

Luzula alpina HOPPE, a neglected Alpine species

Luzula alpina HOPPE, opomíjený alpský druh

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Luzula (sect. *Luzula*) *alpina* HOPPE in STURM 1839 is typified and defined in terms of morphology, karyology and ecology. It is shown to represent an endemic species of the Alps (Au, Ga, Ge, He, It). The Austrian and Swiss plants proved to have $2n=36$, with an unusual karyotype (12 AL + 24 BL). A comparison with other European montane taxa of this group is provided.

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INTRODUCTION

In 1966, during an excursion to Mt. Grammont near Vouvry (Wallis, Switzerland), G. S. Knaben, accompanied by Professor Claude Favarger, noticed a striking *Luzula* morphotype growing just above the timberline. The same type was then collected in Val del Fain near Pontresina (Graubünden, Switzerland). These plants, although superficially resembling *Luzula sudetica*, could not be assigned to any taxon of the *Luzula campestris* agg. recorded in current Swiss Floras (e.g. FAVARGER 1959, HESS et al. 1967). However, older authors, e.g. HOPPE, BEYER and BEAUVERD, did recognize them as distinct; HOPPE as early as 1830. In fact, the present reconsideration is 150 years overdue, and we think this circumstance can be accounted for by the complex morphological and karyological variability within the *Luzula campestris* group. A closer examination of the material mentioned revealed its independent position within the section *Luzula*.

During subsequent visits to Alpine localities in Wallis and Graubünden in 1971, 1979 and 1985, G. S. Knaben and her parties collected material and performed field studies of the taxa under consideration. T. Engelskjøn carried out a study of the somatic chromosomes and morphology of this material and revised herbarium collections on loan from G, NEU and Z, as well as Nordic material from O and TROM. Incidentally, at the same time, J. Kirschner also dealt with the deviant morphotype to be discussed here, and ascertained characteristic features of its morphology and karyotype. J. K. is also responsible for the nomenclatural aspects of the present study. Geographical distribution has been outlined on the basis of the literature

and herbarium records (collections in BRNM, FI, G, GZU, PR, PRC and W were revised by J. K.).

In the literature, this taxon appears under several names, and useful records are available on its ecology and distribution. Accordingly, we shall summarize all these data to obtain a more complete picture of the taxon in question.

HISTORICAL

D. H. HOPPE recognized our taxon in 1830 and issued it as no. 108 of his exsiccate series *Herbarium vivum plantarum graminearum* (under an invalid name, *L. campestris alpina* HOPPE, see Fig. 1). However, only ten years later, the taxon was accorded a valid name, *Luzula alpina* HOPPE in STURM, 1839. This name has been generally relegated to the synonymy of *Luzula sudetica*. BEYER (1900) studied this taxon again, and described it as *L. multiflora* var. *alpestris*. The name *L. campestris* var. *vallesiaca* BEAUVERD (1919) also refers to our taxon (Plate 2, 3a) and NORDENSKIÖLD (1951, 1956) gives important karyological observations under that name. Little effort has been made to correlate these findings with the taxonomic position of her material.

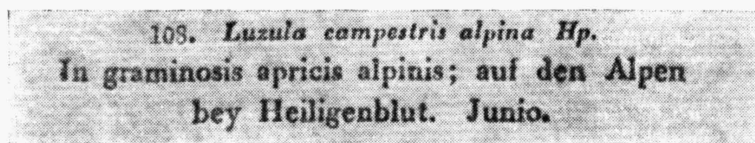


Fig. 1. — *Luzula alpina* HOPPE. Original label of the lectotype (D. H. HOPPE, ca 1830, BRNM; cf. Plate 1).

TAXONOMIC TREATMENT

Luzula alpina HOPPE in STURM, *Deutschl. Fl.* 1/77: no. 6, 1839.

Lectotypus: „In graminosis apricis alpinis auf den Alpen bey Heiligenblut.“ D. H. HOPPE (ca. 1830), *Herb. Viv. Pl. Gramin.* no. 108. In herb. BRNM, collectio Münch-Bellinghausen (cf. SUTORÝ 1986. Vide nostr. fig. 1 et Pl. 1).

Note

The protologue not only contains a detailed description and an illustration, but also a reference to MERTENS et KOCH 1826 : 602 (*Luzula campestris alpina*). In the quoted page, however, two such names can be found: '*Luzula campestris alpina* HOPPE Dec. n. 108', and *L. campestris* "β. *alpina* GAUD. *Agrost.* II. p. 247" [1811], both as synonyms. We regard the name published by HOPPE in STURM as referring to *L. campestris alpina* HOPPE. HOPPE (1839) always quotes the synonyms exactly according to the original wording (compare, for instance, the name *Tofieldia calyculata* β. *rubescens*, and *Luzula multiflora* γ. *nigricans* in the same issue of the *Sturm Flora*).

Synonyms

≡ *Luzula campestris alpina* HOPPE [exsicc.] *Herb. Viv. Pl. Gramin.*, no. 108, ca 1830, nom. inval.

≡ *Luzula multiflora* var. *alpina* (HOPPE) WILLK., *Führer in das Reich der Pfl.*, ed. 2, 282, 1882.

= *Luzula multiflora* var. *alpestris* R. BEYER, *Verh. Bot. Ver. Prov. Brandenb.* 41(1899) : 22, 1900.

T: non vidimus

≡ *L. campestris* subsp. *multiflora* var. *alpestris* (R. BEYER) VOLLMANN, *Fl. Bayern* 138, 1914, nom. illeg., non ČELÁK. 1867

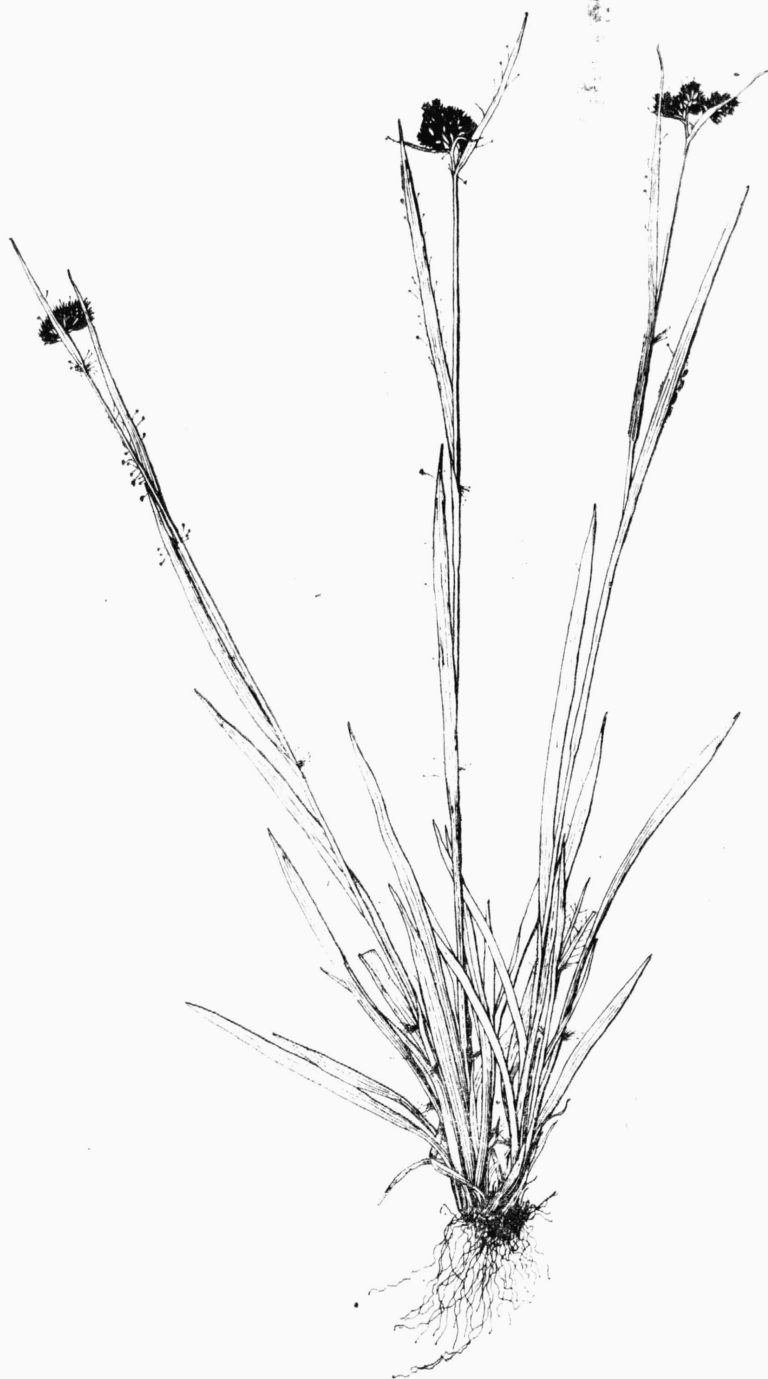


Fig. 2. — *Luzula alpina* HOPPE. Radstätter Tauern (VETTER 1906 W). Del. J. Soják.

