

AUSTRALIAN BIOLOGICAL RESOURCES STUDY, CANBERRA



SPECIES PLANTARUM

FLORA OF THE WORLD

Part 8. JUNCACEAE 3: Juncus subg. Agathryon

compiled by Jan Kirschner



Department of the Environment and Heritage

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EDITORS

Anthony E. Orchard
Annette J.G. Wilson

ASSISTANT EDITOR

Brigitte Kuchlmayr

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CONTRIBUTORS TO THIS PART

Text

Coordinator & compiler:

Jan Kirschner, Institute of Botany, Academy of Sciences, CZ-25243 Průhonice 1, Czech Republic.

Advisors to the whole family treatment:

Sven Snogerup, Botanical Museum, Ö. Vallgatan 18, S-22361 Lund, Sweden.

Vladimir S. Novikov, Botanical Garden, Moscow State University, Vorobjevy Gory, Moscow 119899, Russia.

Teuvo Ahti, Department of Ecology & Systematics, University of Helsinki, P.O. Box 47, FIN-00014 Helsinki, Finland.

Authors (* = Coauthor of the given taxon):

Henrik Balslev, Herbarium, Building 137, Aarhus University, DK-8000 Aarhus, Denmark. (*Juncus* sect. *Steirochloa**)

Ralph E. Brooks, Black & Veatch, 4004 Kruse Way Place, Suite 200, Lake Oswego, Oregon 97035, United States of America. (*Juncus* sect. *Steirochloa* * of N. America)

Steven E. Clemants, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn NY 11225, United States of America. (*Juncus* sect. *Steirochloa* of N. America)

Barbara Ertter, University & Jepson Herbaria, 1000 VLSB #2465, University of California, Berkeley CA 94720-2465, United States of America. (*Juncus* sect. *Juncotypus** of N. America)

Leena Hämet-Ahti, Kotitorpantie 2-E, FIN-00690 Helsinki, Finland. (*Juncus* sect. *Juncotypus**)

M. Carmen Fernández Carvajal Álvarez, Departamento de Biología de Organismos y sistemas, Unidad de Botánica, Universidad de Oviedo, C/Catedrático Rodrigo Uría, s/n, E-33006 Oviedo, Spain. (*Juncus* sect. *Tenageia**)

Jan Kirschner, Institute of Botany, Academy of Sciences, CZ-25243 Průhonice 1, Czech Republic. (*Juncus**, *Juncus* sect. *Tenageia*, sect. *Forskalina*)

Lazaro J. Novara, Herbario MCNS, Facultad de Ciencias Naturales, Universidad Nacional de Salta, Buenos Aires 177, 4400 Salta, Argentina. *Juncus* sect. *Steirochloa**, sect. *Juncotypus**

Vladimir S. Novikov, Botanical Garden, Moscow State University, Vorobjevy Gory, Moscow 119899, Russia. (*Juncus* sect. *Steirochloa**, sect. *Juncotypus**)

Sergey S. Simonov, Botanical Garden, Moscow State University, Vorobjevy Gory, Moscow 119899, Russia. (*Juncus* sect. *Steirochloa**)

Sven Snogerup, Botanical Museum, Ö. Vallgatan 18, S-22361 Lund, Sweden. (*Juncus* sect. *Juncotypus**, sect. *Tenageia**)

Karen L. Wilson, National Herbarium of New South Wales, Royal Botanic Gardens, Mrs Macquaries Rd, Sydney NSW 2000, Australia. (*Juncus* * of Australia, Malesia)

Peter F. Zika, Herbarium, Dept. of Botany, Box 355325, University of Washington, Seattle, WA 98195-5325, United States of America. (*Juncus* sect. *Juncotypus** of Pacific N. America)

Illustrations

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Species Plantarum Steering Committee (as at November 2002)

