. inval.* T: Ethiopia, Semien, Demerki, *Schimper [It. Abyssin.] 1154*; holotype: FI; isotype: K, P, S, PRC.

Luzula volkensii Buchenau, *Bot. Jahrb. Syst.* 21: 192 (1896); *Luzula abyssinica* var. *volkensii* (Buchenau) Engl., *Festschr. Aschers.* 556 (1904). T: [Tanzania, Kilimanjaro] Südabfall der Mawensi-Spitze, 3900 m, 30 Oct 1893, *G.L.A.Volkens 1365*; holotype: B, destroyed; isotype: K, W.

Luzula abyssinica var. *kilimandscharica* Engl., *Festschr. Aschers.* 556 (1904). T: [Tanzania] Moshi, Kilimandscharo, *A.Engler 1834*; *syn:* B, probably destroyed; Moshi, Kilimandscharo, *A.Engler 1755*; *syn:* B, probably destroyed; Kilimandscharo, Kibosho, *Uhlig 1110*; *syn:* B, probably destroyed; isosyn: EA, *n.v.*; [Tanzania] Mt Meru, *Uhlig 609*; *syn:* B, probably destroyed; isosyn: EA, *n.v.*

Illustration: K.A.Lye, in *Fl. Ethiop. Eritr.* 6: 390, fig. 211.3 (1997).

Maps: H.Weimarck, *Svensk Bot. Tidskr.* 40: 173, fig. 14 (1946); H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 88 (1965).

Perennial c. (15–) 20–40 (–50) cm tall; rhizome thin, creeping to ascending; stolons usually absent. Stem erect, often rigid; basal leaves often numerous (few in shaded plants), flat to slightly canaliculate, up to 10–14 cm × 5–6 mm, densely hairy; leaf tip obtuse, swollen. Stem