≡ *L. campestris* subsp. *alpestris* (R. BEYER) KOŽUCHAROV in JORDANOV, Fl. NR
Bolg. 2 : 180, 1964, quoad typo, nom. illog., non ČELAK. 1867.
= *Luzula campestris* var. *vallesiaca* BEAUVERD, Bull. Soc. Bot. Genève, ser. 2, 10 : 285–286,
1918.
T : G! (Plate 2, 3a)

Exsiccate series

HOPPE, Herb. Viv. Pl. Gramin., no. 108 (ut *L. campestris alpina* HOPPE)

REICHENBACH, Fl. Germ. Exs., no. 933 (ut *L. sudetica*)

Soc. Éch. Pl. Vasc. Eur. Occid. Bas. Médit., no. 8876 (ut *L. multiflora* var. *alpestris*, *L. sudetica*
admixta!).

Brief description

Plants densely caespitose, without stolons, sparsely long ciliate. Stems (8)10–20(35) cm long, erect, ± stout. Upper cauline leaves 4–5 cm long, 3–4 mm wide, basal leaves 3–5(7) mm wide. Leaf margin with remote blunt teeth (microscope). Basal bract usually spreading, overtopping the inflorescence which is congested, composed of (3)5–6(8) sessile to subsessile clusters; peduncles (when developed) smooth, clusters usually of 7–10 flowers. Tepals ± lanceolate, gradually tapering to long, narrow, sharp pointed tips, usually dark brown, the outer ones (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 0.5–0.8 mm long filaments. Style about 0.6 mm long, shorter than the ovary. Capsule segments usually 2.5–2.8 mm long, shorter than the perianth, ± obovate. Seeds (excluding caruncles) 1.0–1.2 mm long, narrowly ovoid, 0.7–0.8 mm wide, caruncles 0.3–0.4 mm long¹⁾, see Plate 4a.

CHROMOSOME NUMBER AND KARYOTYPE

NORDENSKIÖLD (1951, 1956) revealed a conspicuous feature of *Luzula alpina* (as *L. campestris* var. *vallesiaca*): an asymmetrical, partly agmatoploid karyotype. Our taxon proved to have $2n=36$, with 24 shorter chromosomes of the BL type (according to the size classification of NORDENSKIÖLD), and 12 longer ones (of the AL type, Figs. 3 a,b). We have ascertained this

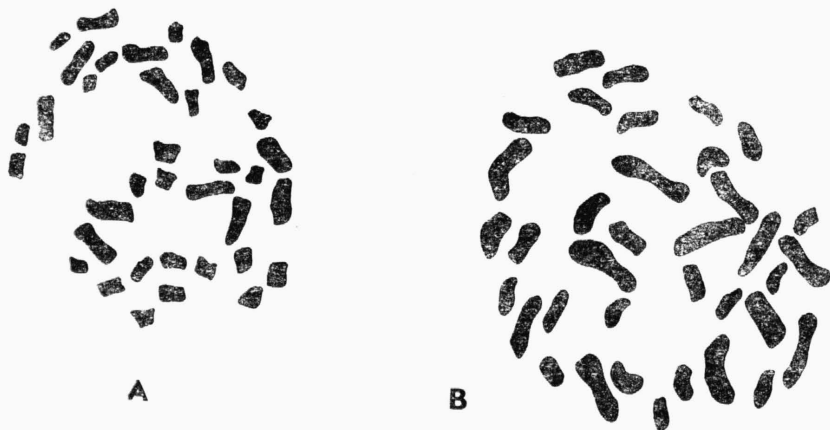


Fig. 3. — *Luzula alpina* HOPPE. Somatic metaphases showing $2n = 36$ (12 AL + 24 BL). A. Austria, Kärnten, Kreuzock, ca 2000 m a.s.l. (SCHEUER 1983 GZU; counted as Kirschn. 67/86). B. Switzerland: Graubünden, Muottas Muragl. (KNABEN 1979 O; counted as Engelskjøn et Knaben L 02).

¹⁾ Quantitative characters of seeds were measured from the dorsal view (cf. KIRSCHNER 1982: fig. 1a–3). The length of seed body is less variable than that of caruncle, and they were measured separately.

number and karyotype in plants from five localities. The incomplete agmatoploidy at the tetraploid level ($2n = 36 = 12 \text{ AL} + 24 \text{ BL}$) seems to represent a constant feature of *Luzula alpina*. At the same time, this type of agmatoploidy is a rare phenomenon in the genus *Luzula*.

Origin of the karyologically studied samples

Austria

1. Osttirol/Kärnten: W Ausläufer der Kreuzecks Gruppe E von Dölsach, ca 2000 m. Scheuer 1983 GZU (counted under no. 67/86, Kirschner, Fig. 3a).
2. Osttirol, Karnische Alpen, SW Kartisch, ca. 1400 m. Polatschek 1979 W (Kirschner 78/86).
3. Tirol, Zillertaler Alpen, Zemmgrund, 1635–1720 m. Polatschek 1982 W (Kirschner 79/86).
4. Tirol, Oetztaler Alpen, Vent, 2200 m. Polatschek 1981 W (Kirschner 80/86).
- 5.–6. Nordenskiöld 1951: 336–339 (both as *L. campestris* var. *vallesiacae*): Tirol: a. Patscherkofel 1300–1500, 1700–1900 m; b. Stockacher Alm, 2000 m.
7. Nordenskiöld 1956: 10–11 (as *L. campestris* var. *vallesiacae*): Vorarlberg (seed from Bot. Garden, Kiel).

Switzerland

8. Graubünden, Muottas Muragl near Pontresina. Knaben 1979 O (Engelskjøn et Knaben L 1,2 and 3; three strains, Fig. 3b).

ECOLOGY

Luzula alpina is confined to subalpine and alpine habitats, usually within the height span of 1800 to 2200 m above sea level. Sometimes it occurs at the timberline, whereas the highest recorded elevations are 2400 to 2600 m a.s.l. Preferred habitats are short-grass meadows of the alpine type, often not too densely covered with vegetation. The most common substrata are shallow, acid soils (pH 4.5–5.2) on silicic rocks. *Luzula alpina* also occurs on locally oligotrophic, humic spots on calcareous substrata.

Coenologically, *L. alpina* belongs to the communities of the alliance *Nardion* BR.-BL. 1926, often associating with such species as *Nardus stricta*, *Carex atrata*, *Festuca nigrescens*, *Campanula barbata*, *Laserpitium halleri* and *Phyteuma zahlbruckneri*. The limits of its coenological amplitude are encountered in the alliance *Poion alpinae* OBERD. 1950, and in some communities carrying a rather thin snow cover in winter.

