FLORA DE COLOMBIA

Monografía No. 26

JUNCAEAE

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BOGOTÁ, D. C., COLOMBIA
2009
ABSTRACT

The family Juncaceae (the rush family) is cosmopolitan and has seven genera and about 440 species. The rush family is found mainly in temperate to polar regions, and in the tropics it is found mostly above 2000 m elevation. Species of Juncaceae are grass-like herbs with glumaceous flowers that are usually bisexual, pentacyclic and trimerous. Here we present a taxonomic treatment of the species of Juncaceae that grow in Colombia, including 3 genera, 22 species and 3 infraspecific taxa. Keys for taxon identification, morphological descriptions, taxonomic notes, information regarding the geographic distribution and distribution maps are provided, as well as, illustrations for the majority of Colombian Juncaceae.

Key words. Distichia, Colombian flora, Juncaceae, Juncus, Luzula, Neotropical plants.

RESUMEN

La familia Juncaceae contiene siete géneros, cerca de 440 especies y tiene distribución cosmopolita. Sus especies son más frecuentes en las regiones templadas y polares, y en los trópicos se encuentran restringidas a las regiones montañosas, preferiblemente por encima de 2000 m de altitud. Las juncáceas son hierbas y se caracterizan por sus flores glumáceas, usualmente bisexuales, trimeras y pentaciclicas. En esta monografía se presenta el tratamiento taxonómico para las Juncaceae de Colombia, el cual incluye 3 géneros, 22 especies y 3 taxones infraespecíficos. Para cada uno de los taxones se presentan descripciones morfológicas, comentarios taxonómicos y sobre su distribución geográfica. Además, se presentan claves para la identificación de los taxones, así como mapas de distribución geográfica e ilustraciones para la mayoría de las especies.

Palabras clave. Distichia, Flora de Colombia, Juncaceae, Juncus, Luzula, Plantas neotropicales.
INTRODUCTION

Most Juncaceae are grass-like herbs with herbaceous culms, linear leaves, and usually many flowered inflorescences of small glumaceous flowers, just as in Poaceae and Cyperaceae. A few genera (e.g., Distichia) have adapted to high altitude through contraction of their internodes and they then grow as dense cushion forming plants. Juncaceae differ from Poaceae and Cyperaceae in having smooth (+ hairy in Luzula), leaves and culms without silica encrustations. Juncaceae also differ from the two families in their floral structure which has complete whorls of 3+3 tepals, usually 3+3 stamens, a gynoecium of 3 carpels, and a fruit with many seeds (but only 3 in Luzula).

Morphology and Anatomy

Roots. As in all Monocotyledons, the roots of Juncaceae are adventitious and they develop along the lower parts of the stem that is modified to form a rhizome. In some cases the root hairs remain and form a very dense and brush like cover over the root. In the cushion-forming Distichia muscoides, the roots are white, fleshy, thick, and emerge among the basal leaves from where they penetrate the dense interior of the cushion that is being transformed into a mass of dead organic material. In some Juncus species the root cortex develops into longitudinal lamellae separated by air canals that permit oxygenation of the plant parts that grow in water-saturated soil.

Rhizomes. In perennial species of Juncaceae (excluding the cushion forming Distichia) the basal part of the stem is modified to a long-lived subterranean rhizome that produces ephemeral aerial culms that bear the photosynthetic leaves and the inflorescences. The rhizome varies in appearance.

1. Branching ascending rhizomes branch loosely and have conspicuous internodes, and side branches emerge at some nodes and ascend to the soil surface where they produce leaf rosettes as in Juncus stipulatus and J. cyperoides.
2. Stoloniform rhizomes creep horizontally with long internodes and leaf rosettes at the nodes, as sometimes found in J. stipulatus and J. cyperoides.
3. Densely branching rhizomes have irregular branching, short internodes, inconspicuous rhizome scales and no definitive branching pattern, giving rise to a tufted overall habit of the plant as seen in J. tenuis, J. microcephalus, J. pallescens, J. eucadoriensis, J. breviculmis.
4. Short-creeping rhizomes creep horizontally and culms arise in dense rows from the upper side of the rhizome, the internodes are very short and the resulting habit of the entire plant is densely cespitose as in J. effusus, J. imbricatus, and J. capillaceus.
5. Long-creeping rhizomes differ from short creeping ones only in having distinguishable internodes that may be up to five times as long as the diameter of the rhizome, and giving a colonial habit of the plants, such as in J. liebmannii and usually in J. balticus. These rhizome types grade from one to the other, and all intermediates can be found, but the species tend to develop one or the other and therefore produce plant habits that
are often taxonomically significant. The rhizome cross-section is strikingly similar to that of the root. A central core with vascular bundles is surrounded by an endodermoid layer; the cortex has longitudinal lamellae and air canals, at least in species growing in wet soils, whereas species growing in dry soils may lack air canals.

**Culms.** The aerial part of the stem - the ephemeral culm - supports the leaves and the inflorescences. The culms are usually erect but some species have ascending or procumbent culms. In the smallest species the culms may be only a few centimeters long, but in the larger species they may be up to two meters long, and they vary in thickness from less than one millimeter up to one centimeter. They are usually terete, smooth or longitudinally striate or ridged. The central part is usually filled with aerenchymatous pith which is surrounded by a vascular cylinder, a cortex and the epidermis.

**Leaves.** The leaves of Juncaceae vary depending on their position along the stems, and they also vary between species. Many leaf characters are extremely important in the classification and identification of Juncaceae species. The most basal leaves are often shaped as scales inserted on the rhizome. The rhizome scales vary in length from a few millimeters to about one centimeter, and their texture may be thin and membranous or thick and sclerified. In outline they vary from semicircular to elongate, and in some species they either cover the rhizome or they sheath it. In other species such as those with densely branching rhizomes the scales are absent or inconspicuous.

Leaves inserted basally on the culm often have their blades reduced to minute needle-like appendages, inserted apically on an otherwise normally developed leaf-sheath. Such blade-less, basal leaves are called cataphylls. They may be small, membranous and inconspicuous or up to 25 cm long and heavily sclerified, strongly pigmented, and very conspicuous. Among the Colombian species, prominent cataphylls are characteristic of *Juncus effusus*, *J. ramboi* and *J. balticus*.

Foliar leaves are inserted in basal rosettes or along the culm. They have a closed sheath in *Luzula*, and an open sheath in *Juncus* and *Distichia*. When the sheath is open its margin may be green and herbaceous or white and membranous. The margin terminates in auricles where the sheath joins the blade; the auricles vary in shape and texture in the variation is of some taxonomic importance. Auricle shape, for instance, help distinguishing two varieties of *J. tenuis*: they are extended and membranous in one variety and rounded and sclerified in the other variety. In *J. bufonius* characteristically has rounded membranous auricles. The blade is very short, round in cross section and conical in *Distichia muscoides*. The blade is bifacial (=flat) and with hairy margins in *Luzula*. In Juncus the blade is flat, bifacial but with glabrous margins in *J. cyperoides*. In the other species of *Juncus* the blade is modified in various ways that are taxonomically significant. *Juncus effusus*, *J. ramboi* and *J. balticus* all have the lamina reduced so it forms a small needle-like tip at the apex of the leaf sheaths. *Juncus bufonius*, *J. cordobensis*, *J. tenuis*, *J. imbricatus* and *J. capillaceus* all have the adaxial surface of the blade provided with bulliform, chlorophyll-less cells and the margins
of the blade are more or less closed around the adaxial surface. The remaining species of *Juncus* have unifacial blades, *i.e.*, the adaxial surface is complete reduced and the blade is round in cross section with the abaxial surface covering the entire blade; the blade is therefore tubular with a central hollow which is interrupted by transversal septa.

**Inflorescence.** The dioecious *Distichia muscoides* has single lateral flowers that emerge from the axils of subapical leaves on the shoots, and then emerge between the densely inserted leafy shoots to barely project above the cushion.

*Juncus* and *Luzula* have many-flowered inflorescences of relatively small, glumaceous, castaneous or straw-colored flowers. The organization of the inflorescence is very varied, and of great taxonomic importance. The basic structure is open (racemose) and anthelate, that is, that towards the end of the culms several lateral branches occur in the axils of inflorescence scales that are inserted closely (separated by short internodes) and the most basal branches tend to overtop the more apical ones. This pattern may repeat itself to several orders, and may be accompanied with different degrees of contraction in the apical parts to produce “spikelets” or heads depending on whether their shape is elongate or rounded. In some species of *Juncus* the structure of the inflorescence is closed (cymose), so the primary axis is terminated by a flower and the continued growth is by lateral shoots which are subsequently terminated by flowers. This forms sickle shaped inflorescences or when the branching is looser then open cymose structures. This cymose inflorescence branching is accompanied by the presence of two bracteoles that clasp each flower, whereas flowers in the anthelate-racemose inflorescences are supported only by the bract that supports the flower pedicel. The different branching patterns are overlain by different degrees of contraction of the inflorescence so some species have very open inflorescences and other have very contracted inflorescences.

Finally there is variation in the development of the inflorescence bracts. Some species simply have reduced foliar organs supporting all branching points in the inflorescence and usually there is a reduction in size of the supporting bracts towards the more distal parts of the inflorescence. In other species the most basal inflorescence bract is very strongly developed and resembling the continuation of the culm so the inflorescence appears lateral (*J. effusus*, *J. ramboi*, *J. balticus*).

**Flower.** The flowers of Juncaceae are typically small, *i.e.*, less than 5 mm long, and chaffy in appearance with small stiff, straw-colored or brownish tepals that enclose the fertile stamens and gynoeicum. The floral diagram is a typical “basic” penta-cyclic and trimerous Monocotyledon diagram. The two whorls of tepals have alternating elements, and often the element of the two whorls are indistinguishable, whereas in other species there is a very slight differentiation between the two whorls, but not enough to call them petals and sepals. Between species the tepals vary; in colour from very dark castaneous to straw-colored, in textures from thin, soft and flexible to sclerified and rigid, in cross
section from rounded to keeled, and in outline from acute to long acuminate. The stamens are inserted in two whorls of three each, alternating with the tepals. The filaments vary from long and filamentous to short and flattened as in \textit{J. balticus}. The anthers are 4-locular or secondarily 2-locular by breakdown of the inner wall, elongate, and in \textit{Distichia muscoides} mucronate. The gynoecium is tri-carpellate, usually unilocular or in some species basally trilocular, with three placentae that may be more or less intruding into the locule. Each placenta has several ovules except in \textit{Luzula} where there is only one basally attached ovule per placenta. The style is round and usually clearly set apart from the ovary. The stigmas are free and often much longer than the styles and forming a spiral structure. The fruit is a loculicidal capsule but the dehiscence of the \textit{Distichia muscoides} fruit is not always very well defined, and sometimes approaching circumscissile.

**Seed.** The seeds of Juncaceae are 0.3-1.5 mm long, usually ellipsoid to ovoid and sometimes tailed. They are variously sculptured and some of this sculpturing is visible under a dissecting microscope and some of it is taxonomically useful. The surface varies from smooth in \textit{Luzula} to irregularly sculptured in \textit{Distichia}, to longitudinally striate with cross-bars in \textit{J. ecuatoriensis}, to a pattern of honeycomb in \textit{J. tenuis}.

**Habitat and Distribution**

Juncaceae as a family occurs on all continents except Antarctica, but it is most diverse and abundant in temperate zones, whereas it mostly occurs at high elevations at tropical latitudes. Juncaceae are native in alpine meadows and in grasslands, especially in the highlands, where they may be weedy in fields and along roads and trails.

The two largest genera of the family (\textit{Juncus} and \textit{Luzula}) are distributed as the family but several small genera have a more restricted distribution in South America. Two species of \textit{Rostkovia} occur in southernmost South America, Tristan da Cunha, and Ecuador; six species of \textit{Oxychloe} in the Andes from Patagonia to Peru; three species of \textit{Distichia} in the Andes from Colombia to northern Chile and Argentina; and \textit{Patosia} in the Andes from Bolivia to northern Chile and Argentina. In Colombia Juncaceae occur along the Andean cordilleras at elevations from 1500–4400 meters.

**Economic Importance**

There are very few reports of direct uses of Juncaceae. In Costa Rica and Guatemala some species, including \textit{Juncus effusus}, are used for weaving mats (Standley 1937, Standley and Steyermark 1952). In Peru \textit{Luzula racemosa} is used as a magic plant (Balslev 1996) and \textit{Distichia muscoides} is used as fuel in the high Andes (Ferreya 1979). In Ecuador \textit{Juncus balticus} var. \textit{andicola} is used for weaving small baskets (Balslev 1996, Macía 2001). In Colombia some species are used for manufactured handcrafted weavings, mats, brooms and ropes (Pérez-Arbélaez 1978, Vargas 2002). Balslev (1996) reports the use of a Juncaceae in Colombia from a note on a herbarium specimen of \textit{Juncus ramboi} subsp. \textit{colombianus}
(Torres-R. 3312A, COL) which says it is used for handcrafted weaving. But many Juncaceae contribute to the biomass of high Andean meadows that are grazed by cattle and some Juncaceae are weeds although no (negative) economic effects of these have been reported.

**Taxonomic History**

Fifteen species of Juncaceae were known to Linnaeus (1753) and two of these are cosmopolitan and found in Colombia (*J. bufonius, J. effusus*). The first Juncaceae to be described based on a plant collected on the South American continent was *Juncus gradiflorus* (Linnaeus filius 1781), which was collected by Foster during Cooks circumnavigation. Subsequently various expeditions to the New World produced new discoveries of tropical American Juncaceae, summarized by the German botanist Buchenau (1879). His studies of the family culminated with the production of two World monographs for the family (Buchenau 1890, 1906). Since then several national floras, but none for Colombia, have treated the Juncaceae. Colombian Juncaceae were included in the treatment of the family for Flora Neotropica (Balslev 1996), and again in the World monograph of the family (Kirschner et al. 2002a, 2002b, 2002c), but the present treatment is the first detailed treatment dedicated to the Colombian members of the family.

**TAXONOMIC TREATMENT**

**JUNCACEAE**

*Juncaceae* Juss., Gen. pl. 43. 1789 (‘Junci’)

**Type genus**: *Juncus* L.


Perennial and usually rhizomatous or rarely annual herbs, glabrous or with hairy leaf margins. **Rhizome** creeping, ascending or erect, unbranched or branched, naked or covered by scales or splitting leaf bases. **Culms** erect, ascending or rarely procumbent,

* The complete list of examined specimens can be consulted in “List of Exsiccate” or extense in the Web page: www.icn.unal.edu.co/icn/floradecolombia.
terete, smooth or longitudinally ridged, naked or leaf bearing. **Leaves** linear or filiform, with an open and sometimes auriculate or closed sheath, spirally arranged or rarely distichous, blades sometimes reduced. **Inflorescence** terminal, sometimes pseudolateral, compound, cymose or racemose, usually in heads or spike-like clusters, rarely reduced to a single terminal or lateral flower. **Flowers** generally small, perfect or imperfect, actinomorphic. **Perianth** with six segments, in two whorls of three, glumaceous, equal or almost equal, free, tepals less than 8 cm long. **Stamens** six in two whorls of three, opposite the perianth segments, inner whorl sometimes reduced; filaments filiform or somewhat flattened and widened at the base; anthers oblong to linear, basifixed, obtuse or mucronate, dehiscing by two longitudinal lateral slits. **Gynoecium** with three connate carpels; ovary superior, 1-locular, 3-septate or 3-locular; style one, up to 10 cm long but usually shorter; stigmas three, terete and of equal diameter throughout or sometimes tapering distally, twining with adaxial papillae. **Fruit** an orbicular to oblong or ellipsoid, 3-lobed, round or trigonous, loculicidal or circumscissile capsule. **Seeds** usually many per capsule, sometimes three; outer seed coat hyaline, whitish or light brown, sometimes drawn out into tail-like appendages, often with distinct sculpturing; inner seed coat brown to castaneous or yellow.