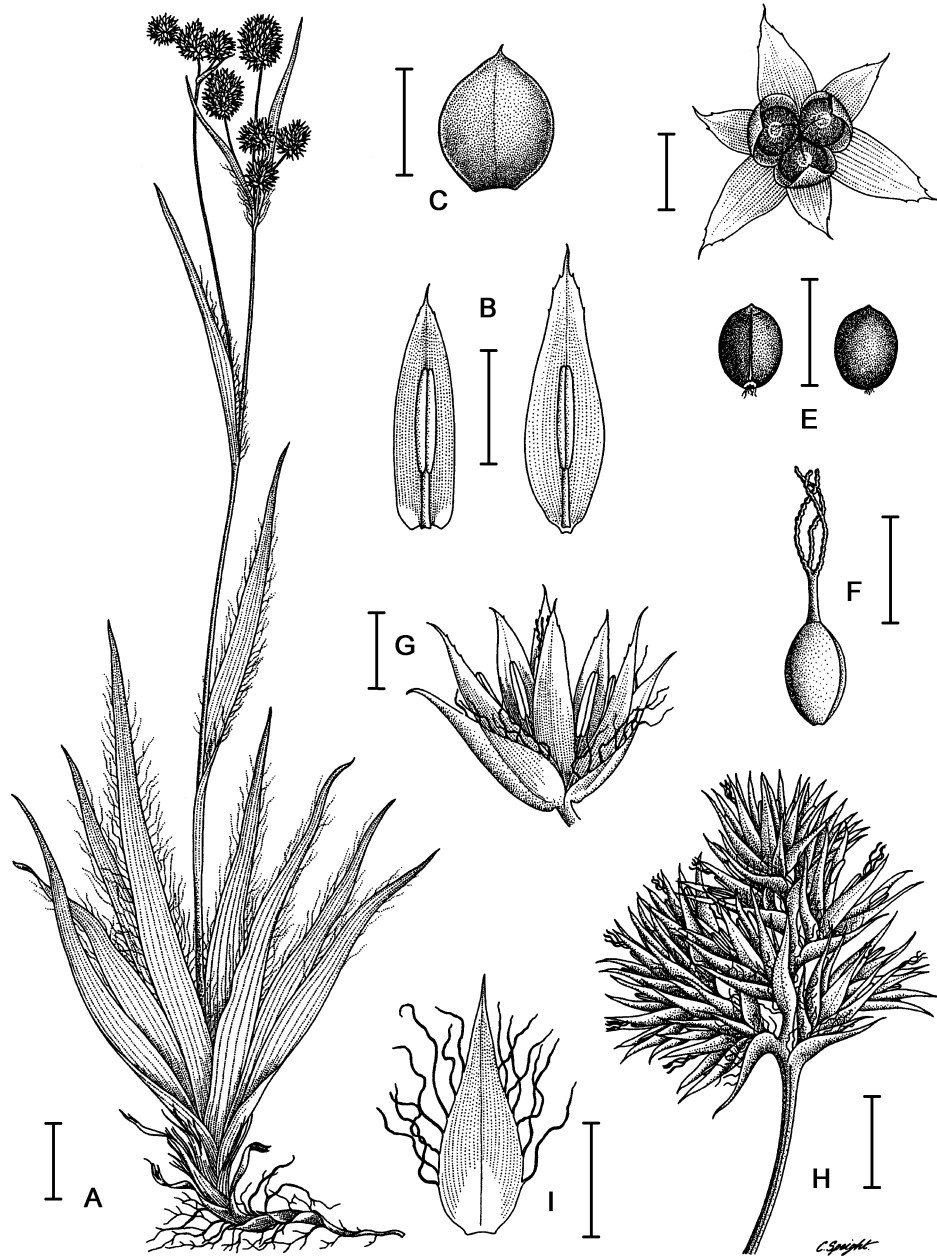


Figure 26. *Luzula mannii* subsp. *mannii*. **A**, habit; **B**, tepals; **C**, capsule segment; **D**, flower with open capsule; **E**, seeds; **F**, pistil; **G**, flower with bracteoles; **H**, flower cluster; **I**, bracteole. (A–I, *Maitland 1248*, K). Scale bars: **A** = 1 cm; **B–G** = 1 mm; **H** = 2 mm; **I** = 1 mm. Drawn by C. Speight. Reproduced by kind permission of the Board of Trustees of the Royal Botanic Gardens Kew, from Kirschner & Cheek, *Kew Bull.* 55: 902, fig. 1 (2000).

JUNCACEAE (*Luzula*)



Figure 27. *Luzula mannii* subsp. *gracilis*. **A**, habit; **B**, flower cluster; **C**, seed; **D**, flower; **E**, pistil. (**A–E**, *Dummer 3545*, K). Scale bars: **A** = 4 cm; **B** = 5 mm; **C** = 1 mm; **D** = 3 mm; **E** = 2 mm. Drawn by M.Grierson. Reproduced by kind permission of the Board of Trustees of the Royal Botanic Gardens Kew, from *Fl. Trop. E. Afr.*, Juncaceae, p. 9, fig. 2 (1966).

leaves 2–3 (–4), usually 8–13 cm × 3.0–4.5 mm, hairy; leaf tip obtuse. Lower bract herbaceous, c. 6 cm × 1 mm, erecto-patent, exceeding inflorescence, with obtuse tip; upper bracts gradually membranous; middle and upper cluster bracts membranous with long acute tip. Inflorescence erect, usually congested and forming an elongated dense head 2–3 (–5) × 0.7–1.0 cm, very often ±interrupted in lower part and lobulate, composed of 6 to many dense clusters of 8–20 flowers, lower cluster sometimes remote or on a long peduncle at the axil of the upper cauline leaf; peduncle smooth. Bracteoles 2.5–3.0 mm long, white-membranous, long fimbriate-ciliate (whole inflorescence has a hairy appearance). Tepals subequal, lanceolate, (2.4–) 2.8–3.2 mm long, entire or with a few teeth near the apex, acute; outer tepal long acuminate, castaneous brown, whitish bordered or unbordered. Stamens 6; anthers c. 0.6–0.9 mm long, slightly shorter or longer than 0.6–0.7 mm long filaments. Style 0.4–0.6 mm long; stigmas 1.5–2.5 mm long. Capsule ±obovoid, obtuse or very slightly subacuminate, castaneous brown, shorter than tepals; capsule segments 1.9–2.1 × 1.2–1.4 mm. Seeds ±ellipsoidal, castaneous brown, 0.9–1.1 mm long, 0.6–0.7 mm wide, with a broad whitish caruncle 0.10–0.15 mm long. 2n=24 [(*Bie 66129*, *O.Hedberg 1216*, herbarium label records; I.Hedberg & O.Hedberg, *Bot. Not.* 130: 11 (1977)].