It should be emphasized that *Luzula alpina* often occurs close to or within *L. sudetica* habitats, and these species are often mixed in herbarium collections. However, *L. sudetica* prefers moister habitats within *Nardion* sensu lato, and is mainly a species of mires. Rarely, a tetraploid *Luzula* taxon close to *L. multiflora* auct. grows in habitats similar to those of *L. alpina*, in contrast to the hexaploid *L. multiflora* auct.

The following phytosociological relevés and species lists indicate plant communities supporting *L. alpina*, with coverage in Braun-Blanquet's scale (our changes in nomenclature are given in brackets).

EGGLER 1954: 102–103

Austria, Kärnten, Kreuzeck Gruppe, Embergeralm bei Greifenburg, 1820 m, EGGLER 26. 7. 1949 (GZU).

Nardus stricta 5, *Luzula* [*alpina*] 2, *Carex sempervirens* +, *Deschampsia flexuosa* +, *Carex pilulifera* 1, *Festuca* [*nigrescens*] +, *Potentilla erecta* 2, *Geum urbanum* 2, *Silene cucubalus* +, *Pulsatilla* [*alpina* subsp. *alba*] +, *Phyteuma zahlbruckneri* +, *Hieracium pilosella* +, *Arnica montana* 1, *Rumex acetosa* +, *Hypericum montanum* +, *Veronica officinalis* +, *Campanula barbata* + *Leucorchis alba* +, *Calluna vulgaris* 1, *Polytrichum* sp. +, *Cladonia rangiferina* +.

Tab. 1. — A comparison of the European montane taxa of the section *Luzula*

| | <i>L. alpina</i> HOPPE | <i>L. sudetica</i> (WILLD.) SCHULT. |
|--|---|--|
| Karyotype | 12 AL + 24 BL | 48 CL |
| Type of growth and general habit | dense tufts of many ± stout stems, broad-leaved | laxly caespitose or with single stems, rhizome creeping, narrow leaved |
| Width of basal leaves (mm) | 3–5(–7) | 1.5–4 ²) |
| Leaf margin teeth (microdentation) | teeth remote and blunt | dense, serrulate |
| Outer perianth segments ³⁾ | (2.7)3.0–3.5(3.7) mm long, equalling the inner ones, narrowly bordered, long acuminate, usually dark | (1.9)2.1–2.5(2.7) mm long, conspicuously longer than the inner ones, very narrowly bordered, acuminate, dark |
| Length of seed (excluding caruncles) ³⁾ | 1.0–1.2 mm | 0.9–1.0 mm |
| Width of seed | 0.7–0.8 mm | 0.5–0.6(0.7) mm |
| Length of caruncles ³⁾ | 0.3–0.4 mm | ca 0.1 mm |
| Length and shape of capsule segments | 2.5–2.8 mm, obovate | (1.6)1.7–1.9(2.0) mm, (obovate) elliptical |

²⁾ Central European strains generally more broad-leaved than Nordic ones.

³⁾ The measurements were made on the basal flowers of (usually pedunculate) clusters. Seeds were measured from the dorsal view (cf. KIRSCHNER 1982: fig. 1a–3). Other methods of measuring give deviating values.

EGGLER 1954: 103–104

Austria, Kärnten, Embergeralm bei Groifenburg, 1790 m, EGGLER 21. 7. 1949 (GZU).

Festuca [*nigrescens*] 5, *Phleum alpinum* 3, *Poa violacea* +, *Anthoxanthum odoratum* +, *Luzula* [*alpina*] +, *Agrostis tenuis* 2, *Rumex acetosa* +, *Cerastium caespitosum* +, *Silene cucubalus* 2, *Geum montanum* +, *Trifolium pratense* 1, *T. repens* 1, *Rhinanthus angustifolius* +, *Campanula scheuchzeri* 1, *Phyteuma zahlbruckneri* +, *Arnica montana* +, *Veratrum album* +, *Stellaria graminea* 1, *Aconitum* sp. +, *Ranunculus acer* 1, *Alchemilla alpestris* 1, *Potentilla erecta* +, *Viola tricolor* +, *Galeopsis pubescens* +, *Veronica chamaedrys* 1, *Achillea millefolium* +, *Crepis aurea* +

G. S. KNABEN and K. HOMBLE, 1985

Switzerland, Wallis, Val d'Arpette, S. exposure, 2090 m, just above the timberline, margin of an acid snow bed.

Nardus stricta (dominant), *Calamagrostis villosa*, *Carex atrata*, *C. nigra*, *Laserpitium halleri*, *Luzula alpina*, *Salix herbacea*.

G. S. KNABEN and K. HOMBLE, 1985

Switzerland, Wallis, to SW. of La Fouly, 1900 m, meadow at the margin of a snow bed.

Alchemilla alpina, *A. vulgaris* sensu lato, *Carex atrata*, *C. ferruginea*, *Gentiana nivalis*, *Laserpitium halleri*, *Luzula alpina*, *Ranunculus* cf. *grenieranus*, *Trifolium badium*, *Tussilago farfara*.

| <i>L. multiflora</i> auct. (6×) | A multiflorous tetraploid (4×) | <i>L. frigida</i> (BUCH.) SAM. |
|--|---|--|
| 36 AL | 24 AL | 36 AL |
| densely to laxly caespitose without creeping rhizome | laxly caespitose or stems single, rhizome short, stems slender, narrow leaved | small tufts or single stems, narrow to medium leaved |
| 3-4(-6) | 3-4 | 3-4 |
| ± dense, crenulate | dense, crenulate to serrulate | ± dense, crenulate |
| (2.5)2.9-3.6(3.9) mm long, ± equalling the inner ones, brown, broadly bordered | 2.0-2.5(2.7) mm long, equalling the inner ones, brown, shortly acuminate, narrowly bordered | (2.4)2.5-2.8(3.0) mm long, ± equalling the inner ones, usually dark or reddish brown, broadly bordered |
| (0.9)1.0-1.2 mm | 0.8-1.0 mm | 0.9-1.0(1.1) mm |
| 0.6-0.9 mm | 0.6-0.7 mm | 0.6-0.7 mm |
| 0.3-0.4(-0.5) mm | 0.3 mm | 0.2-0.3 mm |
| (2.0)2.2-2.6(2.8) mm, obovate to oblong obovate | ca. 2.0-2.3 mm, obovate to elliptical | ca. 2.0-2.5 mm, acuminate, having the widest dimension in the middle |

MÖSCHL 1928 (GZU), a note on the herbarium label
Austria, Styria, Stubalm [Stubalpe].

Luzula [alpina], *Poa alpina* (et var. *vivipara*), *Nardus stricta*, *Deschampsia flexuosa*, *D. caespitosa*, *Festuca [quadriflora]*, *Anthoxanthum odoratum*, *Carex pilulifera*, *Luzula [luzuloides]*, *Cynosurus cristatus*, *Potentilla erecta*, *Campanula barbata*, *C. scheuchzeri*, *Veratrum album*, *Leucorchis albida*, *Arnica montana*, *Dianthus* sp., *Leontodon pyrenaicus*, *Alchemilla vulgaris*.

GEOGRAPHICAL DISTRIBUTION

According to the available records (see the present list of localities), the distribution of *Luzula alpina* is confined to the Alps (Fig. 4). The northeastern limit of *L. alpina* is reached in the mountains of Lower Austria (Schneeberg) and the species is fairly common in the mountain ranges of Styria, Salzburg and Tyrol. The western geographical limit is outlined in a preliminary way in our map (Fig. 4) because only a sparse material from the Western Alps has been revised. Some literature records indicate the presence of *L. alpina* in Bavaria („Schachen, Arns Spitze, 2196 m“, VOLLMANN 1914: 138, as *L. campestris* var. *alpestris*), and certain French records of *L. multiflora* var. *congesta* (GRENIER et GODRON 1848: 356) should also be taken into consideration. Further Italian localities are listed e.g. by PAMPANINI (1958: 137).