**Composition and distribution.** Juncaceae is a family of seven genera and about 440 species, most of which are confined to temperate or cold regions of the world. In the tropics the family is found only at high elevations, usually above 2000 m above sea level but sometimes as low as at 800 m. At the generic level Juncaceae is highly developed in South America with seven genera occurring there. **Prionium**, a shrubby, monotypic genus endemic to South Africa, has been included in Juncaceae, but is now treated as a separate family. **Marsippospermum** with three species is restricted to New Zealand and Patagonia and does not reach tropical South America. **Rostkovia**, **Patosia**, and **Oxychloe** are mainly south temperate but reach into tropical South America. **Distichia** is almost restricted to tropical South America, and **Juncus** and **Luzula** are cosmopolitan.

**Key to the Genera of Juncaceae in Colombia**

1. Plants cushion forming; flowers solitary in the axils of subapical leaves, anthers mucronate; leaves distichously arranged. ......................................................... 1. **Distichia**

1. Plants not cushion forming; flowers in many-flowered, or very rarely few-flowered, inflorescences, anthers not mucronate; leaves spirally inserted. ........................................... 2

2. Leaf sheaths closed, blades with hairy margins; capsule with three seeds. ........ 3. **Luzula**

2. Leaf sheaths open, blades glabrous; capsule with many (up to 120) seeds. ........ 2. **Juncus**
1. **Distichia**

*Distichia* Nees & Meyen, in Meyen, Observ. Bot. 128. 1843.

**Type species.** *Distichia muscoides* Nees & Meyen


Perennial, glabrous, cushion forming herbs. **Stems** more or less regularly forked and covered with persisting leaves. **Leaves** regularly, densely, and strictly distichously inserted along the stem, with a wide sheath clasping the leaf above; blade shorter than the sheath, terete. **Inflorescence** reduced to a single lateral, subapical flower; plants dioecious. **Flowers** supported by 2–4 minute membranous bracteoles. **Tepals** lanceolate. **Staminate flower** long pedicellate; stamens six, with linear mucronate anthers about 10 times as long as the filaments. **Pistillate flower** short pedicellate; ovary on a short gynophore; style with three filiform, sticky, papillose stigmas. **Capsule** unilocular, lifted on a gynophore at ripening. **Seeds** many.

**Etymology.** The name *Distichia* refers to the distichous arrangement of the leaves.

**Composition and distribution.** *Distichia* is a small genus with three species at high elevations in the Andes. *D. muscoides* is distributed from Colombia to northern Argentina, *D. filamentosa* is endemic to Bolivia, and *D. acicularis* is endemic to Ecuador.


**Type:** Peru. Puno: Pisacoma, 4500 m, Apr 1831, Meyen s.n. (holotype n.v., probably destroyed at B; isotypes BR!, P!, photo QCA!).

**Figs. 1, 2**

Perennial herbs, forming dense, hard cushions up to several meters in diameter; single plants consisting of 5-15 cm long, more or less regularly forked shoots, covered by short, strictly distichous, persistent, stramineous or rarely dark brown, wilted leaves; only the two or three distal leaves green and projecting above the cushion. Leaves 1-2 cm long, inserted 1-2 mm apart; sheaths usually 2/3 of entire leaf length, open, wide, V-shaped in crosssection, with narrow and membranous margins, almost completely clasping the sheath of the leaf above; blade bluntly acute. Flowers in leaf axil, near shoot apex. Tepals subequal, 4-7 mm long. Staminate flowers on 1-2 cm long, filiform pedicels; stamens 2, 2-3.5 mm long; filaments 1/10-1/5 as long as the anthers; anthers 1.8-3 mm long. Pistillate flowers hidden in the sheath of the supporting leaf with only the stigmas projecting above the shoot apex; style filiform, exceeding the tepals; stigmas half as long as the style; gynophore stretching at fruit ripening, lifting the capsule slightly above the cushion. Capsule ellipsoid to ovoid, apically acute to slightly apiculate or obtuse, 5-7 x 2.5-3.5 mm, irregularly dehiscing, yellow brown, unilocular. Seeds oblong, 1-1.5 x 0.5-1 mm, covered by a thick white outer seed coat.
Figure 2. Geographic distribution of *Distichia muscoides* (†), *Juncus balticus* subsp. *andicola* (●) and *J. capillaceus* (▲).
**Distribution and habitat.** *D. muscoides* is distributed in the Andes from Colombia to northern Argentina and is characteristic of the high altitude páramo and puna vegetation. It has been collected at altitudes as low as 3600 m above sea level, but is much more common at 4000-4600 m. This species forms dense and very hard cushions, up to several meters in diameter, which in boggy depressions often provide the only secure foothold for the wanderer. On slopes with high precipitation it may create bizarre protruding formations. In Colombia this species is widely distributed along the Cordillera Central, Cordillera Oriental and Nudo de los Pastos, at elevations of 3650-4600 m.


**Vernacular name.** “Llano duro” (*Clee 8731, Clee 8914* COL).
2. Juncus

*Juncus* L., Sp. Pl. 1: 325. 1753

**Type species.** *Juncus acutus* L.


Annual or perennial, rhizomatous, glabrous herbs. **Culms** usually erect, rarely procumbent or ascending. **Leaves** alternate, scale like on the rhizomes, cataphyllous (i.e., with reduced blades) and/or foliar on the base of the culm, and bracteous in the inflorescence; sheaths open, usually conspicuously auriculate at the junction to the blade; blade linear with varying cross section, flat with raised margins and slightly channeled above, canaliculate, round to elliptic, or completely flat. **Inflorescence** compound and often decompound, cymose or racemose, often anhelate. Inflorescence bracts decreasing in size from the base of the inflorescence upwards, the lower bract often conspicuously different from the remaining ones. **Flowers** sometimes clasped by two bracteoles on the pedicel, bisexual. **Tepals** equal or subequal, lanceolate, entire, persistent, stramineous or castaneous, sometimes light green. **Stamens** three or six; filaments filiform or flat, sometimes widened at the base; anthers linear or oblong, obtuse. **Gynoecium** with sessile ovary; stigmas three, filiform, twining, papillose. **Capsule** 1-locular, 3-septate, or 3-locular. **Seeds** many, ellipsoid, oblong or ovoid, smooth, rugose or sometimes with reticulate pattern, brown, yellowish or castaneous.

**Etimology.** The name *Juncus* is derived from the Latin verb “jungo” which means to join or unite, probably referring to ancient use of these plants for binding things together.

**Composition and distribution.** *Juncus* is a cosmopolitan genus of about 315 species, most of which occur in the north temperate region, but with some proliferation in the temperate parts of the southern hemisphere. In the tropics the genus is absent in the lowlands but present at higher elevations, usually over 2000 meters above sea level. The Neotropical region has 41 species, tropical Africa has seven, and tropical Asia has four species of *Juncus*. In Colombia 18 species and three infraspecific taxa have been found.

**Key to the Species of Juncus in Colombia**

1. Each flower clasped by two bracteoles, inserted on the pedicel just below the tepals in addition to the bract that supports the pedicel; inflorescence compound, cymose, with partial inflorescence often being repeatedly onesided or two-sided cymes branching in one plane (drepapia or rhiphidia). .......................................................... 2
1. Flowers without clasping bracteoles on the pedicel but with a floral bract at the base of the pedicel; inflorescence with the flowers grouped in flower heads which are arranged in an anthela. ................................................................. 10

2. Leaf blades well developed, linear, flat or canaliculate; inflorescence terminal on the culm, lower inflorescence bract similar to cauline leaves. ........................................ 3

2. Leaf blades lacking, leaves present as basally sheathing cataphylls only; inflorescence pseudolateral, lower inflorescence bract appearing as a continuation of the culm. ................................................................. 8

3. Annuals without rhizome; inflorescence occupying half or more of total plant height; auricles absent. ...................................................................................... 3. J. bufonius

3. Perennials with rhizome; inflorescence occupying 1/4 or less of total plant height; auricles present at the junction of the sheath to the blade. .................................................. 4

4. Rhizome densely branching, not horizontally creeping, without filamentous cover of splitting leaf based, the culms arising in tufts. ................................................................. 5

4. Rhizome horizontally creeping, covered with a filamentous layer of splitting leaf bases and cataphylls, the culms arising in dense rows on top of the rhizome. .......... 6

5. Blades flat or channeled with even thickness over the cross section, adaxial surface with a band of hyaline cells occupying at least 3/4 of the width; auricles at the junction of the sheath to the blade membranous, white and scario, often elongate and longer than wide; inflorescence more or less lax and irregular, flowers in several loose, few-flowered clusters with visible branch segments in between. .................. 18. J. tenuis

5. Blades terete, angled or channeled in cross section, when channeled then thicker in the central part of the cross section, adaxial surface with a band of hyaline cells occupying less than 1/3 of the width or lacking; auricles firm and cartilaginous, rounded and shorter than wide; inflorescence lax or congested. .................. 8. J. dudleyi

6. Leaf blades flat in cross section 5. ..............................................................J. cordobensis

6. Leaves terete or angled in cross section ............................................................ 7

7. Capsule equal to or longer than the tepals. ...............................................12. J. imbricatus

7. Capsule shorter than the tepals. ........................................................................4. J. capillaceus

8. Pith aerenchymatous. ...................................................................................... 9

8. Pith parenchymatous. ..........................................................16-1. J. ramboi subsp. colombianus

9. Culms ridged. ..............................................................................................11. J. effusus

9. Culms smooth. ..............................................................................................1-1. J. balticus subsp. andicola
10. Leaf blades dorsiventrally flattened with the flat side towards the culm, not hollow. ............................................................................................................................................. 6. *J. cyperoides*

10. Leaves terete, hollow, septate by cross partitions that appear as nodules externally. ......................................................................................................................................... 11

11. Rhizome stoloniferous and/or ascending branching. Plants 1-10 cm tall; leaves 1-8 cm long; inflorescence of one or rarely two, 2-5-flowered heads; rhizome with a branching-ascending part. ............................................................................ 17. *J. stipulatus*

11. Rhizome short creeping, long creeping, or densely branching. .............................................. 12

12. Plants not densely cespitose, rhizome creeping with short internodes; cataphylls present and usually conspicuous. ................................................................................................................................. 13

12. Plants cespitose, rhizome densely branching and not creeping; cataphylls absent or inconspicuous ............................................................................................................................................. 15

13. Tepals acute, V-shaped in cross section, flexuose; capsule acuminate. .......................................................... 13-1. *J. liebmannii* var. *quitensis*

13. Tepals subulate, U-shaped in cross section, rigid; capsule beaked. .............................................. 14

14. Flower heads castaneous; inflorescence 1-2 headed. ............... 9. *J. echinocephalus*

14. Flower heads stramineous; plants 65-135 cm tall; rhizome less than twice as thick as the culm; outer tepals usually longer than inner tepals and the capsule. ................................................................................................................................................. 7. *J. densiflorus*

15. Plants less than 10 cm tall. .................................................................................................................. 16

15. Plants more than 10 cm tall. ............................................................................................................. 17

16. Rhizome branching-ascending. ..................................................................................... 17. *J. stipulatus*

16. Rhizome densely branching; lower inflorescence bract much longer than the inflorescence. ............................................................................................................................................... 2. *J. breviculmis*

17. Flower heads 2-3 flowered. 13-1. ................................................. *J. liebmannii* var. *quitensis*

17. Flower heads many-flowered. ........................................................................................................ 18

18. Foliar leaves and lower inflorescence bract overtopping inflorescence. .............................. 18

18. Inflorescence overtopping foliar leaves and lower inflorescence bract. .................................. 19

19. Seeds 0.7-0.9 mm long; capsule 2.9-4.4 mm long. ............................................. 10. *J. ecuadoriensis*

19. Seeds less than 0.5 mm long; capsule less than 3.5 mm long; stamens six, rarely three. ............................................................................................................................................................. 20
20. Ultimate inflorescence branches >0.45 mm diameter, tepals rigid. ......................
20. Ultimate inflorescence branches <0.4 mm diameter, tepals soft. ......................

15. *J. pallescens*

14. *J. microcephalus*


Type: Ecuador. Andes of Quito, W. Jameson 51 (holotype K; isotypes BM, G).

Fig. 2, 3


Perennial herbs, 20-170 cm high. Rhizome creeping, 2.5-10 mm diameter, branching but with long unbranched segments, internodes very short or more often up to 4 cm long, the insertion of the culms accordingly crowded or spaced, sometimes with a creeping part with long internodes and side branches with short internodes. Culms erect, 1-10 mm diameter, smooth or slightly wrinkled to striate, but only very rarely with longitudinal ridges. Cataphylls 2-3 to each culm, lower one 1-8 cm long, distal one 3-25 cm long, usually mucronate by a up to 3 mm long acicular, rudimentary blade, yellow to light brown or stramineous. Foliar leaves absent. Inflorescence pseudolateral, 20-many-flowered, usually lax and then up to 15 x 10 cm, sometimes congested and only 2 x 2 cm, compound, cymose, consisting of several congested cymes, of which the ultimate ones are unilateral drepania; lower inflorescence bract appearing as a continuation of the culm, (2-)5-15(-25) cm long, or usually constituting between 1/10 and 1/5 of the total plant height, sometimes less, distal bracts progressively shorter, membranous; each flower clasped by two 1.5-2.5 mm long, acute, membranous bracteoles. Tepals equal or outer ones longer, lanceolate, dark brown or castaneous, outer ones 3.5-5.5 mm long, concave, acuminate, inner ones 3-5 mm long, flat to concave, acute. Stamens six, 1.5-2.5 mm long; filaments flat, widened towards the base; anthers linear 0.7-2 mm long, 1-6 times as long as the filaments. Gynoecium with style 1.1-1.5 mm; stigmas 11.5 mm. Capsule ellipsoid to ovoid, acute to truncate, apiculate, round to trigonous or slightly 3-lobed, 2.5-5 x 1.5-2 mm, equalling or shorter than the tepals, light to dark brown, often light at the base and dark at the apex, glossy, 3-septate. Seeds ellipsoid, oblong, ovoid, or irregularly shaped, short apiculate, 0.6-0.8 x 0.2-0.5 mm, rugose, light brown to castaneous below a hyaline outer seed coat.

Distribution and habitat. *J. balticus* is circumboreal and extends toward the south through the Rocky Mountains in W North America to Patagonia. *Juncus balticus* subsp. *andicola* is distributed in Central Mexico and Guatemala and along the Andes to Patagonia. It grows at 2700-4000 m above sea level in the Andes, often in cattle fields and other places under human influence. In Colombia this species is known from one collection of the Nariño department (Nudo de los Pastos).
**Comments.** *J. balticus* subsp. *andicola* shows much ecological variation. We have observed it growing at the edge of a car track in a gradient from gravel to rich humus soil. The culms varied accordingly from 30 cm to 170 cm in height, and from 1 mm to 6 mm in diameter.

**Material examined.** **Nariño:** volcán de Cumbal, laguna Bolsa, 2890 m, 11 Sep 1944, **Ewan 16134** (NY, US).

2-2. **Juncus breviculmis** Balslev, Brittonia 35: 303. 1983. **Type:** Venezuela. **Merida:** páramo at laguna de Mueubaji, near Apartaderos and San Rafael, 35 km NE of Merida, 3800 m, 18 Oct 1953, **B. Maguire 39428** (holotype NY).

Figs 4, 5

Perennial, soft, cespitose herbs, 10-40 cm tall. **Rhizome** densely and irregularly branching, ca. 2 mm diameter. **Culms** erect, 1-20 cm long and always shorter than the leaves, 1-2.5 mm diameter, terete, smooth or with small transverse nodules, sometimes branching in the axils of cauline leaves. **Cataphylls** absent or inconspicuous. **Foliar leaves** 1-2 basal and 0-2 cauline to each culm, 6-40 cm long; sheaths 1-6 cm long, membranous towards the margins and terminating in two rounded, 1-2.5 mm long auricles; blades 1.5-2.5 mm diameter, round in cross section but usually flat in pressed specimens, conspicuously transverse-septate. **Inflorescence** a terminal head or a once to twice branched anthela to 7 x 10 cm with up to seven heads; heads globose, 10 mm diameter and up to 40-flowered when single, or conical, 5 mm diam and only 6-7-flowered in many-headed inflorescences; lower inflorescence bract 4-20 cm long, resembling a cauline leaf, always conspicuously overtopping the inflorescence, sometimes straight, longer than the culm and appearing as a continuation of it except for being cross-septate, sheaths 1-5 cm long, blades 1-2.5 mm diameter, floral bracts lanceolate, acuminate, 2-3 mm long, membranous. **Tepals** equal, 3-4 mm long, lanceolate, acute, brown to reddish with well marked white membranous margins. **Stamens** six, ca. 1.5 mm long; filaments filiform, whitish; anthers oblong, ca. 0.5 mm long, yellow. **Capsule** oblong to obovoid, slightly apiculate and trigonous, 2.3-3 x 1.3-1.6 mm, thin-walled, golden to dark brown. **Seeds** ellipsoid, apiculate, 0.4-0.5 x ca. 0.2 mm, reticulate, brown.