Eastern part of Tropical Africa, from E Zaire and Rwanda to Tanzania, Kenya and Ethiopia. 23: RWA, ZAI. 24: ETH. 25: KEN, TAN, UGA. In mountain grasslands, on rocky slopes, and along paths. Map 99.

23. RWANDA: Muhavura, 3350 m, 20 Feb 1972, *P.H.Auquier 2610* (AAU). 24. ETHIOPIA: Prov. Simien, Geech Plateau, 3650 m, *Heinonen 1009* (UPS); Arussi Prov., Galama Mts, Boraluco, 3750 m, *O.Hedberg 4180* (UPS); Shoa Prov., Mt Wuchacha, 19 Nov 1972, *I.Friis et al. 1233* (C). 25. KENYA: Mt Kenya, NW slopes, 3100 m, 19 Aug 1948, *O.Hedberg 1963* (S); Mt Elgon, 3400 m, 6 Jun 1920, *Lindblom* (S). TANZANIA: Morogoro, Uluguru Mtns, Lukwangule, 2400 m, 19 Feb 1933, *Schiessen 3507* (S); Kilimanjaro, Peters Hut, 3800 m, *O.Hedberg 1216* (UPS); Mt Meru, above Olkakola Estate, 3700 m, 1 Nov 1948, *O.Hedberg 2427* (S). UGANDA: Ruwenzori, Bujuku Valley, near Bigo Camp, 3400 m, 22 Mar 1948, *O.Hedberg 387* (S).

A variable species. Small-flowered forms are sometimes found in populations. Plastic in size of vegetative parts (slender forms found in shady places).

62. *Luzula africana* Drège ex Steud., *Syn. Pl. Glumac.* 2: 294 (1855)

T: [South Africa] Katberg, *J.F.Drège 3963*; syn: BOL, K, PR, PRC, S.

Illustration: A.A.Obermeyer, in A.A.Obermeyer, J.Lewis & R.B.Faden, *Fl. S. Afr.* 4/2: 90, fig. 26 (1985).

Map: H.Weimarck, *Svensk Bot. Tidskr.* 40: 173, fig. 14 (1946).

Perennials, c. 20–50 cm tall, densely caespitose; rhizome short, vertical; stolons absent. Basal leaves up to 10–15 cm long, 2.5–5.0 mm wide, ciliate; cauline leaves 2–3; upper leaves 2.5–6.0 cm long, 2–3 mm wide; all leaves with obtuse swollen tip, margins papillose-serrulate. Lower bracts 1–2, usually 1.0–2.5 cm long, obtuse to subacute, usually ±overtopping inflorescence. Inflorescence congested in a dense many-flowered head c. 1–2 × 1.0–1.2 cm. Bracteoles 1.5–2.0 mm long, ±ovate, ciliate-fimbriate. Tepals subequal, glabrous, straw-brown to brown with darker middle stripe and pale border, lanceolate, acuminate, 2.8–3.5 mm long. Stamens 6; anthers 0.8–1.1 mm long; filaments 0.5–0.7 mm long; style 0.7–0.8 mm long; stigmas 2.0–2.4 mm long. Capsule pale brown, obovate, indistinctly apiculate-submucronate; capsule segments usually 2.2–2.4 × 1.6–1.7 mm. Seeds oblong-ovoid, pale brown, 0.7–0.9 (–1.0) mm long, 0.6–0.7 mm wide; appendage 0.2–0.3 mm long.

Endemic to South Africa. 27: CPP, LES, NAT, OFS, TVL. In moist grasslands in the mountains. Map 100.

27. CAPE PROVINCE: top of Katberg, *J.Hutchinson 1617* (BOL); Ladysmith Div., Toverkop, Swartberg, *E.Esterhuysen 26785* (BOL, K); Doornbosch, Kondeveldberge, *E.G.H.Oliver 5214* (NBG). LESOTHO: Mont aux Sources, 9500 ft. *Flanagan 2008* (BOL, K); Leribe, 1600–1900 m, *A.Dieterlen 734* (K, SAM); Sani, Hodgson's Peaks, 3000 m, *O.Hilliard & B.L.Burt 9676* (E, S). NATAL: Drakensberg, 2450 m, *Phillipson 661* (K). TRANSVAAL: Dullstroom, Verlorenvallei Farm, 2550 m, *Drews 36* (K); Mooi R., 2000 m, *F.R.Schlechter 3336* (BM).