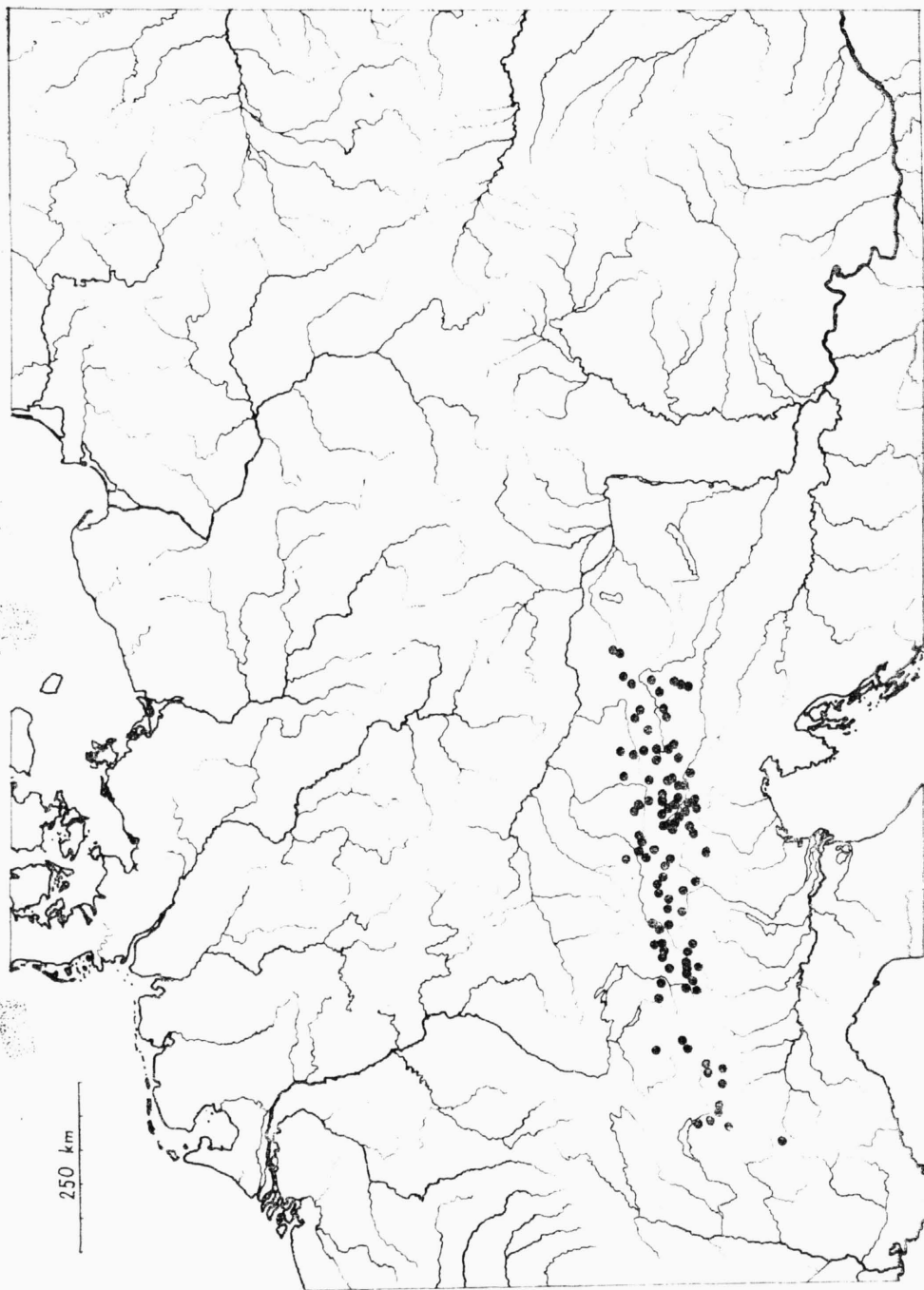


Fig. 4. — *Luzula alpina* HOPPE. Map of distribution according to revised herbarium specimens.

Thus, in terms of Flora Europaea, the distribution of *Luzula alpina* can be summarized as follows: Au, Ga, Ge, He, It.

Localities

Austria

Lower Austria (Niederösterreich): Ochsenböden a. Schneeberg (SALZMANN 1900 GZU). — Schneeberg, ... oberhalb der Bockgrube (KORB 1920 W). — Lower Austria / Styria border: Raxalpe, Prediger Stuhl (MÜLLNER 1886 W). — Rax (BECK 1890 PRC).

Styria (Steiermark): Hochschwabgruppe, Trenchting (RÖSSLER 1950 GZU). — Präbichl-Gebiet (sine coll. 1952 GZU). — Eisenerzer Alpen, Reichenstein (FREYN 1898 BRNM). — Gleinalpe, ... auf der Staringalpe (WIDDER 1926 GZU). — Stubalpe, Hirschegger Speik (EGGLER 1932 GZU). — Stubalpe, ... beim alten Almhaus (WIDDER 1932 GZU). — Gleinalpenzug, Rappenkogel (TEPPNER 1960 GZU). — Stubalpe, ... unweit des Gabels (L. et W. RÖSSLER 1947 GZU). — Koralpe, Loskogel (HUBER 1942 W). — Handalpe bei Deutsch Landsberg (TROYER sine dato GZU, MÖSCHL et PITTONI 1975 GZU). — Rottenmanner Tauern, Bösenstein (L. et W. RÖSSLER 1948 GZU). — Am Kl. Bösenstein See (FREYN 1898 BRNM). — Rottenmann (SALZMANN 1922 GZU). — Scheibl Alm, Rottenmanner Tauern (herb. WITMER sine dato W). — Hochreichart (Möschl 1928 GZU). — zw. Hochreicharthütte u. Brandstätter Törl (JANCHEN 1935 W). — Wölzer Tauern (KRAŠAN 1895 GZU). — Grebenzen bei St. Lambrecht (EGGLER sine dato GZU, EGGLER 1942 GZU). — Zirbitzkogel (NEVOLE 1911 GZU). — Seetaler Alpen, Fuchskogel (PITTONI 1977 GZU). — Seetaler Alpen, zw. Hölzlkogel u. Ranacher Hütte (GÁYER 1928 GZU). — Loser bei Aussee (RONNIGER 1902 W). — Lackenmoosalm, N über Schladming (BASTL 1985 GZU). — Schladminger Tauern, Gollinghütte (RONNIGER 1916 W). — Schladming, Brandalm (RONNIGER 1916 W). — Niedere Tauern, Dockneralpe (LAUS 1936 PR). — Niedere Tauern, Hohenwarth (TEUBER 1901 BRNM). — Kartnerboden b. Tuirach (SALZMANN 1916 GZU). — Eisenerzer Alpen, Wildfeld (NEVOLE 1909 GZU) (not mapped). — Styria/Carinthia border: Koralpe, Brandhöhe (WIDDER 1920 GZU). — Koralpe, ca 5 km NNE des Grossen Speikkogels (SCHEUER 1983 GZU). — Koralpe, Weinbeben (KORB 1934 W). — Koralpe, Speikkogel u. Frauenkogel (WIDDER 1937 GZU). — Koralpe (HESKE 1955 GZU). — Koralpe, ... S v.d. Hühnerstützen (WIDDER 1927 GZU). — Stangalpen, Schoberriegel (MELZER 1978 GZU). — Turracher Alpe (ERNST 1878 GZU).

Carinthia (Kärnten): Koralpe, am Wege vom Schutzhaus zum Grossen Kar (RONNIGER 1932 W). — Flattnitzer Alpen (PACHER sine dato W). — Kärnten, Mallnitz (RONNIGER 1909 W) — Hohe Tauern, Kapponigraben bei Obervellach (RÖSSLER 1951 GZU). — Kreuzeck-Gruppe, Gnoppnitz (DOLENZ 1910 GZU). — Gaugenbühl bei Greifenburg (DOLENZ 1910 GZU). — Embergeralm (DOLENZ 1908 GZU, EGGLER 1949 GZU, STRAKA 1978 GZU). — Nassfeld-Riegel bei Greifenburg (EGGLER 1949 GZU). — Gailtaler Alpen, Goldeck bei Spittal (TEPPNER 1961 GZU). — Heiligenblut (HOPPE ca 1830 BRNM). — Kärnten, Weite Alm (KOLATSCHER sine dato GZU). — Karnische Alpen (SCHAEFFLEIN 1934 GZU). — Kärnten, am Lamprechtskofel (KORB 1907 W). — Karnische Alpen, SW Rattendorf im Gailtal (REMLER et MICHELITSCH 1979 GZU).