**Distribution and habitat.** *J. breviculmis* is distributed in the N Andes from the province of Merida in Venezuela to Colombia. It grows, sometimes submerged, in lakes and streams in the páramos at elevations of 3250-4000 m. According to label information, **Cuatrecasas 1557** was growing submerged. In Colombia this species is found in center of the Cordillera Oriental (Santander, Boyacá and Cundinamarca departments), at elevations of 3250-3950 m.

**Comments.** *J. breviculmis* may be recognized most easily by its short culms, which never lifts the inflorescence above the tip of the foliar leaves. As a result of ecological modifications the length of the culm and the degree of congestion of the inflorescence both vary considerably but in a correlated manner. Thus small plants with culms 1-3 cm long usually have a quite congested inflorescence which often consists of a single 1 x 1 cm head and which terminates the culm; whereas taller plants with culms 15-20 cm long have more open inflorescences up to 7 x 10 cm with several heads, each bearing 6-7 flowers. All intermediates occur.
Figure 5. Geographic distribution of *Juncus breviculmis* (★) and *J. bufonius* (▲).
Representative specimens. **Boyacá:** NW of Belén, stream Minas NE of lake El Alcohol, 3850 m, 29 Feb 1972, *Cleef* 2061, fl (COL, U); Sierra Nevada del Cocuy, alto Valle Lagunillas, 3915 m, 7 Oct 1972, *Cleef* 5926, fl (COL, U); páramo de la Rusia, NW-N de Duitama, 3565 m, 6 Dec 1972, *Cleef* 6740, fl (COL); 3570 m, 13 Dec 1972, *Cleef* 7136A, fl (COL). **Cundinamarca:** Planos de Toldadero, 3950 m, 13 Sep 1938, *Cuatrecasas* 1557, fl (COL, F, US); páramo de Monserrate, El Granizo, 3250 m, 8 Feb 1986, *Fernández-Alonso* 5149, fr (COL); Bogotá, localidad 20, PNN Sumapaz, alrededores de lagunas Chisacá, Larga y del Rebosadero, 3700-3950 m, 15 Oct 1999, *Pedraza* 723 (COL); páramo de Guargua, Pantano Largo, 3610 m, 2 May 1987, *R. Sánchez* 98, fl (COL); páramo de Chisacá, 3500 m, 3 Jun 1987, *R. Sánchez* 139, fl (COL). **Santander:** páramo del Almorzadero, 3600-3800 m, 28 Nov 1941, *Cuatrecasas* 13509, fl (COL, US); N of Cerrito, 31 Oct 1944, *Fassett* 25999, fl (NY, UC, US); páramo de Santurbán, 3600 m, 27 Aug 1948, *Araque-Molina* 185722, fr (US).


Annual, cespitose herbs, 5-40 cm tall. **Rhizome** absent. **Culms** erect, procumbent or ascending, terete, smooth, 0.5-1.5 mm diameter, sometimes producing foliar shoots in leaf axils on procumbent stems. **Cataphylls** absent or rarely one to each culm and then inconspicuous, membranous, 7-12 mm long. **Foliar leaves** 1-5 basal and 1-3 cauline to each culm, 4-15 cm long; sheaths 0.5-3 cm long, with membranous margin which is not extended into auricles; blade flat with raised margins, slightly channeled above, 0.5-1.5 mm wide. **Inflorescence** usually occupying more than half of the total plant height, lax, compound, consisting of several unilateral cymes (drepania) with the flowers inserted individually and emoved from one another, or rarely 2-4 flowers clustered together, individual drepania up to 10 cm long; lower inflorescence bract resembling cauline leaf, 4-15 cm long, distal bracts progressively shorter, the ultimate ones to 5 mm long and membranous; each flower clasped by two 1.5-2.5 mm long bracteoles. **Tepals** unequal, lanceolate, acuminate, light green with membranous margins, turning brown at fruit ripening, outer ones 4-6(-7) mm long, inner ones 3.5-5(-6) mm long. **Stamens** six, 1.3-2.2(-2.6) mm long; anthers linear or oblong, 0.3-1(-1.5) mm long. **Capsule** ellipsoid, trigonous, truncate and mucronate, 3-4 x 1.5-2 mm, with persisting 0.1-0.3 mm long style, castaneous at maturity, dehiscing apically, 3-locular. **Seeds** oblong, apiculate, 0.4-0.6 x 0.2-0.3 mm, smooth to slightly rugose, yellow-brown.
**Distribution and habitat.** *J. bufonius* is a weedy cosmopolitan species most common in the north temperate region but it is also found in the cool highlands of all tropics and occurs in all major southern temperate areas. It is most often found in open and exposed soils along roads, ditches, etc. Its altitudinal range is wider than that of most other *Juncus* species, occurring between 350 and 4000 m. In Colombia this species has been collected from center to north of the Andes, at elevations of 1000-3600 m.

**Comments.** *J. bufonius* is the only annual species of *Juncus* found in Colombia. It may furthermore be recognized by its very loose inflorescence which usually occupies more than half the height of the plant, and by the leaf sheaths which do not form auricles at the junction to the leaf blade. Morphologically *J. bufonius* is variable and in Europe and the Middle East it has been treated as a complex of closely related micro-species (Cope & Stace 1978; Loenhoud & Sterk 1976; Snogerup 1971, 1980; Krechetovich & Goncharov 1935). *J. prolifer* is based on a large specimen from Colombia.

**Representative specimens.**

**Antioquia:** municipio Jardín, vía Jardín-Ríosucio km 13, 2100-2400 m, 8 Jun 1987, Callejas 3829, fl (COL, MO); Urrao, páramo de Frontino, Llano Grande, 3420 m, 15 Sep 1984, Londoño 556, fl (COL); Urrao, páramo de Frontino, Churumblum, 3310 m, 12 Sep 1984, Londoño 469, fl (COL); Medellín, cerro del Padre Amaya, Boquerón, 4 Aug 1979, Palacios 24, fr (COL); Urrao, páramo de Frontino, 3380 m, 10 Sep 1986, Roldán 312 (AAU, MO, NY).

**Boyacá:** Tunja, 2820 m, 5 Jul 1973, Ballesteros-G. 7, fl (COL); river Pomeca valley 13 km NW of Arcabuco, 2850 m, 20 Aug 1944, Fassett 25641, fr (US); Sierra Nevada del Cocuy below El Playon, 3500 m, 11 Sep 1957, Grubb 791, fl (COL, K, US); Ventaquemada, 2 Jun 1971, Guarín-M. 952, fl (COL); Aquitania, lago de Tota, 3015 m, 4 Aug 1953, Mora-Osejo 1229, fl (COL).

**Caldas:** páramo de Letras, 3700 m, 4 Dec 1958, H. G. Barclay 6266, fl (COL, MO, US).

**Cundinamarca:** páramo de Palacio, río Negro, 3375 m, 22 May 1972, Cleef 3938, fl (COL, US); Bogotá, San Cristóbal, 2700 m, 12 Apr 1932, Cuetreccasas 2064 (B); Bogotá, Universidad Nacional, 2600 m, 28-29 Apr 1986, Fernández-Alonso 6404, fr (COL); 5 km SW of Bogotá on road to Usme, 2800 m, 4 Aug 1950, Galen-Smith 1317, fr (B, COL, MO, NY, US); Zipaquirá, 2600 m, 20-24 Oct 1917, Pennell 2557, fr (F, GH, MO, NY, US).

**Nariño:** Ipiales, páramo El Cultún, vía a la Victoria, 3000 m, 25 Nov 2006, Baca 887 (COL).

**Norte de Santander:** Valley of River Chitaia, SW of Pamplona, 2600 m, 19 Oct 1944, Fassett 25942, fr (NY, US); Sarare road 10 km S of Pamplona, 2600 m, 29 Nov 1944, Fassett 26037, fl (US); Mutiscua-Pamplona, 2700-3400 m, 23 Feb 1927, Killip 19698, fl (COL, NY, US); Pamplona-Toledo road at divide between rivers La Teja and Mesme, 2500-2800 m, 28 Feb 1927, Killip 19889, fr (COL, NY, US).

**Risaralda:** municipio Pereira, Parque Natural Regional Ucumari, La Pastora-Peña Bonita, 2300-2600 m, 22 Nov 1989, G. Galeano 2138, fr (COL); Santa Rosa de Cabal, arriba de Ternales, 16 Sep 1993, Katib 113 (COL).

**Santander:** páramo de Santurbán, 3600 m, 2800 m, 27 Aug 1948, Arape-Molina 18S694, fl (COL, US); along highway between Vélez and Barbosa, 2 km W of Barbosa, 2 May 1983, Croat 56935 (NY).

**Tolima:** Ibague, corregimiento de Laureles, inspección de Dantas, finca Alondra, 1700 m, 29 Jan 1979, Echeverry-E. 3235, fl (COL); Quindío highway between Cajamarca and summit of Divide, 2438 m, 27-28 Mar 1939, Killip 34538, fl (AAU, COL, F, GH, MO, NY, P, S, US).

Figs. 2, 6

Perennial, cespitose herbs, 5-30 cm tall. **Rhizome** creeping, 1.5-2 mm diameter, covered with a filamentous dark brown layer of remaining sclerenchyma strands from splitting leaf bases and cataphylls, internodes very short and the culms arising in dense rows. **Culms** erect, canalicate, 0.4-0.7 mm diameter. **Cataphylls** 1-3 to each culm, to 1.5 cm long, yellow-brown, with a rudimentary blade to 5 mm long. **Foliar leaves** all basal, 1-2 to each culm, 5-20 cm long; sheaths 0.7-1.7 cm long with the margins terminating in two 0.3 mm long, rounded auricles; blades filiform, 0.3-0.6 mm diameter, obtuse-angled with an adaxial groove at the base. **Inflorescence** terminal or pseudolateral, compound, 2-10 flowered, consisting of 2-3 short, unilateral cymes (drepania); lower inflorescence bract 1.5-5 cm long, appearing as a continuation of the culm and exceeding the inflorescence, upper bracts progressively shorter, the ultimate ones membranous, to 3 cm long; each flower clasped by two, 1 cm long bracteoles. **Tepals** unequal, lanceolate, light green with membranous margins, turning brown to stramineous at fruit ripening, outer ones 2.3-3 mm long, inner ones 2-2.5 mm long. **Stamens** six, 1.1-1.3 mm long; anthers oblong, 0.3-0.4 mm long. **Capule** ellipsoid, to oblong, apiculate or often becoming truncate towards dehiscence, trigonous with concave sides, 2.3-2.6 x 1.2-1.6 mm, brown, glossy at maturity, thin walled and often with impressions of the contained seeds, 3-septate. **Seeds** ovoid, asymmetrical, slightly apiculate, 0.4-0.6 x 0.3-0.4 mm, finely patterned by narrow, transversally arranged polygons, brown.

**Distribution and habitat.** *J. capillaceus* grows at high elevations, usually above 2700 m, along the Andes from Venezuela to Bolivia and Peru. It also occurs at low elevations in Concepción in Chile and along the E coast of South America from Rio de Janeiro in Brazil to Buenos Aires in Argentina. There are scattered occurrences in South Africa (Adamson 1935) and in Australia (Beadle et al. 1972) which presumably represent recent introductions since the plants are ruderal there. At least in the N Andes, where we have observed it, it is ecologically similar to *J. imbricatus* and grows and flowers in dry hard soils, and the two species are often seen together. It is found in small clumps along roads or in old grass fields rarely in salt meadows (*Ewan 15631*). In Colombia this species is found in the Cordillera Oriental (departments of Boyacá, Cundinamarca and Norte de Santander), center of Cordillera Central (Valle del Cauca) and Nudo de los Pastos, at elevations of 2100-3400 m.


Perennial, cespitose herbs, 10-30 cm tall. **Rhizome** horizontal, creeping, 1.5-3 mm diameter, covered by a brushy, filamentous layer of persisting sclerenchyma strands from degraded leaf bases and cataphylls, internodes very short and the culms arising in densely crowded rows. **Culms** erect, terete, smooth or longitudinally ridged, 0.6-1.1 mm diameter **Leaves** 2-3 to each culm, all basal, 5-15 cm long, mostly not overtopping the inflorescence; sheaths 1.5-4 cm long with membranous margins terminating in two 0.2-0.5 mm long auricles which are scarious or slightly cartilaginous towards the center; blades linear, flat, 0.8-1.3 mm wide with an adaxial band of hyaline epidermal cells occupying the width of the blade except for the 0.1 mm wide margin. **Inflorescence** terminal 1.5-3 x 1-2 cm, consisting of 1-5 up to 6-flowered unilateral cymes (drepania); lower inflorescence bract resembling a basal leaf, herbaceous, 1.5-6 cm long, shorter or longer than the inflorescence, upper bracts much smaller, scale like or membranous, each flower clasped by two obtuse ca. 2 mm long membranous bracteoles. **Tepals** unequal, lanceolate, acuminate, stramineous, with membranous margin, outer ones 5-6 mm long, concave, inner ones 4.5-5 mm long, flat or slightly concave. **Stamens** six, ca. 2 mm long; filaments filiform; anthers linear, ca. 0.8 mm long. **Capsule** ellipsoid, acute to obtuse, round to slightly trigonous in cross section, 3.5-4 x 1.5-2.5 mm, ca. 1/5 shorter than the tepals, yellow-brown, unilocular to slightly triseptate. **Seeds** ellipsoid, apiculate, 0.3-0.4 x ca. 0.2 mm, rugose, castaneous.

**Distribution and habitat.** This species is widespread, occurring in dry areas along the Andes from Colombia to Argentina, and in the lowlands of temperate South America. In Colombia this species has been found in the departments of Cundinamarca and Boyacá, usually above 2700 m.

**Comments.** *J. cordobensis* is closely related to *J. imbricatus* and *J. capillaceus* with which it shares the peculiar feature of a brushy and filamentous cover of sclerenchyma strands that remain on the creeping rhizome when the leaf bases and cataphylls degrade. It differs from *J. capillaceus* in being more robust and larger in both vegetative and reproductive
Figure 7. Geographic distribution of *Juncus cordobensis* (■) and *J. cyperoides* (♦).
parts. It differs from *J. imbricatus* in having: 1) flat leaf blades with an obvious broad band of enlarged hyaline epidermal cells that occupy almost the entire adaxial surface instead of terete or angular blades with only a narrow band of hyaline cells; 2) scarious instead of cartilaginous auricles; 3) the capsule much shorter than the tepals instead of much longer; and 4), the outer tepals 5-6 mm long instead of 4-5 mm long.

Representative specimens. **Boyacá:** Tunja, predios de la UPTC, *Guarín-M.* **1114** (COL). **Cundinamarca:** Sopo, *Brother Ariste-Joseph* s.n., fr (US); San Rafael, Bosa, Jan 1936, *García-Barriga 4881*, fr (COL); Guasca, 2700 m, *V. Grant 7347*, fr (US).