- G. Achoundong, Herbar National de Cameroon, Yaoundé, Cameroon
A. Anton, Museo Botánico, Universidad Nacional de Córdoba, Argentina
W. Berendsohn, Botanischer Garten und Botanisches Museum, Berlin, Germany
D.E. Boufford, Harvard University Herbaria, Cambridge, Mass., USA
L. Boulos, Dokki, Cairo, Egypt
R.K. Brummitt, Herbarium, Royal Botanic Gardens, Kew, UK
S. Castroviejo, Real Jardín Botánico, CSIC, Madrid, Spain
A.C. Chikuni, National Herbarium and Botanic Gardens of Malawi, Zomba, Malawi
M.D. Correa, Universidad de Panamá, Panamá
T.F. Daniel, California Academy of Sciences, San Francisco, Calif., USA
D.Darnaedi, Kebun Raya Indonesia, Bogor, Indonesia
P. Dávila, Escuela Nacional de Estudios Profesionales, UNAM, Tlalnepantla, Mexico
T.S. Filgueiras, Reserva Ecológica do IBGE, Brasília, Brazil
E. Forero, Universidad Nacional de Colombia, Bogotá, Colombia
I. Friis, Botanical Museum and Library, Copenhagen, Denmark
V. Funk, Smithsonian Institution, Washington DC, USA
D. Geltman, Komarov Botanical Institute, St Petersburg, Russia
A.S. George, Kardinya, WA, Australia
W. Greuter, Botanischer Garten und Botanisches Museum, Berlin, Germany
Hong D.Y., Chinese Academy of Sciences, Beijing, China
K. Iwatsuki, Yokohama, Japan
B. Jonsell, Bergius Foundation, Stockholm, Sweden
B. Khayota, National Museums of Kenya, Nairobi, Kenya
J. Kirschner, Academy of Sciences, Průhonice, Czech Republic
H.P. Linder, Insitut für Systematische Botanik, Zurich, Switzerland
P.-A. Loizeau, Conservatoire et Jardin Botaniques, Genève, Switzerland
J.L. Luteyn, New York Botanic Gardens, Bronx, New York, USA
K. Marhold, Slovak Academy of Sciences, Bratislava, Slovakia
M. Moraes, Universidad Mayor de San Andres, La Paz, Bolivia
P. Morat, Muséum National d'Histoire Naturelle, Paris, France
N.R. Morin, The Arboretum at Flagstaff, Arizona, USA
Nguyen T.H., Institute of Ecology & Biological Resources, Hanoi, Vietnam
H. Ohashi, Tohoku University, Sendai, Japan
A.E. Orchard, Australian Biological Resources Study, Canberra, ACT, Australia
R.J. Pankhurst, Royal Botanic Garden, Edinburgh, UK
M. Sanjappa, Botanical Survey of India, Calcutta, India
T. Santisuk, Royal Forest Department, Bangkok, Thailand
Sebsebe Demissew, Addis Ababa University, Addis Ababa, Ethiopia
J.H. Seyani, Commonwealth Secretariat, London, UK
G.F. Smith, National Botanical Institute, Pretoria, South Africa
W.D. Stevens, Missouri Botanical Garden, Saint Louis, Missouri, USA
W.L. Wagner, Smithsonian Institution, Washington DC, USA
K. Wilson, Royal Botanic Gardens, Sydney, NSW, Australia

INTRODUCTION

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

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

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

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

The text description of distribution for each taxon strives to be as complete as possible, encompassing both specimens examined and literature reports (with qualifications where necessary). The maps on the other hand are indicative only, based only on specimens examined, and may not cover the full distributional range. Short-term casual introductions, in particular, may not always be mapped.

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

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

A.E.Orchard & A.J.G.Wilson

Canberra

November 2002

PREFACE

This volume is the third and final part of a three-part treatment of the Juncaceae.