Salzburg: Salzburger Alpen (HARTMANN sine dato PR). — Moserkopf bei Mauterndorf (FRITSCH 1888 GZU). — Preber, Tamsweg (SCHNEIDER 1902 W). — Tamsweg (WILDT 1907 BRNM). — Stangalpenzug, Nockgebiet, Rosanin (HACHTMANN 1959 GZU). — Abtenau, am Gipfel des Gamsfeldes (KORB 1932 W). — Radstädter Tauern, Passhöhe (RONNIGER 1911 W). — Radstädter Tauern (VETTER 1906 W, SCHNEIDER 1921 W). — Schwalbenwand ad Zell am See (PRZYBYLSKI 1882 GZU). — Schmittenhöhe bei Zell am See (RONNIGER 1888 W, GRUBER 1928 PRC, RONNIGER 1936 W). — Fusch (SPITZEL sine dato W). — Kolm-Saigurn, oberh. d. Tauernhofes (RONNIGER 1936 W). — Fuscher Tal, Brennalpe ober Ferleiten (FREYN 1885 BRNM). — Krimml, Filzsteinalpe (RONNIGER 1936 W).

Tyrol (Tirol): Kitzbühler Alpen, Lärchenfilzkogel (SEIPKA 1979 W). — Kitzbühler Alpen, vom Schneegrubenschartl zur Schneegrubenspitze (KRENDL 1969 W). — Kitzbühler Alpen, vom Steinbergstein zum Schneegrubenschartl (KRENDL 1969 W). — Osttirol, Schober-Gruppe. ... von der Losacher Riegelshütte nach Kals (POLATSCHER 1973 W). — Osttirol, Kals (TEUBER 1901 BRNM). — Putzkögle bei Matriei (G. et P. MAYER 1972 W). — Hinterburg bei Matriei (in Osttirol) (G. et P. MAYER 1972 W). — Osttirol, Dorfertal N Kals (KUMMERT 1971 W). — Osttirol, Kals-Matriei Törl (FREYN 1885 BRNM, TEUBER 1901 BRNM, VETTER 1923 W). — Osttirol, vom Innerschlöss zum Löbentörl (KRENDL 1969 W). — Osttirol, Lasörling-Gruppe, Glanzalpe (SEIPKA 1969 W). — Osttirol, Defereggen-Gebirge, von der Michelbachalm zur Weissen Wand (KRENDL 1969 W). — Osttirol, Schrentebachalm, nach Sillianer Hütte (POLATSCHER 1967 W). — Osttirol, (Defereggen) Lapptal bei Mariahilf (SEIPKA 1980 W). — Osttirol, Zettersfeld (SEIPKA 1969 W). — Osttirol, Lienzer Dolomiten, Golzentipp (NEUMAYER 1937 W). — Osttirol, ... bei

Lionz (P... [illegible] 1843 W). — Osttirol, E von Dölsach (SCHEUER 1983 GZU). — NW von Kötschach (ZERNY 1920 W). — Osttirol, Maurer Tal bei Prägraten (RONNIGER 1939 W). — Kitzbühler Alpen, Widdersberger Horn (KRENDL 1969 W). — Tuxer Alpen, Kellerjoch bei Schwaz (POLATSCHKEK 1973 W). — Kitzbühler Alpen, Galtenberg (WOYNAR sine dato GZU, WOYNAR 1887 W). — Kitzbühler Alpen, von der Neuen Bambergerhütte zum Schafsiedel (KRENDL 1969 W). — Zillertal: Brandberg — Steinerkogel — Mayrhofen (K. et F. ENGEL 1969 W). — Zemmgrund, Schwemmalpe (RONNIGER 1969 W). — Nordtirol, Sonnwendjoch (WOYNAR 1889 BRNM). — Vent, Niedertal — Martin-Busch-Hütte (POLATSCHKEK 1981 W). — Osthang nahe Oberburgl (BOCK 1953 GZU). — Stubai Alpen, Kalkkögel (POLATSCHKEK 1968 W). — Stubaital, supra Milders (A. KERNER sine dato GZU). — Padasterjoch, Gschnitz (PODLECH 1976 W). — Oetzal, E der Erlanger Hütte (sine coll. 1968 W). — Paznauntal, Galtür-Tschaftein (GILLI 1970 W). — Verwall-Gruppe, Birkhankopf (ob. Galtür) (SEIPKA 1975 W). — Samnaun-Gruppe, Planseck (SEIPKA 1973 W). — Thialkopf bei Landeck (POLATSCHKEK 1966 W).

Vorarlberg: Verwallgruppe, Innerberg (POLATSCHKEK 1971 W). — Bielerhöhe (POLATSCHKEK 1966 W). — Silvrettasee bei der Bielerhöhe (ARSAN 1966 W).

Italy

Südtirol, Pusteria, Sexten (HUTER 1878 GZU, 1875 PRC). — Schönberg bei Luttach (TREFFER 1897 GZU, G). — Schluderbach (FREYN 1872 BRNM). — Dolomiten, Rolle-Castelazzo (RONNIGER 1908 W). — Ritten, Bozen (SCHNEIDER 1909 W). — Meran, Vigiljoch (RONNIGER 1938 W). — Mastaun (L. PAUL 1888 PR). — Piemont, Bardonecchia, Pt. Gasparre, 1500 m, Lärchwald (KELLER 1898 Z). — Val Lia e Cardoni, 2000 — 2200 m (LONGI 1901 Z) [loc. ?]

Switzerland

St. Gallen, Brändlisberg bei Vältis, Rhododendretum (SCHINZ 1908 Z). — Glarus, Bächikamm, 2050 m (BLUM 1911 Z). — Uri, zwischen Andermatt und Realp (herb. BUCHENAU 1857 W). — Unterwalden, Pilatus (SCHUSTERER sine dato PRC). — Graubünden, St. Moritz (NICKERL 1862 PR). — Lai da Vons bei Sufers (A. RAUCH 1915 Z). — Julierpasshöhe, 2200 m (BAUMANN 1913 Z). — Oberhalbstein, Martegnas (SCHINZ 1921 Z). — Davos, Disdomathal (HEGER 1899 Z). — Splügen (LERCH 1839 NEU). — Cresta Avers, Hohgrälli, 2300 m (ROHRER 1915 Z). — Val Bergell (ROHRER 1918 Z). — Pontresina (SCHELLENBRUN 1861 NEU). — Val del Fain (KNABEN 1966 O). — Muottas Muragl (KNABEN 1979 O). — Bernina-Hospiz, 2300 m (FRUHSTORFER 1920 Z). — Wallis, Grimsel, Gemmi (SERING 1826 NEU). — Saas-Gründ, Weissmieshütte (FLÜCK von AARAU 1946 Z). — Oberhalb Zermatt (BUCHENAU 1878 W). — Zermatt, Riffelalp (KNABEN 1979 O). — Garides sous Zeneggen (BEAUVERD 1916 G). — Gebidem-Salenboden-Vispertenminen (HESKE 1958 GZU). — Grammont at Vouvy (KNABEN et FAVARGER 1966 O). — SW. of La Fouly, 1900 m (KNABEN et HOMBLE 1985 O). — Val d'Arpette, 1675 m, 2090 m (KNABEN et HOMBLE 1985 O). — Sefère — Salanfe, 1900 m (OBERSON 1939 NEU). — La Tremoille sur Emosson, 2200 m (OBERSON 1950 NEU). — Alp Musauna (FRICK 1936 Z).

France

In Chamonix Alpib. (sine coll. 1856 NEU).