**2-6. Juncus cyperoides** Laharpe, Essai monogr. Jonc. 57. 1825. **Type:** “L’Amerique meridionale”, *L. Née s.n.* (holotype G). **Figs. 7, 8**

Perennial herbs, 5-30 cm tall. **Rhizome** creeping and branching ascending, gradually changing into the culm, 0.71.5 mm diameter, internodes to 3 cm long, with up to 1.5 cm long, membranous scales and adventitious roots at the nodes. **Cataphylls** usually absent, or 1-3 to each culm, inconspicuous, membranous, 0.5-2 cm long, with rudimentary blade to 3 mm long. **Foliar leaves** 5-15 to each culm, separately and somewhat distantly inserted, sometimes clustered at the base of the culm, linear, 3-12 x 0.1-0.7 cm, flat, without raised margins and therefore not bifacially differentiated; sheaths 0.5-3 cm long, not differing from the blade, upper parts with or without membranous margin, without auricles. **Inflorescence** with (1)5-40 flower heads in anthelate arrangement, each head on delicate, 0.2-0.3 mm thick branches; heads (3-)5-10 flowered, sometimes with viviparous shoots; lower inflorescence bract resembling cauline leaves, to 9 cm long, distal bracts shorter, floral bracts membranous, to 5 mm long. **Tepals** linear to lanceolate, equal to subequal, 2.24(-5) mm long, green with narrow membranous margin, turning castaneous and finally light brown, outer ones concave, inner ones flat. **Stamens** six, 2-3 mm long; filaments filiform; anthers linear, 0.5-1 mm long, much shorter than the filaments. **Gynoecium** with style ca. 0.5 mm long; stigmas 1.5-2 mm long. **Capsule** ellipsoid, trigonous, 2-3.5 x 1-1.5 mm, with ca. 0.5 mm long beak, about as long as the tepals, thin walled, 3-septate. **Seeds** ellipsoid, apiculate, 0.4 x 0.2 mm, reticulate, castaneous, ca. 40 per capsule.

**Distribution and habitat.** *J. cyperoides* occurs in the Andes from Colombia to N Peru and Bolivia at elevations above 2000 m, and from Tucuman to Aysen in Argentina, and in adjacent Chile, sometimes at sea level. It grows in wet places in bogs, meadows, swamps, ditches, etc. In Colombia this species is found in center of the Cordillera Oriental (departments of Boyacá, Cundinamarca and Meta) and Macizo Colombiano (Cauca and Huila), at elevations of 2000-4000 m.

Representative specimens. **Boyacá:** páramo de Pisba, Socha-La Punta road km 72, 3500 m, 9 Jun 1972, *Cleef 4274*, st (U, COL), 3570 m, 11 Jun 1972, *Cleef 4372A*, st (COL), 3580 m, 11 Jun 1972, *Cleef 4391A*, fl (COL), 3580 m, 11 Jun 1972, *Cleef 4406A*, st (COL);
Sierra Nevada del Cocuy, S of lake Cuadrada, 4060 m, Cleef 5578A (COL). **Cauca:** river Palo, La Tolda above Tacueyo, 2000 m, 18 Dec 1944, Cuatrecasas 19458, fl (F, GH, MO, US); Silvia, Popayán, 2300-2600 m, n. d., Lehmann 8473, fl (F, GH, K, US); Mt. Puracé, 3600-3700 m, 12 Jun 1922, Pennell 6547, fl (GH, NY, PH, US); Coconuco, 2400 m, 25 Feb 1939, von Sneidern 2080, fl (F, G, NY, US). **Cundinamarca:** Chicasá, río Santa Rosa cerca de 1 km al S de laguna Larga, 3660 m, 22 Aug 1972, Cleef 5187, fl (AAU, COL, P); stream Chuza between páramos Palacio and Chingaza, 3640 m, 19 Sep 1972, Cleef 5476 (COL, P, U); Bogotá, laguna Chisacá 40 km al N de Sumapaz, 3300-4000 m, 10 Sep 1959, García-Barriga 17197B (COL); páramo Palacio, hacienda La Siberia, 3200-3400 m, 5 Jan 1960, Mora-Osejo 955 (COL); municipio La Calera, vereda Libano, río Teusaca, 3000 m, 28 Apr 1985, Schmidt-Mumm 261 (COL). **Meta:** páramo de Sumapaz, laguna La Guitarra, 3450 m, 22 Jan 1971, Cleef 871A (COL st). **Nariño:** La Chorrera, 2600 m, 12 Jan 1952, Fernández-Pérez 1234, fl (COL); GRE, 2600 m, Feb 1951, Knoth 4005 (NY). **Putumayo:** Colón, 21 Mar 1940, de Garganta-Faabregas s.n., fl (COL).


Perennial herbs, 65-135 cm tall. **Rhizome** horizontal, creeping, 3-8 mm diameter, scales thin, membranous, not covering the rhizome, internodes 1.5-2 cm long. **Culms** erect, 2.5-5.5 mm diameter, smooth or finely nodulated, sometimes with fine longitudinal striations but never ridged. **Cataphylls** conspicuous, 1-3 to each culm, all basal or upper ones rarely inserted up to 20 cm from the base, stramineous to brown, lower one 1-6 cm long, upper ones to 20 cm long with 4-6 mm long rudimentary acicular blade. **Foliar leaves** (1-)2(-3) spread along the culm, lower one 25-75 cm long, sheaths 7-16 cm long with membranous margins terminating in two rounded 2-4 mm long auricles, blades terete 2-4.5 mm diameter, hollow with transverse septa 2-15 mm apart but not always nodulated on the outside, upper leaf often inserted above the middle of the culm, usually much smaller, blade sometimes only 5 cm long. **Inflorescence** emaiings, anthelate, up to 20 x 7 cm, or congested and sometimes only 3 x 2.5 cm, flower heads 7-45, globose, 7-15 mm diameter, 20-40-flowered, stramineous, principal branches to 12 cm long and 1.5 mm in diameter; lower inflorescence bract 313 cm long, resembling cauline leaves with short blade or the blade rudimentary to 5 mm long, distal bracts shorter, floral bracts less than half as long as the flowers. **Tepals** linear-lanceolate, subulate, rigid, outer ones 3-4 mm long, longer than inner ones, concave to V-shaped in cross section, inner ones 2.5-3.5 mm long, flat. **Stamens** three, 1.5-2 mm long; filaments filiform; anthers oblong, 0.4-0.8 mm, distinctly shorter than the filaments. **Capsule** ovoid, beaked, trigonous, 1.9-2.7 mm (incl. beak) x 1.1-1.2 mm, about 1/3 shorter than the tepals, light brown, unilocular, dehiscing laterally, the carpels emaiing connate at the beak. **Seeds** ellipsoid, apiculate, 0.4-0.5 x 0.15-0.2 mm, reticulate.
Figure 9. Geographic distribution of *Juncus densiflorus* (▲) and *J. dudleyi* (✦).
**Distribution and habitat.** *J. densiflorus* is distributed in the Andes from Venezuela (including Guayana Highlands) to Colombia at elevations of 1450-3100 m above sea level, in the highlands of SE Brazil at elevations of 800-1600 m above sea level, and in the lowlands of Paraguay, Argentina, and Uruguay. It grows in humid places in marshes, swamps, and along creeks and streamlets below the timberline. In Colombia this species is distributed in center of the Cordillera Oriental and Cordillera Central, Macizo Colombiano and Nudo de Los Pastos, at elevations of 1500-3300 m.

**Vernacular name.** “Junco” (*Duque-Jaramillo 2775*, COL); “Totorilla” (*da Rocha 3*, COL).


Perennial cespitose herbs, to 70 cm tall. **Rhizome** densely branching. **Culms** usually smooth, sometimes slightly longitudinally ridged; auricles ca. 0.5 mm long, wider than long, rounded, cartilaginous. **Leaf blade** terete or channeled, when channeled the central part of the cross section is thicker than the edges, adaxial side with a narrow band of hyaline cells occupying less than 1/3 of the width. **Inflorescence** composed of several few-to many-flowered unilateral cymes, congested into one more or less dense head; lower inflorescence bract usually filiform, flexuose, obviously longer than the distal ones. **Tepals** not or only slightly recurving. **Capsule** thin walled, usually clearly shorter than the tepals when mature, valves not recurved along the seams and the capsule therefore not 3-keeled.

**Habitat and distribution.** *J. dudleyi* is widely distributed in North America and Mexico, scattered in the Central American highlands. In South America is distributed in the Andes from Venezuela to Ecuador, and disjunctly in central Peru. It grows in wet places, along streams, lakes, and roads, and in meadows and grass lands at elevations of 2600-3900 m above sea level, which is, on the average, higher than *Juncus tenuis*. In Colombia *J. dudleyi* has been found in center of the Cordillera Oriental (Boyacá, Cundinamarca and Santander) and Cordillera Central (Valle del Cauca), at elevations of 2600-3650 m.

**Comments.** This species is probably introduced in tropical and temperate South America and was often recognized as *J. tenuis* var. *platycaulos*. However, the identity of the South American plants requires further study.

**Representative specimens.** **Boyacá:** near Soata, 2800 m, 4 Mar 1939, *Alston 7394 p.p.*, fr (F, NY, US); Tunja, 2820 m, 5 Jul 1973, *Ballesteros-G. 3*, fr (COL); Sierra Nevada del Cocuy, río San Paulino-finca Ritacuba, 3650 m, 4-5 Apr 1959, *H. G. Barclay 7320*, fl (COL, MO, US). **Cundinamarca:** Bogotá, 2640 m, *André 1369* (K); without data, *Brother Idinoel 6* (NY); Bogotá, Universidad Nacional, 2600 m, 28-29 Apr 1986, *Fernández-Alonso 6412*, fr (COL); Zipaquirá, 2600 m, 20-24 Oct 1917, *Pennell 2558*, fr (GH, MO, NY, US); laguna La Herrera, 2600 m, 19 Jun 1985, *Vink 372*, fl (COL). **Santander:** E slope of páramo de
Las Coloradas above La Baja, 3900 m, 27 Jan 1927, Killip 18483, fr (GH, NY, US). **Valle del Cauca:** Barragán, río Bugalagrande, Loma de Barragán, La Parilla-La Machuca, 2660-2750 m, 13 Apr 1946, Cuatrecasas 20644, fr (F, US).


Perennial herbs, 30-80 cm tall. **Rhizome** creeping, 2-5 mm diameter, scales thin, membranous, inserted individually and not overlapping, internodes 0.5-2 cm long. **Culms** erect, 1.2-3 mm diameter, smooth or sometimes with small transverse nodules on the basal internode. **Cataphylls** 2-3 to each culm, lower one 1-3 cm long, upper one 5-10 cm long, conspicuous, reddish tinged when young, later light brown. **Foliar leaves** 1-2 basal and 1-2 cauline to each culm, basal one 20-50 cm long, cauline ones shorter, sometimes only 10 cm long; sheaths 4-8 cm long, first reddish tinged, becoming light brown, with distinct membranous margins terminating in two 1.5-2.5 mm long, rounded auricles; blades terete, 1-2.5 mm diameter, hollow with septa 0.2-1 cm apart. **Inflorescence** omm.ounds with very short principal branches, condensed into one or sometimes two irregularly shaped dark, reddish brown, bristly heads, 1-3 cm in diameter, the omm.ounds structure sometimes indicated externally by the somewhat globular subunits of the head; lower inflorescence bract 27 cm long, green, soon turning brown, sheath wide, open, rudimentary blade thin, 0.5-1.5 cm long, distal bracts shorter, the ultimate ones membranous and to 4 mm long. **Tepals** equal or outer ones sometimes slightly longer, 2.7-4.5 mm long, linear-lanceolate, subulate, pale with membranous margins at the base, the apex very dark brown or almost black. **Stamens** six, or more commonly three through abortion of the inner whorl, 1.3-1.6 mm long; anthers up to 0.7 mm long, as long as the filaments, with age sometimes less than 0.3 mm long and shorter than the filaments. **Capsule** ellipsoid, beaked, trigonous to 3-lobed, 2.5-3.2 mm (incl. beak) x ca. 1 mm, shorter than the tepals, gradually darker brown towards the apex, unilocular. **Seeds** ellipsoid, apiculate, 0.4-0.5 x ca. 0.2 mm, reticulate, yellowish brown.

**Distribution and habitat.** *J. echinocephalus* is distributed in the páramos of Colombia and barely reach into the adjacent páramos of Venezuela (Tama) and Ecuador (El Angel). It grows in wet places at elevations of 2500-4200 m above sea level, most often at 2800-3800 m. In Colombia this species is distributed in north of the Cordillera Occidental (Antioquia), center of the Cordillera Oriental and Cordillera Central (Tolima and Risaralda), Macizo Colombiano and Nudo de Los Pastos. It grows between 2800 and 4200 m, and is common in eutrophic cattle fields (Cleef, pers. comm.).

**Comments.** *J. echinocephalus* is related to *J. densiflorus*. They both have creeping rhizomes and conspicuous cataphylls beaked capsules, and rigid, subulate tepals which give the flower heads a bristly appearance. *J. echinocephalus* may be distinguished by
Figure 10. Geographic distribution of *Juncus echinocephalus* (★) and *J. ramboi* subsp. *colombianus* (●).
its inflorescence which is congested, 1-2-headed, with very short principal inflorescence branches. *J. densiflorus* has well developed principal branches which are terminated by globular flower heads.

**Representative specimens. Antioquia:** páramo Morro Frontino N of Urrao, 3650 m, 11 Mar 1944, Core 397, fl (US); Urrao, páramo de Frontino, 3500-3800 m, McDougal 4494 (AAU). **Boyacá:** Cordillera Oriental, páramo de Huina entre Belen y Susacón, 3440 m, 6-9 May 1959, H. G. Barclay 7590 (MO); municipio Ráquira, vereda Firta Peña Abajo, laguna Confites, 2850m, 19 May 1998, Becerra 195 (COL); Vado Hondo, 3015 m, 9 Jul 1973, Cleef 9540B, st (COL); páramo El Cóncavo, 3770 m, 6 Jul 1973, Cleef 10008, fl (COL); Sierra Nevada del Cocuy, Valle San José, El Playón, 3800 m, 10 Sep 1957, Grubb 771, fl (COL, K, US). **Cauca:** Macizo Colombiano, Valle de las Papas cerca a Valencia, 3100 m, 24 Sep 1958, H. G. Barclay 5745, fl (COL, MO, US); páramo Las Barbillas cerca a Guachicono, 3100 m, 19 Jul 1944, Core 966, fl, fr (COL, US); Letreros-Santo Domingo, 3350 m, Idrobo 3377 (P); Llano de Paletara, 2950-3100 m, 15-17 Jun 1922, Pennell 6908, fl (GH, NY, PH, US); Puracé, estación San Rafael, 3200 m, 18 Apr 1982, Torres-R. 930, fl (COL). **Cundinamarca:** páramo de Sumapaz, S of San Juan, 3545 m, 28 Jan 1973, Cleef 8399B, fl (COL); macizo de Bogotá, La Calera, páramo de Palacio, hacienda La Siberia, 3420-3500 m, 11 Dec 1959, Cuatrecasas 25595, fl (COL, US); Ridge between quebrada Las Chorreras (Bejucas River) and quebrada Tunal (River Gobernador) 20 km SE of San Bernardo, 3630 m, 13 Aug 1943, Fosberg 20804, fl, fr (COL, US); La Calera, páramo de la Siberia, 3000-3500 m, 25 Oct 1952, Humbert 26852, fl (COL); represa de Pantano Redondo, Zipaquira, 3100 m, 15 Aug 1956, Idrobo 2245, fl (COL). **Meta:** macizo de Sumapaz, laguna la Guitarra, 3380-3420 m, 4 Jul 1981, Díaz-Piedrahita 2427, fl (COL); Cubarral, laguna La Guitarra, páramo de Sumapaz, 3420 m, 5 Jul 1981, Franco-Roselli 162, fl (COL). **Nariño:** páramo del Cerro Precipicio, 3100 m, 4-5 Oct 1944, Ewan 16283, fl (UC, us). **Norte de Santander:** páramo Tama above la Cueva, 3100-3200 m, 27 Oct 1941, Cuatrecasas 12623, fl (COL, F, US); vía Toledo hacia Vereda Santa Isabel, entre páramo Santa Isabel y finca Palo Colorado, 1750-3050 m, 4 Nov 1994, Fernández-Alonso 11874, fl (COL); páramo de Romeral, 3800-4200 m, 30 Jan 1927, Killip 18627, fr (F, GH, NY, S, US). **Putumayo:** páramo de Santa Lucia, río Alisales, 2900-3100 m, 9 Jan 1941, Cuatrecasas 11872, fl (COL, US); río Guamues, río Estero, volcán Cerro Patascoy, 2800-3075 m, 27 Oct 1944, Ewan 16363, fl (COL, US). **Risaralda:** río Otún, laguna Taburetes, 3580 m, 24 Nov 1946, Cuatrecasas 23172, fl (F, US). **Santander:** páramo N of Cerrito, 3250 m, 12 Oct 1944, Fassett 25922, fl (NY, US), 12 Oct 1944, Fassett 25925, fl (COL, US). **Tolima:** Rosalito cerca páramo de Ruiz, 2800-3100 m, 15-17 Dec 1917, Pennell 2969, fl (GH, MO, NY, US). **Locality unkown:** Brother Ariste-Joseph s.n., fl (US); Mutis 5221 p.p. (US mixed with *J. densiflorus*).
Figure 12. Geographic distribution of *Juncus ecuadoriensis* (♦) and *J. imbricatus* (➕).