Not mapped: [illegible] Meuvoville (sine coll. 1865 NEU). — Isère, La Salette (PUGET 1869 FI).

A COMPARISON WITH OTHER MONTANE TAXA OF THE SECTION *LUZULA*

Morphological relationships of *L. alpina* to the closest montane taxa of this group are shown in Table 1.

Relatively broad basal leaves, dense tufts of stout stems, congested, often dark inflorescences, and gradually tapering acuminate tepals are diagnostic for *Luzula alpina*. Some Scandinavian plants referable to *Luzula frigida* with congested inflorescences show a certain resemblance to *L. alpina* although the diagnostic features allow us to distinguish these two taxa without difficulties. *Luzula frigida* (BUCHENAU) SAMUELSSON (= *L. campestris* var. *frigida* BUCHENAU), as characterized by BUCHENAU (1898, 1906), represented a heterogenous group of similar, dark-flowered and slender morphotypes. Along with the Fennoscandinavian and hemi-Arctic taxon with acuminate capsule, a Central European montane type of *L. multiflora*

auct.⁴), and some North American plants, in part referable to *L. groenlandica* BÖCHER (cf. KNABEN et ENGELSKJØN 1967, KNABEN 1968), were also included in it. The problems of typification, taxonomic rank, and evolutionary relations of *L. frigida* will not be considered further in the present contribution; reference is made to KRECZETOVICZ (1935), PIHAKASKI (1966), KNABEN et ENGELSKJØN (1967) and ŠLJAKOV (1978).

Outside Europe, there are at least two other taxa showing some resemblance to *L. alpina*: *L. stenophylla* STEUDEL (\equiv *L. pseudosudetica* KREZC.) of the Caucasus and Northern Anatolia, and *L. groenlandica* BÖCHER (Greenland and Labrador), both with $2n=24$ (BÖCHER 1950, KIRSCHNER et KRÍSA 1979). However, they belong to a group of species within the section *Luzula*, that is characterized by conspicuously different seeds.

Luzula alpina was previously included in *L. sudetica* owing to a superficial similarity (Plate 3). *Luzula sudetica* often has congested inflorescences (Plate 5), and this feature, which is obviously modifiable, is observed in various parts of its geographical range, e.g., in the Eastern Alps, the Western Carpathians, and exposed Scandinavian montane sites. However, *L. sudetica* is a distinct species within the group in question, being characterized by unequal tepals, small seed (Plate 4b), creeping rhizome, and serrulate leaf margin. *L. sudetica* has $2n=48$ chromosomes of the CL type (NORDENSKIÖLD 1956, KNABEN et ENGELSKJØN 1967, UHRÍKOVÁ in MÁJOVSKÝ et al. 1976 etc.).

In the Alps, *L. alpina* should primarily be compared with *L. multiflora* auct. The seed and stamen characters do not distinguish these two taxa whereas other features entered in Table 1 are diagnostic. Two cytotypes are known within the Alpine *L. multiflora* auct., as mentioned in the ecological part of this study. $2n=24$ was found in material both from Austria and Switzerland (NORDENSKIÖLD 1956, ENGELSKJØN unpubl., KIRSCHNER unpubl.). This slender Alpine tetraploid requires further study but is treated as a separate unit here.

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SUMMARY

A conspicuous type of the *Luzula campestris* agg. occurring in the Alps of Austria, Switzerland, Federal Republic of Germany, Italy and France was studied taxonomically. In terms of morphology, it is characterized by dark, congested inflorescence, acuminate, gradually tapering tepals, and relatively broad basal leaves. This taxon is apparently widespread in Alpine short-grass meadows (e.g. of the *Nardion* alliance) usually from 1800 to 2400 m above sea level. An independent position of it is also indicated by a peculiar karyotype showing $2n=36$ with 12 AL

⁴) The name *Luzula multiflora* is used in the current conception here. However, it is hardly nomenclaturally acceptable for the widespread hexaploid taxon. An analysis of this name is being prepared for publication.

and 24 BL chromosomes. The correct name of this taxon is *Luzula alpina* Hoppe in Sturm 1839; the name is based on Hoppe's exsiccate (*Herbarium Vivum Plantarum Graminearum*, no. 108, ca 1830; lectotypus: BRNM). *Luzula alpina* is compared with other European montane taxa of the section *Luzula*.

SOUHRN

Autoři studovali nápadné populace ze sekce *Luzula*, vyskytující se v Alpách. Zjistili, že studované rostliny spojuje vedle morfologických znaků (temné, stažené květenství, dlouze zašpičatělé tepaly, široké přízemní listy) také pozoruhodný karyotyp, $2n = 36 = 12 AL + 24 BL$, vzniklý prostřednictvím neúplné agmatoploidizace. Studované rostliny, které se vyskytují nad hranicí lesa (nejčastěji 1800 až 2400 m n.m.) ve společenstvech krátkostébelných luk (např. svazu *Nardion*), jsou hodnoceny jako samostatný druh, jehož správným jménem je *Luzula alpina* Hoppe in Sturm 1839. V předložené práci je toto jméno typifikováno (lektotyp je vybrán z Hoppeho exsikatové sbírky *Herbarium Vivum Plantarum Graminearum* a je uložen v herbáři BRNM) a taxon je srovnán s dalšími horskými zástupci sekce *Luzula*.

REFERENCES

- BEAUVERD G. (1919): Excursions phytogéographiques aux environs de Viège et de Zermatt (Valais). — Bull. Soc. Bot. Genève, ser. 2, 10 : 285–286.
- BEYER R. (1900): Formen von *Luzula multiflora* (Ehrh.) Lej. — Verh. Bot. Ver. Prov. Brandenburg, Berlin, 41 (1899) : 20–25.
- BÖCHER T. W. (1950): Contributions to the flora and plant geography of West Greenland. II. The *Carex capitata*-, the *Luzula multiflora*-, and the *Torularia humilis*-complexes. — Meddel. Grönl., København, 147/7 : 1–39.
- BUCHENAU F. (1898): *Luzula campestris* und verwandte Arten. — Österr. Bot. Zeitschr., Wien, 48 : 1–33 (p. separ.).
- (1906): Juncaceae. — In: A. ENGLER, Das Pflanzenreich 4/36 : 1–284. Leipzig.
- EGGLER J. (1954): Vegetationsaufnahmen alpiner Rasengesellschaften in Oberkärnten und Osttirol. — Carinthia, Klagenfurt, 64 : 99–105.
- FAVARGER C. (1959): Alpenflora. 2. Subalpine Stufe. — Bern.
- GRENIER J. C. M. et GODRON D. A. (1848): Flore de France. Vol. 1. — Paris.
- HESS H. E., LANDOLT E. et HIRZEL R. (1967): Flora der Schweiz und angrenzender Gebiete. Vol. 1. — Basel et Stuttgart.
- KIRSCHNER J. (1982): Poznámky k určování zástupců komplexu *Luzula campestris-multiflora* (*L. campestris* agg.) v ČSSR. — Zpr. Čs. Bot. Společ., Praha, 17 : 25–37.
- KIRSCHNER J. et KRÍSA B. (1979): Notes on the taxonomy and cytology of the genus *Luzula* in the West Caucasus. — Preslia, Praha, 51 : 333–339.
- KNABEN G. S. (1968): Chromosome numbers of flowering plants from Central Alaska. — Nytt Mag. Bot., Oslo, 15 : 240–254.
- KNABEN G. S. et ENGELSKJØN T. (1967): Chromosome numbers of Scandinavian Arctic Alpine plant species II. — Acta Borealia, Tromsø, ser. A, 21 : 1–57.
- KREZETOVICZ V. (1935): Ožika — *Luzula*. — In: Flora SSSR 3 : 559–576. Moskva et Leningrad.
- MERTENS F. C. et KOCH W. D. J. (1826): J. C. Röhlings Deutschlands Flora. Vol. 2. — Frankfurt am Main.
- MÁJOVSKÝ J. et al. (1976): Index of chromosome numbers of Slovakian flora 5. — Acta. Fac. Rer. Natur. Univ. Comen. — Bot., Bratislava, 22 : 1–18.
- NORDENSKIÖLD H. (1951): Cyto-taxonomical studies in the genus *Luzula* I. Somatic chromosomes and chromosome numbers. — Hereditas, Lund, 37 : 325–355.
- (1956): Cyto-taxonomical studies in the genus *Luzula* II. Hybridisation experiments in the *campestris-multiflora* complex. — Hereditas, Lund, 42 : 7–73.
- PAMPANINI R. (1958): La flora del Cadore. — Forlì.
- PIHAKASKI S. (1966): Studies on northern *Luzula multiflora* (Retz.) Lej. races. — Ann. Univ. Turku, ser. A II, no. 36 : 106–131.
- STURM J. (1839): Deutschlands Flora. Vol. 1/77. — Nürnberg.
- SUTORÝ K. (1986): Konstantin Karl Münch-Bellinghausen's herbarium collection of the Moravian Museum. — Čas. Morav. Mus., Brno, 71 : 131–134.
- ŠLJAKOV R. N. (1978): K sistematike ožik (*Luzula* DC.) komplexu *L. multiflora* (Retz.) Lej. — Nov. Sist. Vysš. Rast., Leningrad, 16 : 82–86.
- VOLLMANN F. (1914): Flora von Bayern. — Stuttgart.

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See also Plates VI—X in the Appendix



Plate 1. — *Luzula alpina* HOPPE. The lectotype. Austria, Heiligenblut (D. H. HOPPE, BRNM).

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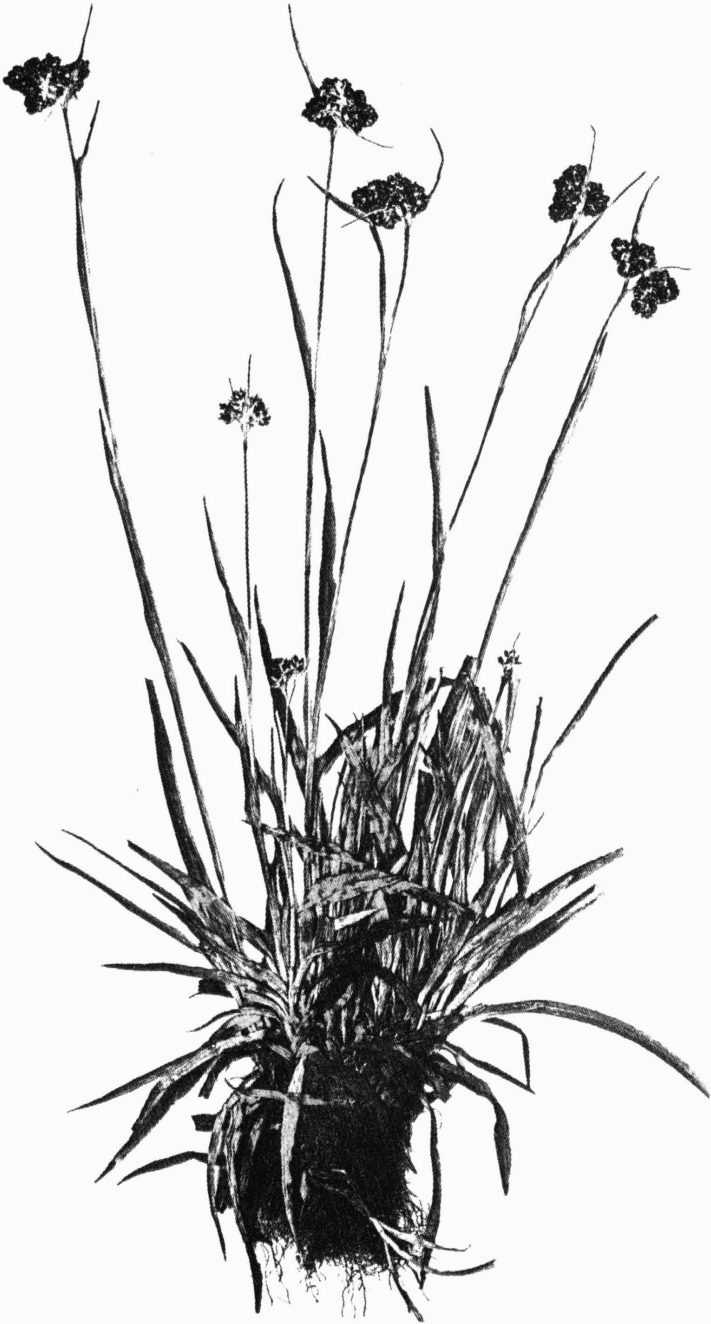


Plate 2. — The type of *L. campestris* var. *vallesiaca* (= *L. alpina*). Note the broad-leaved tufted base. Switzerland, Wallis: Garides sous Zeneggen, vers 1300 m. (BEAUVERD 1916 G).

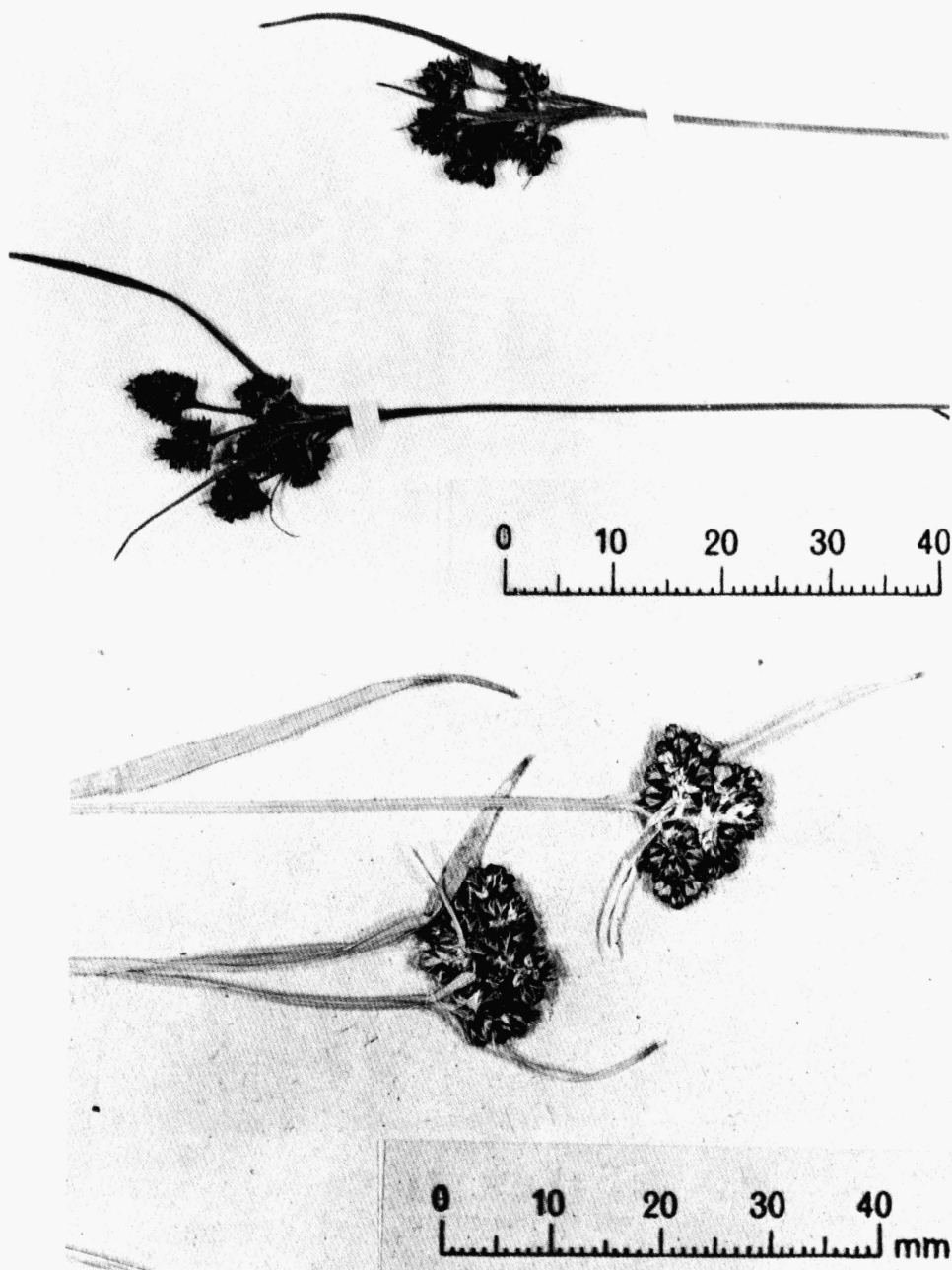


Plate 3. — Representative inflorescences of *L. alpina* and *L. sudetica*.
Left: *L. alpina* (Zeneggen, a detail of Plate 2)
Right: *L. sudetica* (Iceland, Siglufjörður, Lid 1939 O).