Figs. 11, 12

Perennial, loosely cespitose herbs, (20-)35-80 cm tall. **Rhizome** densely and irregularly branching, 2.5-3.5 mm diameter. **Culms** erect, 1-4 mm diameter, terete, smooth or with small elongate transverse nodules on the basal part. **Cataphylls** usually absent, sometimes present as a membranous sheathing, but never conspicuously different from the leaf sheaths. **Foliar leaves** 1-3 basal and 1-2 cauline to each culm, 20-70 cm long; sheaths 5-15 cm long, sometimes nodulated like the culm, margin membranous and terminating in two 1-3.5 mm long, scarious, rounded auricles; blades 2-5 mm diameter, round to elliptic in cross section, nodulated by conspicuous septa 1-4 cm apart. **Inflorescence** varying from one terminal flower head to a 20-headed, 1-3 times branched anthela, up to 7 x 15 cm, heads first conical, becoming semi-globose to globose with age, 1-1.5 cm diameter, many-flowered, the ultimate head bearing branches more than 0.4 mm diam; lower inflorescence bract 3-13 cm long, resembling basal and cauline leaves but much shorter, distal bracts shorter, the ultimate ones scale like and about 1 cm long, floral bracts to 3.5 mm long, castaneous to stramineous, with membranous margins. **Tepals** equal, 3.8-4.6 mm long, lanceolate, acute, green, becoming castaneous or sometimes stramineous, margin membranous, outer ones concave, inner ones flat, slightly narrower than the outer ones. **Stamens** three, 1.4-1.8 mm long; anthers oblong to linear, 0.5-0.8(-1) mm long or usually shorter than the filament. **Capsule** narrowly ellipsoid, acute and apiculate, trigonous, 2.9-4.4 x 1-1.3 mm, sometimes protruding from the tepals, light brown at the base, dark brown to almost black at the apex, unilocular. **Seeds** narrowly ellipsoid, apiculate, 0.7-0.9 x ca. 0.3 mm, reticulate, yellow-brown.

**Distribution and habitat.** *J. ecuadoriensis* occurs in the Andes from Venezuela to S Ecuador. It grows in wet places between 1950 and 4000 m, in seepage areas and in *Sphagnum* bogs. In Colombia this species is distributed in center of the Cordillera Oriental (Boyacá, Cundinamarca and Norte de Santander), north of the Cordillera Occidental (Antioquia), Macizo Colombiano and Nudo de los Pastos, at elevations of 1980-4000 m.

**Representative specimens. Antioquia:** Urrao, páramo Frontino, Puente Largo-cerro Cuchilla de Frontino, 36003800 m, 19 Jul 1995, *D. Sánchez* 2258, fl (COL); Urrao, páramo de Frontino, bosques del Alto del Diablo, 3450-3500 m, 28 Sep 1995, *D. Sánchez* 2355, fl (COL); Urrao, páramo de Frontino, Llanuras de Santa Bárbara, 3500-3600 m, 1 Oct 1995, *D. Sánchez* 2464, fl (COL). **Boyacá:** Aquitania, Península de Suse, 3050 m, May 1976, *Aguirre-C.* 396, fr (COL); municipio Pesca, vereda Puerta Chiquita, páramo de La Cortadera, 3500-3700 m, *Bejarano-B.* 39, fl (COL); Cusiana River, 1 km E of Vado Hondo, 2880 m, 31 Mar 1973, *Cleef* 9225B, fr (COL); páramo Sarna between Sogamoso and Vado Hondo valley, 3405 m, 5 Apr 1973, *Cleef* 9406A, fl (COL); páramo La Rusia between La Osera and stream de la Esperanza on Duitama-Charala road, 3624 m, 20 Aug 1953, *Langenheim* 3503, fl, fr (COL, NY, US). **Cauca:** Macizo Colombiano, Valle de Las Papas, cerca a Valencia, 3140 m, 25 Sep 1958, *H. G. Barclay* 5794, fl, fr (COL, US); páramo Las Barbillas near Guachicono, 3100 m, 19 Jul 1944, *Core* 985, fl (US);
29 Oct 1981, Las Papas valley cerca Valencia, 2700 m, 20 Jul 1944, Core 1004, fr (US); Paletara, 2950-3100 m, 15-17 Jun 1922, Pennell 6909, fr, fl (GH, NY, PH, US). **Chocó:** Valle de San Francisco, macizo de Tamana, 3300 m, 14 Feb 1983, Torres-R. 1936 (COL). **Cundinamarca:** páramo de Guasca, 3200-3400 m, 6 Jan 1959, H. G. Barclay 6522, fl, fr (COL, US); páramo de Sumapaz, Lagunitas 4.5 km S of San Juan, 3455 m, 29 Jan 1973, Cleef 8447A, fl (COL); macizo de Bogotá, páramo Palacio, hacienda La Siberia, El Tablón, 3350 m, 14 Dec 1959, Cuatrecasas 25661, fl (COL, US); Fomeque, Chingaza National Natural Park, 3210 m, 26 Jan 1982, Franco-Roselli 951, fl (COL); páramo Guasca, 2800-3000 m, 12 Jul 1963, Soejarto 52, fl, fr (F, US). **Nariño:** laguna Cocha, 3 May 1876, André 3093 (F, GH, NY); Cumbal, 4000 m, 24 Mar 1941, von Sneidern A431, fl (GH, NY, US). **Norte de Santander:** Alto de Almorzadero N of Cerrito, 3800 m, 31 Oct 1944, Fassett 25995, fl (COL, US); 35 km de San Bernardo de Bata en la vía a Saravena, Alto de Santa, 1980 m, 1 Nov 1994, Fernández-Alonso 11807, fr (COL). **Santander:** páramo del Almorzadero, Perlonso, 3200 m, 19 Jul 1940, Cuatrecasas 9876, fl, fr (COL, US mixed with J. microcephalus); páramo N de Cerrito, 3050 m, 12 Oct 1944, Fasset 25927, fl (US).

2-11. **Juncus effusus** L., Sp. pl. 1: 326. 1753. **Type:** Herb. Linn. No. 449.6 (LINN, lectotype designated by: Kirschner in Jarvis (ed.) 2007). **Figs. 3, 13**


Perennial, cespitose herbs, 50-100 cm tall. **Rhizome** creeping, 2-5 mm diameter, covered with dark, castaneous scales, internodes very short and the culms arising in densely crowded rows. **Culms** erect, terete, 2-6 mm diameter, externally striate by 40-60 longitudinal, subepidermal sclerenchyma strands running parallel to the vascular bundles; pith continuous, aerenchymatous with asteriform cells. **Cataphylls** 3-5 to each culm, to 30 cm long, with rudimentary, acicular blade to 5 mm long, usually densely sheathing, dark castaneous at the base, light brown or stramineous upwards. **Foliar leaves** absent. **Inflorescence** pseudolateral, many-flowered, loosely branching and up to 10 x 20 cm, or usually smaller and sometimes congested, capitulate and only 1.5 x 1.5 cm, sometimes subdivided, compound cymose, consisting of several congested cymes, the ultimate ones being unilateral drepania; lower inflorescence bract appearing as a continuation of the culm, 10-45 cm long, and usually constituting 1/5 or more of the total plant height (rarely only 1/10 in Costa Rica), smoothly jointed to the culm, sheath narrow, upper bracts scale like or membranous; each flower clasped by two 0.7-2 mm long bracteoles. **Tepals** unequal, lanceolate, 2-5 mm long, stramineous to castaneous, outer ones concave, slightly longer than the flat inner ones. **Stamens** three, 12 mm long; anthers linear or oblong, 0.3-1 mm long, shorter than or equalling the filaments. **Capsule** ellipsoid to obovoid, obtuse, trigonous to 3-lobed, 1.5-5 x 1-2.5 mm, stramineous to castaneous, 3-septate. **Seeds** ovoid, assymetrical, short apiculate, 0.4-0.6 x 0.2-0.3 mm, rugose, yellow to brown.
Figure 13. Geographic distribution of *Juncus effusus* (●) and *J. liebmannii* var. *quitensis* (★).
Distribution and habitat. *J. effusus* is a cosmopolitan species, most common in the north temperate region, but frequent at higher elevations in the tropics, and scattered in the south temperate region. It occurs in Hispaniola, Guadeloupe, Mexico, Central America until Costa Rica, the Andes from Venezuela to N Peru, Bolivia, Tucuman in Argentina, and also in SE Brazil. It grows in pastures, along roads, and in ditches and other places under human influence. In Colombia is widely distributed in the Andean region with a few collections in the Cordillera Occidental (department of Antioquia), between 1500 and 3600 m of elevation.

Comments. The Colombian collections of *J. effusus* commonly have dense inflorescences of castaneous flowers with 3-3.5 mm long tepals and long lower inflorescence bracts that occupy at least 1/5 of the total plant height.

Vernacular name. “Totora” (Soejarto 1162) Putumayo; “Totorilla” (da Rocha 02, COL); “Junco” (E. Cárdenas 2” COL); “Junco” (de Wilde 2795, COL); “Junco chiquito” (Yepes-Agredo 3263, COL); “Junco” (Duque-Jaramillo 2775A, COL).

Representative specimens. Antioquia: Caldas, vereda La Corrala, Finca La Zarza, 2500 m, 1 Jun 1988, Albert de Escobar s.n., fl (US); Santa Rosa de Osos 86 km NE of Medellín, 2500 m, 22 Nov 1978, Callejas 976 (JAUM, NY); Yarumal-Valdivia road, km 124 near 12 km N of Yarumal, 2050 m, 23 Mar 1979, Luteyn 7072, fr (COL, NY); Guane, Piedras Blancas, 2200 m, 8 Jul 1971, Soejarto 3023, fr (COL); Medellín, cerro del Padre Amaya road 10 km from Medellín-Santa Fe de Antioquia road, 2970 m, 15 Sep 1987, Zarucchi 5307, fl (MO, NY, US). Boyacá: Aquitania, Llanos de Alarcon, lago de Tota, 3025 m, Apr 1976, Aguirre-C. 251, fl (COL); municipality of Duitama, vereda El Carmen en la via a Virolín, 2320 m, 23 Nov 1994, Fernández-Alonso 12182, fr (COL); Socha in rio Chicamocha valley, 2700 m, 8 Nov 1944, Fosberg 22227, fr (F, GH, UC, US); Puebloviejo, 3040 m, 9 Aug 1953, Langenheim 3373, fl (COL, US); Tota, 3000 m, Dec 1951, Yepes-Agredo 3263, fl (COL). Caldas: páramo de las Letras, 3700 m, 4 Dec 1958, H. G. Barclay 6308 fl (COL, US). Cauca: quebrada de Santa Lucia S of laguna de la Cocha, 2850 m, 8 Jan 1941, Cuatrecasas 11808, fl (COL, US); páramo de Paletara, 3000 m, 18 Nov 1968, Espinal-T. 3319, fl (COL); Coconuco, 2300-2500 m, 17-18 Jun 1922, Killip 6864, fr (GH, NY, PH, US); Natural Park, Cuevade los Guacharos, 3000 m, 28 Dec 1988, Ortiz 1284, fr (COL); laguna la Cocha-páramo de Tábano road, 2800-3000 m, 1 Jun 1946, Schultes 7839, fl (US). Cesar: Sierra Perija E of Manaure, Sabana Rubia, 3000-3100 m, 8 Nov 1959, Cuatrecasas 25100, fr (COL, US); municipio Manaure, serranía de Perija, cerro el Avión, 3100 m, 8 Nov 1959, Cuatrecasas 25100, fr (COL, US); municipio La Paz, corregimiento San José de Orienté, serranía de Perija, finca Los Sauces, 3077 m, 26 Feb 2006, Rangel-Ch. 13678, (COL). Cundinamarca: Monserrate, 28 Jun 1957, H. G. Barclay 4330, fr (COL); Sabana de Bogotá, 2600 m, 29 Dec 1938, Cuatrecasas 477, fl, fr (COL, F, GH, US); San Bernardo, vereda Santa Marta, quebrada La Chorrera, 2300-2350 m, 20 Jul 1981, Díaz-Piedrahita 2941, fl (COL); S of Usme between La Regadera and El Hato, 15 Jun 1950, Idrobo 336, fl (COL, NY, US); Sabana de Bogotá, 2600 m, Pérez-Arbeláez 262, fr (COL). Huila: Balsillas, 2000-2100 m, 3-6 Aug 1917, Rusby 738 (NY), 2100-2200 m,
Perennial cespitose herbs, 15-45 cm tall. **Rhizome** creeping, 2-3 mm diameter, covered with a filamentous dark brown layer of remaining sclerenchyma strands from splitting cataphylls and leaf bases; internodes very short and the culms arising in densely crowded rows. **Culms** erect, canaliculate, 0.5-1.5(-1.8) mm diameter. **Cataphylls** 3-4 to each culm, to 5 cm long, dark brown or upper ones sometimes yellow-brown or light green, with a rudimentary blade to 5 mm long. **Blade** bearing leaves all basal, 1-2 to each culm, 10-35 cm long; sheaths 1.5-6 cm long with membranous margins terminating in two 0.3-0.5 mm long auricles; blades filiform, 0.6-1 mm diameter, canaliculate and obtuse-angled, with an adaxial basal groove. **Inflorescence** terminal, compound, 1-30 flowered, consisting of (1-)2-4 clustered, unilateral cymes (drepania); lower inflorescence bract resembling a basal leaf, herbaceous, to 8 cm long and exceeding the inflorescence, or shorter than the inflorescence and needle-like, distal bracts progressively shorter, the ultimate ones membranous, to 3 mm long; each flower clasped by two 1.5-2 mm long bracteoles. **Tepals** unequal, lanceolate, midrib green, turning brown, margins castaneous, membranous at fruit ripening, outer ones 3.5-5 mm long, inner ones 3-4 mm long. **Stamens** six, 1.7-2.1 mm long; anthers linear, 0.8-1 mm long. **Capsule** ellipsoid, apically obtuse to truncate, trigonous with somewhat
concave sides, 3.5-5 x 1.8-2.5 mm, castaneous, glossy at maturity, thick walled and not showing impressions of the contained seeds, 3-septate. Seeds broadly ovoid, asymmetrical, slightly apiculate, 0.4-0.6 x 0.2-0.3 mm, rugose, brown.

**Distribution and habitat.** *J. imbricatus* occurs in the Andes from Colombia to N Argentina, in Concepcion in Chile, and in E South America in Corrientes in Argentina, in Uruguay, and in the highlands S of Buenos Aires. It also occurs in Mexico, South Africa, Australia, and Portugal, where it presumably is recently introduced since the plants are ruderal there. In the Andes it is as a weed on roadsides and in abandoned fields at elevations of 2300-3800 m above sea level. Together with *J. capillaceus* it is different from most other species of *Juncus* because it often grows and flowers in very dry habitats where the soil may be completely hardened. In Colombia this species is found in the center of the Cordillera Central (Valle del Cauca) and Cordillera Oriental (Boyacá and Cundinamarca), at elevations of 2300-2820 m.

**Comments.** *J. imbricatus* is related to *J. capillaceus*, with which it shares the feature of a brushlike cover of splitting leaf sheaths and cataphylls on the creeping rhizome. The two species are similar in several other respects, but are always distinct through the larger dimensions of *J. imbricatus* in both vegetative and reproductive structures, especially the size of the capsule (3.5-5 mm vs. 2.3-2.6 mm long).


Perennial herbs, (15-)20-50(-65) cm tall. Rhizome creeping, 1.5-3 mm diameter, scales absent or few, membranous, internodes 0.5-1 cm long. Culms erect, often slightly curved, 1-2.5 mm diameter. Cataphylls 0-3 to each culm, 1.5-7 cm long, reddish tinged when young,
light brown with distinct membranous margin with age, rudimentary blade to 2 mm long. **Blade** bearing leaves 1-4 basal and 1-2 cauline to each culm, 10-30 cm long; sheaths 3-12 cm long, with membranous margins terminating in two, 0.3-1.3 mm long, scarious auricles; blades 1-2.5 mm diameter, elliptic to round in cross section, laterally compressed, hollow, nodulated by septa 5-15 mm apart, but sometimes inconspicuously so. **Inflorescence** composed of 2-3 flowered glomerules, usually loosely congested into two subequal parts, one terminal on the culm and one lateral, originating in the axil of the lower inflorescence bract; the lateral one overtopping the terminal one; lower inflorescence bract to 12 cm long, resembling cauline leaves, sometimes membranous and shorter, to 2 cm long, distal bracts shorter, the ultimate ones scarious to 4 mm long, floral bracts to 3 mm long. **Tepals** subequal, lanceolate, dark brown, sometimes with green midribs and castaneous margins at the base, outer tepals 2.3-3 mm long, keeled to V-shaped in cross section, at least when young, inner tepals 2-2.5 mm long, flat. **Stamens** six, 1.1-1.8 mm long, inner whorl sometimes slightly shorter than outer whorl; filaments 0.8-1 mm long, flat or filiform, slightly widened at the base; anthers oblong, 0.4-0.8 mm long, shorter than the filaments. **Capsule** ellipsoid, apiculate, trigonous, becoming 3-keeled before dehiscence, 2-3 x (0.9-)1-1.6 mm, sometimes longer than the tepals when mature, dark brown, unilocular. **Seeds** ellipsoid, apiculate, ca. 0.5 x 0.2 mm, with a conspicuous reticulate pattern, yellowish brown.

**Distribution and habitat.** *J. liebmannii* occurs in Mexico and N Andes. In Mexico there are two varieties (var. *polycephalus* and var. *liebmannii*), and in the N Andes there is one variety. *J. liebmannii* var. *quitensis* is distributed from S Colombia to central Ecuador. It grows in pastures, meadows, along rivulets, and in raised bogs at elevations of 2800-3500 meters above sea level, often in the páramos as well as in cultivated areas. In Colombia this species is found in south of the Andes toward Macizo Colombiano and Nudo de los Pastos (Cauca and Nariño), between 2500 and 2900 m of elevation.

**Comments.** The leaf blades of *J. liebmannii* are laterally compressed, clearly unitubular and the crosspartitions (septa) are complete, occupying the whole cross section of the tube.

**Representative specimens.** **Cauca:** Popayán-Totoro road, 2500-2830 m, 8 Apr 1970, Lozano-C. 1552, fl (COL). **Nariño:** Upper río Tescual above Córdoba, 2840-2890 m, 5 Oct 1944, Ewan 16298, fr (GH, US). **Locality unknow:** “New Granada”, 2690 m, Triana 478 (K); “Prov. de Tuquerres”, May 1853, Triana s.n., fr (COL).


Perennial, cespitose herbs, 20-100 cm tall. **Rhizome** densely branching, 1-4 mm diameter, with few, thin, membranous scales. **Culms** erect, 0.5-4 mm diameter, terete, smooth or striate. **Cataphylls** 0-2 to each culm, to 15 cm long, green or reddish tinged,
Figure 16. Geographic distribution of *Juncus microcephalus* (▲) and *J. pallescens* (■).
with distinct membranous margin. **Foliar leaves** 1-3 basal and 1-2 cauline to each culm, (5-)10-50 cm long; sheaths (1.5-)5-15 cm long, with membranous margins terminating in two 0.5-5 mm long, rounded auricles; blades 0.7-4 mm diameter, round to elliptic in cross section, conspicuously septeate, sometimes with an obvious adaxial groove at the base. **Inflorescence** decompound, anthelate, (3-)5-20(-30) x (1.5-)3-10(-15) cm, flower heads (3-)7-50(-100), conical to globose, 5-10 mm diameter, (3-) 10-35 flowered, stramineous or brown, ultimate head bearing branches less than 0.4 mm diameter; lower inflorescence bract to 5(-12) cm long, much shorter than the inflorescence, scale like with reduced blade or occasionally resembling a small basal leaf with a well developed blade, distal bracts shorter, floral bracts acuminate, ca. 3 mm long, membranous, usually not contrasting tepal color. **Tepals** unequal 1-3.5(-5) mm long, lanceolate, acute, outer ones concave and membranous towards the margin, inner ones flat with distinct membranous margin. **Stamens** six or three, 1-2 mm long; filaments flat, linear; anthers oblong to linear, 0.3-0.7 mm long, or about half as long as the filaments. **Capsule** ellipsoid to obovoid, round in cross section or 3-lobed at the base, obtuse to bluntly acute or short mucronate, 2-3.5 x 1-1.5 mm, stramineous to brown or almost black, unilocular. **Seeds** ellipsoid, apiculate, 0.4 0.5 x ca. 0.2 mm, reticulate, yellow-brown with a hyaline outer seed coat.

**Distribution and habitat.** *J. microcephalus* is distributed throughout the highlands of the Neotropical region, from central Mexico to Bolivia and SE Brazil. In Colombia this species is widely distributed in the Andean region, between 1500 and 3600 m of elevation. At Paipa in Boyacá this species grows on salt flats (*Fasset 25900, 25894*), but it is otherwise found in freshwater swamps.

**Vernacular name.** “Totorilla” (*da Rocha 4, COL*).

**Representative specimens.**

**Antioquia:** La Ceja, 2180 m, 2 Nov 1947, *Barkley 1612*, fl (COL, US); Guatape, Guatape-Santa Rita road, 4 km N of Guatape, 1830 m, 22 Oct 1987, *Brant 1445* (MO); Monte del Diablo, La Ceja, 21 Jul 1944, *Brother Daniel 3306*, fl, fr (COL, US); 12 km S of Urrao, río Penderisco, 2040 m, 9 Mar 1944, *Core 374*, fr (COL, US); Sonsón, km 17.6 Sonsón-La Unión road, 38 km from La Unión, 2140 m, 4 Oct 1987, *Zarucchi 6249* (MO).

**Boyacá:** Paipa, 2550 m, 11 Oct 1944, *Fasset 25894*, fr (COL, US); quebrada Corrales, 3260-3330 m, 12 Aug 1953, *Langenheim 3421*, fl (COL, US); lago de Tota, 3015 m, 4 aug 1953, *Mora-Osejo 1241*, fl (COL); Aquitania, El Cerrito, lago de Tota, 3025 m, Apr 1976, *Rangel-Ch. 202*, fl (COL); Sachica, 1990 m, Aug 1964, *Saravia 4398*, fl (COL).


**Cundinamarca:** represa Neusa, Peña Blanca, 24 Jun 1957, *H. G. Barclay 4245*, fl (COL); Sabana de Bogotá, 2600 m, 29 Dec 1938, *Cuatrecasas 479*, fr (COL, F, US);
Suba, hacienda Santa Ines, laguna de Tibabuyes, 28 Mar 1943, Jaramillo-Mejía 223, fr (COL); Granada, El Soche, Sibate road, 2700-2900 m, 12 May 1987, Morales-L. 830, fr (COL); Bogotá, Aug 1931, Pérez-Arbeláez 1180, fl, fr (COL, US). **Nariño:** laguna Cocha, 3 May 1876, André 3093, fl (GH); Reserva Natural la Planada, 7 km from Chucunes, 1800 m, 15 Nov 1987, de Benavides 8925 (MO); Reserva La Planada 7 km from Chucunes, 800-1850 m, Gentry 60371 (AAU). **Norte de Santander:** rio Chitagá, Vega Colombia, 2880-3000 m, 21 Jul 1940, Cuatrecasas 10067, fl (COL, F, US); 35 km of San Bernardo de Bata, en la via a Saravena, 4.5-5 km después del parador, 1980 m, 1 Nov 1994, Fernández-Alonso 11807 (COL); Pamplona-Toledo road at rio La Teja and rio Mesme, 2500-2800 m, 28 Feb 1927, Killip 19883, fl (F, GH, NY, US). **Putumayo:** Valle de Sibundoy 2-5 km N of San Pedro, 2250-2700 m, 3 Aug 1963, Chindoy-B. 172, fl (GH, US), Valle de Sibundoy, 2090 m, 29 May 1973, da Rocha 4, fl (COL). **Risaralda:** municipio Pereira, UCUMári, entre El Cedral y La Pastora, 2300 m, 15 Jun 1989, Bernal 1735 (COL); Pereira, Parque regional UCUMári, vereda La Pastora, 2460 m, 31 Jul 1989, M. P. Galeano 248 (COL). **Santander:** Cordillera Oriental, páramo del Almorzadero, Peralonzo, 3200 m, 19 Jul 1940, Cuatrecasas 9876 (US mixed with J. ecuadoriensis); Virolín, 1800 m, 6-12 May 1986, Fernández-Alonso 6047, fr (COL); Mesa de los Santos, 1500 m, 11-15 Dec 1926, Killip 15173, fr (GH, NY, US); Virolín, Finca La Sierra, 2500-2600 m, 16 May 1976, Lozano-C. 2573, fr (COL); Charalá, Virolín, Olival road, 1800 m, 18 Oct 1983, Torres-R. 2599, fl (COL). **Valle del Cauca:** Bitaco, 1550 m, Aug 1939, García-Barriga 8021, fl (COL). **Locality unknown:** Zub Honda, 19 Oct 1875, André K1430 (NY); “Colombia”, Brother Apolinaria Maria 165 (F); Mutis 5226, fl (US); Mutis 5227, fl (US); Mutis 6182, fl (US); Mutis 6183, fl (US), Mutis 6186, fr (US); “n. Grenada”, 1851-1857, Triana s.n., fr (US).


Figs. 15, 16

Perennial, cespitose herbs, 20-35 cm tall. **Rhizome** densely branching, 1.5 mm diameter, with few, small, scariose scales. **Culms** erect, 0.8-1.5 mm diameter, terete, smooth. **Cataphylls** 0-2 to each culm, to 4 cm long, inconspicuous. **Foliar leaves** 2-3 basal and 0-1 cauline to each culm, 10-16 cm long; sheaths 2-7 cm long with scariose margins terminating in two 1.5-3.5 mm long, rounded auricles; blades 1.5-2 mm diameter, round to elliptic in cross section, separte but sometimes inconspicuously so. **Inflorescence** decompound, anthelate, 1.5-10 x 1.5-4 cm, flower heads (1-)3-4, globose at maturity, 0.5-1 cm diameter, (4-)8-20-flowered, castaneous, ultimate head bearing branches more than 0.45 mm diameter; lower inflorescence bract 1-3 cm long, shorter than the inflorescence, resembling foliar leaves or scalelike; distal bracts shorter; floral bracts acuminate, ca. 3 mm long, scariose, whitish, usually contrasting the tepal color. **Tepals** subequal, 3-4.5 mm long, lanceolate, acuminate, robust, rigid, outer tepals concave and scariose towards the margin, inner tepals flat with distinct scariose margin. **Stamens** usually 6 or rarely 3, 1-2 mm long; anthers 0.5-0.9 mm long, usually about 1/2 as long as the filaments. **Capsule** ellipsoid to obovoid, truncate to
bluntly acute, 3-lobed to trigonous, (2.2-)2.5-3 x 1.2-1.3(-1.6) mm, green at the base, brown at the apex, glossy, unilocular. **Seeds** broadly ellipsoid, conspicuously apiculate, 0.3-0.4 x ca. 0.2 mm, reticulate, yellowish brown with a hyaline outer seed coat.

**Distribution and habitat.** *J. pallescens* occurs in the Andes from southern Colombia to S Chile and in E South America from Rio Grande do Sul in Brazil to Buenos Aires in Argentina. In Colombia, Ecuador, Peru, and Bolivia it grows at elevations of 1900-3600 m, often in disturbed areas but also in natural *Sphagnum* bogs and edges of páramo lakes. In Colombia this species is known from a single collection made in the Nariño department.

**Material examined.** **Nariño:** municipio de Pasto, Torobaje, Predios de la ciudad universitaria, 2530 m, 25 Sep 1985, *Ramírez-P. 353*, fl (COL).


Perennial, densely cespitose herbs, 20-30(-65) cm high. **Rhizome** creeping, ca. 2 mm in diameter, densely branching, covered with stramineous or brown scales to 5 mm long, internodes short and the culms arising densely crowded. **Culms** erect, 0.6-1.2 mm diameter, equally thick from base to top, with 12-18 longitudinal ridges, pith continuous, parenchymatous. **Cataphylls** 3-4 to each culm, the uppermost and longest one to 4.5 cm long with an up to 4 mm long, acicular, rudimentary blade, castaneous. **Foliar leaves** absent. **Inflorescence** pseudolateral, capitulate, 10-20 flowered, composed of 2-4 densely crowded cymes; lower inflorescence bract appearing as a continuation of the culm, 2-5 (-9) cm long, round in cross section, distal bracts obtuse, membranous, ca. 1 mm long; each flower clasped by two 1.5-2 mm long, obtuse, castaneous or membranous bracteoles. **Tepals** subequal, lanceolate, acute, castaneous, often pale green along the midrib, turning stramineous, outer ones 3.5-4.5 mm long, concave, inner ones slightly smaller and flat or slightly concave. **Stamens** six, 1.6-2 mm long; filaments flat, widened at the base; anthers linear, 0.5-0.8 mm long. **Capsule** ovoid to obvoid, round to trigonous in cross section, 2.5 3.5 x 1.5-2.2 mm, castaneous, sometimes pale brown at the base, 3-septate. **Seeds** ellipsoid or curved, apiculate, 0.5 0.6 x 0.2-0.3 mm, reticulate by longitudinal ridges and transverse lines, castaneous below a hyaline outer seed coat.

**Distribution and habitat.** *J. ramboi* subsp. *colombianus* is distributed in the Cordillera Oriental of the Andes in Colombia, departments of Boyacá and Cundinamarca. It grows in páramos at elevations of 2650-3200 m above sea level, on moss covered damp soil along “quebradas” (*Langenheim 3644*) or in water on open plateaus (*Galen-Smith 1373*). The typical variety is known from a few collections from Rio Grande do Sul and Santa Catarina in southeastern Brazil, where it grows in bogs, pastures, dry woods and brook banks at elevations of 900-1600 m above sea level.
Comments. *J. ramboi* subsp. *colombianus* is peculiar in having a parenchymatous dense pith and not an aerenchymatous pith of asteriform cells. The wiry thin culms and the rigid, castaneous flowers are also very distinct.