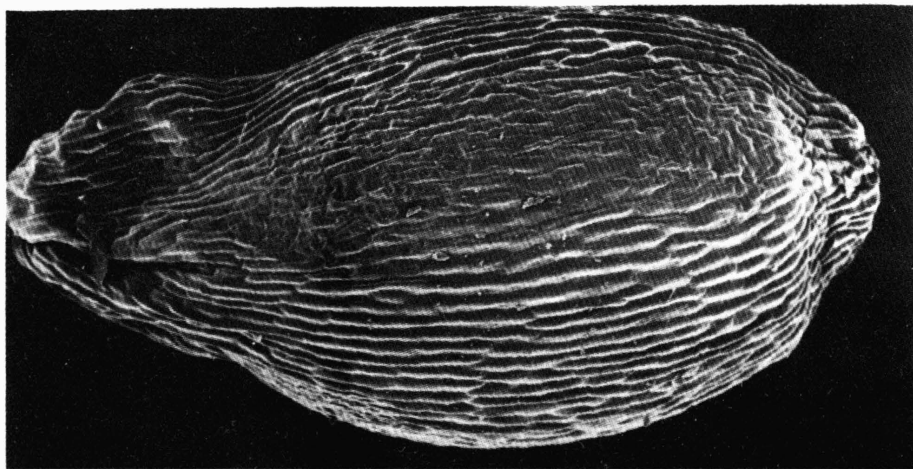
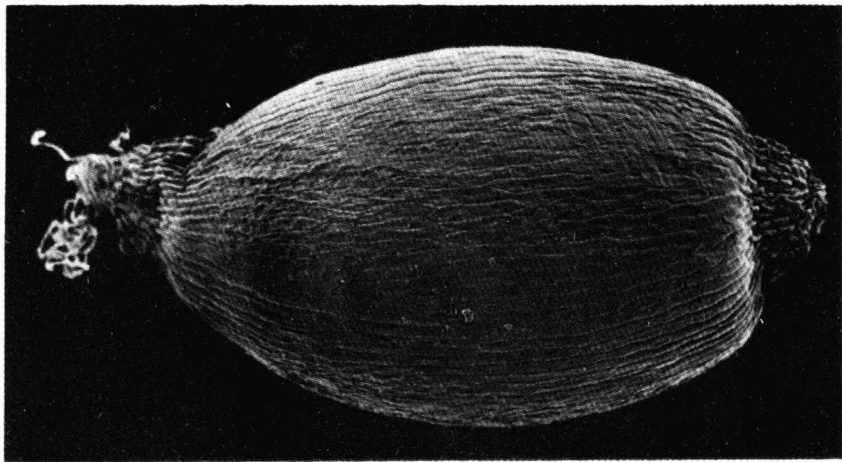


Plate 4. — Representative seed of *Luzula alpina* and *L. sudetica*.
Left: *L. alpina*. (Muottas Muragl, KNABEN 1979 O)
Right: *L. sudetica*. (Iceland, Skutilsfjörður, LID 1939 O). 7.2 cm = 1 mm.

J. Kirschner et al.: *Luzula alpina*

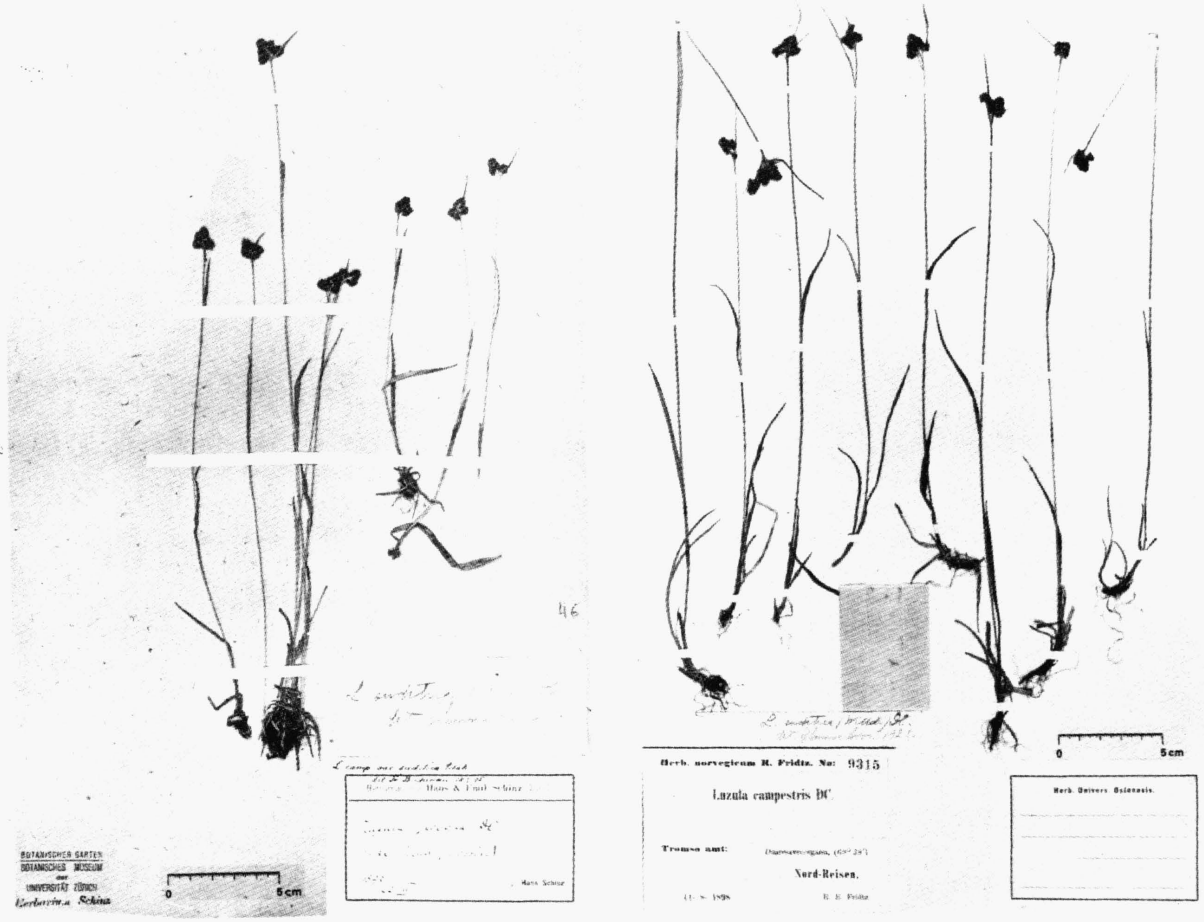


Plate 5. — *Luzula sudetica* (WILLD.) SCHULT. with more or less congested inflorescences. Note also slender rhizome, lax tufts and few basal leaves.
 Left: Switzerland, Val Piona (SCHINZ 1892 Z).
 Right: Norway, Nordreisa, Doaresavecegaissa, 69° 38' N. (FRIDTZ 1898 O).