Figs. 14, 18

Perennial herbs, 1-10(-20) cm tall. **Rhizome** with long creeping, horizontal sections and branching-ascending sections which gradually change into culms, rhizome scales 5-10 mm long, membranous, light brown to stramineous, inserted 1-2 cm apart and enveloping the rhizome. **Cataphylls** absent, but the basal leaves sometimes slightly reduced. **Foliar leaves** 10-15 to each culm, clustered or moderately spaced along the transition zone between the rhizome and culm, 1-8 cm long; sheaths 2-15 mm long, margin membranous and terminating in two, 0.2-0.8 mm long, rounded auricles; blade 0.2-0.3 mm diameter, round to elliptic in cross section, sometimes with an adaxial groove at the base, sepalate, the septa usually visible on the outside, 1-3 mm apart, sometimes absent or invisible when the leaves are small. **Inflorescence** of one or rarely two, 2-5 flowered heads terminal on the culm, sometimes reduced to a single flower on a pedicel which is as long or slightly longer than the flower; lower inflorescence bract resembling basal foliar leaves, to 2 cm long, sheath slightly shorter than the flower head, blade acicular, floral bracts membranous, about as long as the flowers. **Tepals** equal or subequal, 2-3.5 mm long, lanceolate, acute, outer ones slightly wider than the inner ones, midrib green, turning castaneous, the margin castaneous turning stramineous and becoming membranous. **Stamens** six, 2.2-3.1 mm long, anthers linear, 0.8-1.3 mm long. **Capsule** ellipsoid to suborbicular, apiculate, 2.5-3.5 x 1.5-2 mm, light brown to almost black, unilocular. **Seeds** broadly ellipsoid, apiculate, 0.3-0.6 x 0.2-0.3 mm, usually reticulate, brown to castaneous.
Figure 18. Geographic distribution of *Juncus stipulatus* (●) and *Luzula vulcanica* (◆).
Distribution and habitat. *J. stipulatus* is distributed in the Andes from Colombia to the Magellan Strait. In the N Andes it grows over 2700 m above sea level. It grows in a variety of habitats, including road sides, as a pioneer plant on land slides, or as part of soft vegetation cover of suspended bogs. Near edges of streams and on lake shores it may function as a sand binder forming loose vegetation mats on the sediments. In Colombia *J. stipulatus* is found from south to center of the Andean region except in the Cordillera Occidental. It grows at elevations of 2700-4250 m.

Representative specimens. Boyacá: páramo de la Rusia NWN of Duitama, 3515 m, 8 Dec 1972, Cleef 6861A, st (COL). Caldas: páramo del Quindío, 3700-4200 m, 15-20 Aug 1922, Pennell 9963, fl (GH, K, NY, PH, US). Cauca: N slope Mountain Puracé, 2700-2800 m, 23 Jul 1956, H. G. Barclay 165 fl (COL, GH); páramo de las Papas, San Sebastián-Valencia, 3100 m, 17 Sep 1958, H. G. Barclay 5743 fl (COL); río Vinagre, El Alfombrado, 3800 m, 7 Jan 1972, Cleef 629 (COL st); Mt. Puracé, 3600-3700 m, 12 Jun 1922, Pennell 6543, fl (GH, NY, PH); Puracé Mountain, 3450 m, 2 Apr 1939, von Sneidern 2081, fl (F, G, NY, S, US). Cundinamarca: páramo de Sumapaz, Andabobos, 3800 m, 12 Feb 1972, Cleef 1676, st (COL); páramo de Palacio, laguna de Buitrago, 3620 m, Cleef 2351 (P); páramo de Sumapaz, Chisacá, 3660 m, 11 May 1972, Cleef 3639, st (AAU, COL, P); quebrada Chuza between páramo de Palacio and páramo de Chingaza, 3650 m, 30 Aug 1972, Cleef 5361, st (COL). Meta: páramo de Sumapaz, cerro Nevado del Sumapaz, 3650 m, 15 Jan 1973, Cleef 7898, st (COL); macizo de Sumapaz, hoya de la quebrada Clarincito (o Los Frailes), 3720 m, 2 Jul 1981, Díaz-Piedrahita 2313 (COL); Macizo de Sumapaz, 2900 m, 12 Jul 1981, Díaz-Piedrahita 2847, fl (COL). Nariño: páramo del Tábano, between Pasto and El Encano, 3200 m, 11 Jan 1941, Cuatrecasas 11937, fl (COL, US). Putumayo: Near lake Cocha, 2700 m, 1 May 1939, Alston 8311, fr (US). Risaralda: Pereira, Los Nevados National Park, 4200 m, 18 Jan 1980, Jaramillo-Mejía 5717, st (COL); páramo de Santa Rosa, laguna del Otún, 3900-4250 m, 21 Jan 1980, Jaramillo-Mejía 5806, fl (COL).


Perennial, cespitose herbs to 60 cm tall. **Rhizome** densely branching. **Culms** smooth or sometimes slightly longitudinally ridged; auricles 0.5-1.5 mm long, usually longer than wide, rounded, thin, scariosus. **Leaf blades** flat, adaxial side with a band of hyaline cells occupying 3/4 or more of the width, only the margins with dense, chlorophyll filled cells. **Inflorescence** composed of several few-flowered, unilateral cymes, the branching is irregular and the inflorescence is not equally dense throughout, and relatively long, flower-free branch segments alternate with more clustered sections; lower inflorescence bract similar to basal leaves, distal ones gradually shorter. **Tepals** recurving apically towards maturity. **Capsule** shorter than the tepals when mature, thin walled, the valves not recurved along the seams and the capsule therefore not 3-keeled.
Figure 19. Geographic distribution of *Juncus tenuis* (▲).
**Distribution and habitat.** *J. tenuis* is a widespread and common species in North America and introduced to western Europe in the 19th century where it is now widespread and still extending its range. In the Neotropical region this species is found throughout the highlands. It occurs throughout the Mexican and Central American highlands, on Jamaica and Puerto Rico, and in the Andes from Venezuela to Ecuador and Argentina. It is weedy and typically anthropochorous, commonly found at elevations of 1000-3000 m above sea level, along roads and in places where the soil is disturbed and wet from seeping water. In Colombia *J. tenuis* is widely distributed across the center of the Andean region, and two collection in south (Cauca and Putumayo), between 1300 and 2850 m. The dispersal is facilitated by the ability of the outer seed coat to swell up to become a sticky, gelatinous cover that adheres to passers-by.

**Comments.** Balslev (1996), in the Flora Neotropica treatment recognized three varieties of *Juncus tenuis*, two of which were found in Colombia (*J. tenuis* var. *tenuis* and *J. tenuis* var. *platycaulos*). However, Kirschner et al. (2002c) elevated these varities to independent species and this treatment follows this proposal.

**Representative specimens.**

**Antioquia:** Bello, 15001800 m, 17 Jun 1930, *Archer 182* (US); 3 km above Nariño on road to Sonsón, río Samana, 2130-2800 m, 24-25 May 1944, *Ewan 15719*, fl (US); Facultad de Agronomía, Medellín, 1560 m, 10 Jul 1947, *Hedge 6938*, fr (US); Frontino, Nutíbara, río Cuevas, 2000 m, 14 Jul 1987, *P. Sánchez 1402*, fr (COL); Frontino, Nutíbara-Murri road km 13, 1925 m, 23 Sep 1987, *Zarucchi 5689*, fl (COL, MO, NY).

**Boyacá:** Tunja, 2820 m, Aug 1973, *Ballestero-G. 36*, fl (COL); río Pómeca valley 20 km NW of Arcabuco, 2280 m, 20 Aug 1944, *Fassett 25632*, fr (COL, US); Arcabuco, vereda Peñas Blancas, hacienda Las Delicias, 2600 m, 11 May 1996, *Fernández-Alonso 14154*, fr (COL); Pajarito, Corinto, Chorro road, 1600 m, 22 Jun 1988, *G. Sánchez 63*, fr (COL); Santa María, sender ecológico Hyca-Quye, carretera Santa María-Bogotá, 1000-1200 m, 20 May 2009, *A. Zuluaga 469* (COL).

**Cauca:** above Carpenteria, E slope of Cordillera Occidental, 2500 m, 23 Apr 1939, *Alston 8227* (NY).

**Chocó:** Bolivar-Quibdó road, km 126, 1460 m, 13 Apr 1983, *Croat 55981* (MO).

**Cundinamarca:** Sabana de Bogotá, 2600 m, 29 Dec 1938, *Cuatrecasas 475*, fl, fr (COL, US); San Bernardo, vereda Santa Marta, quebrada La Chorrera, 2300-2350 m, 20 Jul 1981, *Díaz-Piedrahita 2998*, fl (COL); Bogotá, Ciudad Universitaria, May 1941, *García-Barriga 10012*, fl (COL); Albán, Oct 1932, *Pérez-Arbeláez 2207*, fr (COL, US); Quetame, río Saname, 1450 m, 11 Feb 1960, *Uribe-Uribé 3613*, fr (COL).

**Putumayo:** Valle de Sibundoy, 2200 m, 7 May 1963, *Bristol 937*, fr (GH, COL).

**Quindío:** Cocora Natural Park, La Cascada, 2750 m, 10 May 1990, *Franco-Roselli 3157*, fl (COL); Salento, 2100-2500 m, 25-31 Jul 1922, *Pennell 8879*, fr (GH, K, NY, PH, US).

**Risaralda:** municipio Pereira, Parque Natural Regional Ucumarí, entre La Pastora y Peña Bonita, 2300-2600 m, 22 Nov 1989, *Galeano 2139*, fl (COL).

**Norte de Santander:** Sarare, 1300 m, 13 Oct 1941, *Cuatrecasas 12115*, fr (COL, F); río Colorado confluence near río Valegra, Chitagá, 1845 m, 15 Nov 1942, *Fosberg 19107*, fr (COL, US).

**Santander:** Charala, veredas El Taladro and Bogotacito, 2100-2300 m, 7 Dec
1978, Díaz-Piedrahita 1678A, fr (COL); 5 km SW of La Paz towards Vélez, 2220 m, 27 Apr 1944, Fasset 25150, fr (NY, US); 5 km N of La Paz and 25 km NE of Vélez, 1900 m, 5 May 1944, Fasset 25176, fr (NY, UC, US, WIS); río Minero valley near Florian, 1850 m, 24 Sep 1944, Fasset 25786, fr (COL, US), Fasset 25787, fr (US, COL). Tolima: Toche, 2500 m, 25 May 1942, von Sneidern 3132, fr (GH, NY, US). Valle del Cauca: hoya del río Bugalagrande, loma de Barragán, desde La Parilla a La Machuca, 2660-2750 m, 13 Apr 1946, Cuatrecasas 20651, fl, fr (F, US), Cuatrecasas 20674, fl (F, US); Carrizales N of Las Brisas, 2200 m, 25 Oct 1946, Cuatrecasas 22543, fl (F, US). Locality unknow: Mutis 3736, fr (US), Mutis 6191, fl (US).

3. Luzula


**Type species.** *Luzula campestris* (L.) DC. typus cons.


**Etymology.** The name *Luzula* is a corruption of the Latin verb *lucciola* for shining which refers to the shining appearance of the inflorescence which is overlain by hairs in certain species.

Perennial, rhizomatous herbs, hairy at the margin of leaves and bracts. **Culms** erect. **Leaves** alternate, scale like on runners and rhizomes, foliar at the base of the culm, and bracteous in the inflorescence; sheaths closed, without auricles at the junction to the blade; blades linear to narrowly lanceolate, flat, concave or with involute margins. **Inflorescence** with many individually inserted flowers arranged in loose, much branched panicles or with the flowers congested into dense clusters which are then arranged in a panicle, an anthela, a raceme, or contracted into dense spike like structures. **Flower** perfect, subtended by a bract at the base of the pedicel and clasped by 1-2 bracteoles inserted on the pedicel just below the flower. **Tepals** unequal or subequal, lanceolate; margin entire, sometimes membranous or divided into ciliate lobes. **Stamens** 3-6; filaments filiform, rarely linear and flattened; anthers oblong, rarely linear. **Gynoecium** with sessile ovary; style short, filiform; stigmas three, filiform, twining, covered with sticky papillae. **Capsule** trigonous, sometimes basally 3-lobed, unilocular. **Seeds** three per capsule, attached to the placenta by a long delicate funicle, ellipsoid to oblong, brown to reddish brown, outer seed coat white, hyaline or light brown.
**Distribution and habitat.** *Luzula* is a cosmopolitan genus of ca. 115 species, most of which occur in the north temperate region. In the tropical region the genus is totally absent in the lowlands, but present at higher elevations, mostly above 2500 meters above sea level. Tropical America has eight species of *Luzula*, tropical Africa three, tropical Asia one. Three species of this genus has been found in Colombia.

**Key to the Species of *Luzula* in Colombia**

1. Flowers inserted individually on visible pedicels, not in clusters or heads; inflorescence a loose panicle. Rachis segments 5-15 cm long, the inflorescence divided into 4-5 subequal nodding panicles, one above the other. ........................................... 1. *L. gigantea*

1. Flowers in round or oblong heads or elongate clusters; the clusters arranged in anthers, loose panicles, racemes, or spike like structure. ................................................ 2

2. Runners present; bracts of flower clusters all membranous and not exceeding the cluster; culms usually straight. ................................................................. 3. *L. vulcanica*

2. Runners not present; bracts of at least the lower flower clusters herbaceous and exceeding the cluster; culms usually curved. ........................................ 2. *L. racemosa*


Figs. 20, 21

Perennial herbs, 20-90 cm high. **Rhizome** ascending, 1.53 mm diameter, often covered with wilted leaves and giving rise to ascending runners terminated by leaf rosettes. **Culms** erect, terete, 2-4 mm diameter. **Basal leaves** up to 25 in a rosette; sheaths short; blade bending away from the culm, linear to narrowly lanceolate, (5-)10-20 mm wide, flat, margin hairy in young leaves. **Cauline leaves** resembling basal ones, but sheath to 6 cm long, and the blade shorter and more erect. **Inflorescence** a loose, much branched panicle constituting more than 1/3 of the total plant height, stoded and subdivided by 5-15 cm long rachis segments into 4-5 subequal, nodding parts, one above the other, the flowers inserted individually on distinct pedicels; bracts of primary inflorescence branches resembling cauline leaves, proximal ones to 20 cm long, distal ones progressively smaller; bracteoles and distal bracts in the inflorescence linear to lanceolate, membranous, margin entire or divided into ciliate lobes. **Tepals** unequal, light brown to dark castaneous, outer ones 2-3(-3.5) mm long, inner ones 1.5-2.5 mm long, narrower. **Stamens** six, 1-1.5 mm long; anthers oblong, 0.3-0.6 mm long. **Capsule** broadly ellipsoid, apiculate, 1.3-2 x 0.8-1.6 mm, light green at first, castaneous and glossy at maturity. **Seeds** ellipsoid to oblong, broadly apiculate, 0.9-1.3 x 0.40.6 mm, smooth to rugose, inner seed coat castaneous, outer seed coat white to light brown.

**Distribution and habitat.** *L. gigantea* is distributed in the Andes from Venezuela to N Argentina at elevations of 2650-4500 m above sea level, but most commonly at 3000-4000 m. In Colombia it is widely distributed along Andes and the Sierra Nevada de Santa Marta, between 2660 and 4500 m.
Figure 21. Geographic distribution of *Luzula gigantea* (★).
**Comments.** *L. gigantea* is easily recognized by its individually inserted flowers and broad, long leaves. It is also distinct because of its long rachis segments that subdivide the inflorescence in 4-5 subequal nodding parts, one above the other.

**Representative specimens.**

**Antioquia:** páramo de Frontino, río Urrao, 3200 m, 11 Mar 1944, *Core 415*, fl (NY, US); Urrao, páramo de Frontino, 3600-3800 m, 19 Jul 1995, *D. Sánchez 2225* (COL). **Boyacá:** nevado del Cocuy, Chorreón de San Paulino, 3750 m, 10 Sep 1938, *Cuatrecasas 1367*, fl, fr (COL, F, US); páramo de Pisba, carretera Socha-La Punta, km 70, 3530 m, 16 Jun 1972, *Cleef 4621*, fl (COL); municipio Cocuy, cañón del Chicamocha, 3500 m, 22 May 1991, *Etter 478* (COL); Sierra Nevada del Cocuy, quebrada de las Playas, 4100 m, 7 Aug 1957, *Grubb 321*, fl (K, US); municipio Güicán, Sierra Nevada del Cocuy, laguna Grande de Los Verdes, 3900-4100 m, 20 Sep 1978, *Rangel-Ch. 1567*, fl (COL). **Caldas:** Guadalupe, 2900 m, Jul 1912, *Brother Apolinar-Maria 120* fl (US); nevado del Ruiz, entre Termales, Nevado y Líbano, 4050-4100 m, 17 Dec 1958, *H. G. Barclay 6398*, fl, fr (COL, US); páramo del Quindío, 4100-4300 m, 15-22 Aug 1922, *Pennell 9885*, fl (US); páramo del Quindío, 4300-4500 m, 15-20 Aug 1922, *Pennell 9900*, fl (NY, US), nevados del Ruiz y de Santa Isabel, 4140-4300 m, 9 Oct 19, *Rangel-Ch. 1796*, (COL). **Cauca:** municipio Puracé, N slope volcán Puracé, 2700-2800 m, 23 Jul 1956, *H. G. Barclay 156*, fl, fr (COL, GH); Chapa-río Blanco, 3000 m, 13 Jul 1944, *Core 908*, fr (GH, US); páramo Las Moras, 3700-3800 m, 19 Feb 1969, *Cuatrecasas 27430*, fl (COL, US); La Plata road from Puracé to Alto de San Rafael, 2660-3450 m, 21 Jul 1948, *Garcia-Barriga 12828*, fl, fr (COL, US); páramo de Guanacas, Popayán, 2800-3300 m, no date, *Lehmann 5258*, fl, fr (F, US). **Cesar:** Sierra de Perija, E of Manaure, 3000-3100 m, 7 Nov 1959, *Cuatrecasas 25089*, fr (COL, US); serranía del Perija, municipio Manaure, cerro El Avión, 3400 m, 6 Nov 1993, *Rangel-Ch. 11153* (COL); municipio de La paz, Serranía Perija, base del Cerro El Avion, 3200-3600 m, 3 Mar 1959, *Romero-Castañeda 7365*, fr (COL). **Chocó:** municipio de Nóvita, macizo de Tatamá, pico Belisario, 4100 m, 19 Feb 1983, *Torres-R. 2443*, fl (COL). **Cundinamarca:** Bogotá, corregimiento Santa Rosa, entre Chisacá y la casa del Pnn Sumapaz, 6 Sep 1999, *Betancur 8176* (COL); páramo de Sumapaz, laguna Gobernador, 3835 m, 26 Jan 1973, *Cleef 8310B*, st (COL); macizo de Bogotá, La Calera, páramo de Palacio, hacienda la Siberia, 3420-3500 m, 11 Dec 1959, *Cuatrecasas 25591*, fr (COL, US); S of Usme between La Regadera and El Hato, 3000-3100 m, 15 Jun 1950, *Idrobo 385* fl (COL, US); Los Gaques, W slope of páramo de Guasca, Los Gaques, 3250 m, 12 Mar 1939, *Killip 34162*, fl, fr (COL, US). **Magdalena:** Sierra Nevada de Santa Marta, río Sevilla, 3100 m, 22 Jan 1959, *H. G. Barclay 6614*, fr (COL, MO, US); Sierra Nevada de Santa Marta, Alto Buritica, 3300 m, 9 Aug 1977, *Jaramillo-Mejia 5501*, fl (COL). **Meta:** páramo de Sumapaz, Hoya Sítiales, laguna La Primavera, 3580 m, 25 Jan 1972, *Cleef 992*, fl (COL, U); páramo de Sumapaz, cerro nevado de Sumapaz, 3600-4100 m, *Cleef 8092*, fl (COL); macizo de Sumapaz, Cerro Nevado, 4100-4350 m, 6 Jun 1981, *Díaz-Piedrahita 2572*, fl (COL); macizo de Sumapaz, quebrada El Buque, 3400 m, 11-12 Jun 1981, *Díaz-Piedrahita 2780*, fl (COL); Cubarral, laguna de La Guitarra, páramo de Sumapaz, 3420 m, 11 Jun 1981, *Franco-Roselli 324*, fl (COL). **Nariño:** Galeras near Pasto, 18 Jul 1957,
3-2. *Luzula racemosa* Desvaux, J. Bot. (Desvaux) 1: 162, tab.6. fig.3. (1808). **Type:** “America calidiore”, (lectotype P, (left hand specimen, the rest is a fragment of a *Luzula* of another section), designated in Kirschner et al. 2002a).

Perennial, cespitose herbs, 5-45 cm high. **Rhizome** erect or ascending, without stolons. **Culms** erect, straight or more often slightly curved, 0.5-2 mm diameter. **Basal leaves** five to several to each culm, in a loose or sometimes squarrose rosette; sheaths short; blades apically acute, 525 x 0.1-0.5 cm, flat or sometimes thickened and concave. **Cauline leaves** 0-4 to each culm, to 15 cm long, the sheath occupying 1/6-1/3 of the length. Leaf margins hairy, especially in young and cauline leaves. **Inflorescence** a terminal, erect or nodding, spike like raceme of three to several flower clusters, 1-6 x 0.5-2 cm; flower clusters oblong to ovoid, 0.5-1.5 x 0.3-1 cm, sessile or sometimes short pedunculate, crowded or sometimes spaced along the rachis; basal inflorescence bract herbaceous, linear, usually much longer than the flower cluster and up to 5 cm long, distal bracts progressively shorter. **Tepals** unequal, dark castaneous or white and membranous when old, outer ones 2.5-4 mm, inner ones 2-3.5 mm long. **Stamens** usually three but often six, 0.6-1.5 mm long; anthers oblong to linear, 0.2-0.5 mm long, usually shorter than the filaments. **Capsule** broadly ellipsoid to ovoid, 3-lobed to trigonous, 1.5-2 x 1-1.5 mm, usually conspicuously shorter than the tepals but sometimes almost as long, castaneous, dehiscing with the entire valve recurving. **Seeds** ellipsoid, apiculate, 0.7-1.1 x 0.4-0.6 mm, brown with a hyaline, rugose outer seed coat.

**Distribution and habitat.** *L. racemosa* is distributed in the highlands from Central Mexico to Guatemala and along the Andes from Venezuela to Chile and Argentina. Within the Neotropical region it has been collected at elevations of 2900-4700 m above sea level, but it is most commonly found above 3500 m. It grows in well drained, sunny, exposed places in...
Figure 23. Geographic distribution of *Luzula racemosa* (●).
grassy openings in the upper montane forest belt and in the páramos above the timber line. In Colombia *L. racemosa* is found toward the center of Cordillera Central and Cordillera Oriental, and Sierra Nevada de Santa Marta, between 2900 and 4500 m of elevation.

**Comments.** In *Flora of Ecuador*, Baslev recognized three species (*L. racemosa*, *L. peruviana*, and *L. chilensis*) within what is here treated as one species, *L. racemosa* (Balslev 1979a). Buchenau (1906) cut it even finer and recognized four species. In the meantime we have examined a large material covering the area from Mexico to Bolivia, and it is obvious that there is a genetic variation between different populations which gives them quite a large morphological range. We have however been unable to draw lines between consistently distinguishable taxa therein. The relation between ecological and genetic variation between the populations is also uncertain.

**Representative specimens.** **Arauca:** Sierra Nevada del Cocuy, quebrada El Playón, Patio Bolos, 4260-4350 m, 7-10 Mar 1973, Cleef 8833A, fl (COL), Cleef 8857B, fr (COL), Cleef 8928B, fr (COL), Cleef 8960A, fl (COL), Cleef 9045C, st (COL). **Boyacá:** Sierra Nevada del Cocuy, alto Ritacuba, 4525 m, 11 Apr 1959, H. G. Barclay 7342, fl (COL, MO, NY); Sierra Nevada del Cocuy, Lagunilla, Bocatoma, Concavo, Cusiri, 4060-4510 m, 26 Sep 1972-5 Mar 1973, Cleef 5537, fl (COL); nevado del Cocuy, alto valle de las Lagunillas, 4000-4300 m, 12 Sep 1938, Cuatrecasas 1469, fl (COL, F, GOET, US); páramo de Loja, 18 km SE de Socha, 3400 m, 11 Nov 1944, Fosberg 22281, fr (COL, US); valle de las Playas, Sierra Nevada del Cocuy, 4000-4200 m, 4 Aug 1957, Grubb 275, fl (COL, US). **Caldas:** nevado del Ruiz, Termales, Nevado, Líbano, 4390 m, 12 Dec 1958, H. G. Barclay 6356, fl, fr (COL, US); nevado del Ruiz, 4500 m, 18 Mar 1972, Cleef 2418 (COL); nevado de Ruiz, 3900-4200 m, 5 May 1940, Cuatrecasas 9271, fr (COL, US); páramo de Quindío, 4100-4300 m, 15-20 Aug 1922, Pennell 9819 (GH, NY); nevado del Ruiz, El Silencio, 4310 m, 7 Oct 1978, Rangel-Ch. 1731A, fr (COL). **Caldas-Tolima:** Cordillera Central, nevado del Ruiz, páramo Termales, Nevado y Líbano, 4000 m, 21 Dec 1958, H. G. Barclay 6458, fl (COL, MO, US). **Cauca:** mountain Puracé above Pilimbala, 4000 m, Wood 4789, fr (COL, K). **Cundinamarca:** Cordillera Oriental, S of Usme, páramo de Chisacá, 3910 m, 9-11 Nov 1958, H. G. Barclay 6105, fr (COL, MO, US); entre Cogua y San Cayetano, laguna Seca, 3670-3685 m, 9-16 Nov 1972, Cleef 6122, fl (COL, US); páramo de Chisacá, laguna Negra, 3660-3720 m, 11 Sep 1961, Cuatrecasas 25890, fl (COL, US); boquerón de Chipaque, 31503250 m, 16 Mar 1939, Killip 34208, fr (COL, US); páramo de Chipaque, Dec 1853, Triana s.n. (COL). **Magdalena:** Sierra Nevada de Santa Marta, río Ancho, páramo de Macotama, 3770-3840 m, 30 Jan 1959, H. G. Barclay 6939, fr (COL, MO, US); Sierra Nevada de Santa Marta, al S de los picos Reina and Ojeda, 4200-4300 m, 8 Oct 1959, Cuatrecasas 24580, fl, fr (COL, US); Sierra Nevada de Santa Marta, transecto de Buritica, 3500 m, 15 Aug 1977, Rangel-Ch. 954, fl (COL, NY); Sierra Nevada de Santa Marta, 30 km from Dibulla, 4875 m, Jul 1932, Seifriz 512, fl (US); source of río Donachui (COL-specimen says “Valley of río Yibosimeina, 3500-4000 m”), 4500 m, 21 May 1977, White 521, fr (COL, MO,


Perennial herbs, 5-45 cm high. **Rhizome** erect or ascending, 1-2 mm diameter, with ascending runners that terminate in a leaf rosette. **Culm** erect, 0.7-2 mm diameter, usually straight, sometimes curved to the opposite direction of the nodding inflorescence. **Basal leaves** 3-8 to each culm, inner ones erect and somewhat appressed to the culm, blade 3-15 x 0.2-0.5 cm, margin hairy when young, later glabrous. **Cauline leaves** usually two to each culm, 1-5(-11) cm long, inserted above the middle of the culm and usually close to the inflorescence. **Inflorescence** terminal with 3-7 flower clusters arranged in a spike-like raceme, 1-4 x 0.51.5 cm, constituting less than 1/5 of the total plant height, erect at first, later nodding; clusters 0.5-2 x 0.51 cm, sessile or the basal one(s) sometimes short pedunculate and separated from the others by a short rachis segment; bracts membranous, the margin divided into ciliate lobes, the basal bract usually about 1 cm long, broadly lanceolate, occasionally to 2 cm long and somewhat herbaceous in large specimens. **Tepals** subequal, membranous, dark castaneous in young flowers, outer ones 3-4 mm long, inner ones 2-3.5 mm long. **Stamens** three, 1-1.5 mm long; anthers obovate, 0.2-0.6 mm long, shorter than the filaments. **Capsule** broadly ellipsoid, basally 3-lobed, apically trigonous, 1.5-2 x 1-1.3 mm, finely rugose, light castaneous. **Seeds** ellipsoid, apiculate, 1-1.2 x 0.5-0.6 mm, castaneous below a white or light brown, smooth outer seed coat.
**Habitat and distribution.** *L. vulcanica* is distributed in Mexico and in the Andes from Colombia to Bolivia. In the Andes it has been collected at elevations of 3300-4700 m above sea level. It is most commonly found in wet and boggy places in the páramos which is unusual for species of *Luzula*; the other Neotropical species in the genus are all found on well drained soils. In Colombia is found toward the center of Cordillera Central (Caldas) and Cordillera Oriental (Boyacá and Cundinamarca), and Sierra Nevada de Santa Marta, at elevations of 3300-4630 m.

**Comments.** According to Buchenau (1906) *L. vulcanica* is closely related to *L. racemosa*, and later authors have treated them as conspecific. It is true that there is not a single character by which the two species are always distinct, but the combination of a number of characters gives them different appearances so they always look different, both in the field, and in the herbarium. The differences between *L. vulcanica* and *L. racemosa* are: the presence of stolons (vs. absent); culms straight (vs. curved); lower inflorescence bract broadly lanceolate, membranous and more or less as long as flower cluster (vs. linear, herbaceous and longer than flower cluster); and tepals dark (vs. light castaneous).

**Representative specimens.** **Boyacá:** páramos NW of Belen, quebrada minas, 600 m SE de la laguna Alcohol, 3840 m, Cleef 2046, fl (COL, U); Sierra Nevada de Cocuy, Valle Alto del Lagunillas 1 km al N de laguna Pintada, 3960 m, Cleef 5597, fl (COL). **Caldas:** nevado del Ruiz, Termales-Nevado-Líbano, 4200 m, 9 Dec 1958, H. G. Barclay 6318, fl (COL, US); Termales-Nevado, 4400 m, 11 Dec 1958, H. G. Barclay 6326, fl, fr (COL, MO, US); páramo de Quindio, 3700-4300 m, 15-20 Aug 1922, Pennell 9858, fl (US), 15-20 Aug 1922, Pennell 9959, fl (GH, NY, US); carretera entre La Finca Buenos Aires y laguna del Otún, 4140 m, 9 Oct 1978, Rangel-Ch. 1765, fr (COL). **Cundinamarca:** páramo de Sumapaz, Chisacá, 3685 m, 23 Mar 1972, Cleef 2579 (COL fr, NY); Cogua-San Cayetano near laguna Seca, 3680 m, Cleef 6527A, fl (COL), Cleef 6546, fl (COL); páramo Sumapaz, 18 km E of Cabrera, 4000 m, 9-11 Aug 1943, Fosberg 20740, fl (US); páramo de Sumapaz, Chisacá, 3300-4000 m, 10 Sep 1959, Garcia-Barriga 17196, fl (COL, NY, US). **Magdalena:** Sierra Nevada de Santa Marta, río Ancho, páramo de Macotoma, 3770-3840 m, H. G H. G. Barclay 6939 (US).
ACKNOWLEDGMENTS

We are grateful for help and encouragement from our institutions, Aarhus University and Universidad Nacional de Colombia, and we wish to thank Julio Betancur for his valuable comments and suggestions to this manuscript. Also we are grateful to the agencies that fund our research, especially the Danish Natural Science Research Council and Instituto de Ciencias Naturales of the Universidad Nacional de Colombia.

LITERATURE CITED


NUMERICAL LIST OF TAXA

1  Distichia
   1-1  Distichia muscoides

2  Juncus
   2-1  J. balticus
   2-1-1  Juncus balticus subsp. andicola
   2-2  J. breviculmis
   2-3  J. bufonius
   2-4  J. capillaceus
   2-5  J. cordobensis
   2-6  J. cyperoides
   2-7  J. densiflorus
   2-8  J. dudleyi
   2-9  J. echinocephalus
   2-10 J. ecuadoriensis
   2-11 J. effusus
   2-12 J. imbricatus
   2-13 J. liebmannii
   2-13-1 J. liebmannii var. quitensis
   2-14 J. microcephalus
   2-15 J. pallescens
   2-16 J. ramboi
   2-16-1 J. ramboi subsp. colombianus
   2-17 J. stipulatus
   2-18 J. tenuis

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   3-2  L. racemosa
   3-3  L. vulcanica
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