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

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

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

Jan Kirschner

Průhonice

July 2002

7. JUNCUS (continued)

KEY TO SUBGENERA AND SECTIONS

- 1 Inflorescence racemose; a pair of floral bracteoles absent; flowers usually in heads or clusters, rarely borne singly (subg. *Juncus*)
- 2 Leaves terete, stem-like, basal, not septate; vascular bundles scattered over most of T.S.; lower bract apparently forming a prolongation of stem **sect. 1. Juncus***
- 2: Leaves flat, compressed, canaliculate or if terete, then usually septate, not stem-like, basal or cauline; vascular bundles usually in subepidermal position; lower bract usually not in a position of stem prolongation
- 3 Leaves unitubulose or pluritubulose, perfectly septate; if pluritubulose (not bitubulose) and imperfectly septate, then terete, or flattened but then not arranged perpendicular to stem **sect. 6. Ozophyllum***
- 3: Leaves flat or with raised margins, not septate; or bitubulose and septate; or laterally compressed and pluritubulose and imperfectly septate (then arranged perpendicular to stem); if unitubulose and perfectly septate then anthers distinctly exserted
- 4 Annuals **sect. 3. Caespitosi***
- 4: Perennials
- 5 Anthers distinctly to at least partly exserted from perianth in later stages of flowering **sect. 4. Stygiopsis***
- 5: Anthers not exserted
- 6 Most of inflorescence not fertile, of golden-coloured feather-like branchlets **sect. 4. Stygiopsis***
- 6: Inflorescence usually fully fertile, not of the above appearance
- 7 Leaves laterally compressed, pluritubulose, imperfectly septate, arranged perpendicular to stem **sect. 5. Iridifolii***
- 7: Leaves dorsiventrally compressed or canaliculate, not septate, arranged with adaxial flat side facing the stem
- 8 Seeds with two distinct appendages. [Sino-Himalayan region] **sect. 4. Stygiopsis***
- 8: Seeds without appendages, if appendages present then found in W North America **sect. 2. Graminifolii***
- 1: Inflorescence cymose, a pair of floral bracteoles present below each flower; flowers usually borne singly or in loose groups (subg. *Agathryon* [subg. *Poiophylli*])
- 9 Annuals **sect. 7. Tenageia**
- 9: Perennials
- 10 Inflorescence seemingly lateral (pseudolateral); lower inflorescence bract terete, erect, seeming to be a continuation of stem; basal leaves bladeless; cauline leaves absent; sterile shoots terete, stem-like **sect. 9. Juncotypus**
- 10: Inflorescence obviously terminal; lower bract flat, canaliculate or terete, not as a continuation of stem; at least some basal or sub-basal leaves with a well developed blade; sterile shoots not stem-like
- 11 Cauline leaves terete (epidermal cells of the same size); pith of astericiform cells **sect. 10. Forskalina**
- 11: Cauline and/or basal leaves flat to canaliculate (at least some cells of adaxial epidermis enlarged; margins with thin sclerenchymatous strands); inner part of leaves of chlorenchyma, rarely with air channels, not of astericiform cells **sect. 8. Steirochloa**

Subg. 2. Agathryon**Juncus** subg. **Agathryon** Raf., *Autik. Bot.* 196 (1840)T: *Juncus bufonius* L.; lecto, designated here.**SECTION 7. TENAGEIA****Juncus** sect. **Tenageia** Dumort., *Fl. Belg.* 142 (1827)*Juncus* subg. *Tenageia* (Dumort.) V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 515 (1935), *nom. illeg.*; *Juncus* subsect. *Tenageia* Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 112 (1990). T: *Juncus tenageia* Ehrh. ex L.f.*Juncus* [unranked] *Isophyllon* K.Koch, *Linnaea* 21: 628 (1848). T: *Juncus bufonius* L., lecto, *fide* J.Kirschner & al., *Folia Geobot.* 34: 387 (1999).*Juncus* subg. *Poiophylli* Buchenau, *Monogr. Juncac. Cap* 500 (1875); *Juncus* sect. *Poiophylli* (Buchenau) Rouy, *Fl. France* 13: 251 (1912) [*Juncus* sect. XVI. *Paeophylli*’, an orthographic variant]. Isonym: F.Vierhapper, in H.G.A.Engler & F.Prantl, *Nat. Pflanzenfam.*, 2nd edn, 15a: 215 (1930); *Juncus* [unranked] *Bufonii* Rydb., *Fl. Rocky Mts.* 150 (1917); *Juncus* subsect. *Poiophylli* (Buchenau) Novikov, *Nov. Sist. Vyssh. Rast.* 19: 52 (1982); *Juncus* subsect. *Ambigui* Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 112 (1990); *Juncus* sect. *Bufonii* K.F.Wu, *Acta Phytotax. Sin.* 32: 450 (1994), *nom. illeg.* T: *Juncus bufonius* L.*Juncus* [unranked] *Annui* Boiss., *Fl. Orient.* 5: 35 (1884). T: *Juncus bufonius* L., lecto, *fide* J.Kirschner & al., *Folia Geobot.* 34: 384 (1999).*Juncus* sect. *Subsegregatiflores* Cout., *Bol. Soc. Brot.* 8: 89 & 99 (1890). T: *Juncus bufonius* L., lecto, *fide* J.Kirschner & al., *Folia Geobot.* 34: 389 (1999).*Juncus* subsect. *Plebeji* Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 114, 1990. T: *Juncus plebeius* R.Br.

Small to medium-sized annuals; rhizome absent. Leaves basal and cauline, ±flat, canaliculate or semiterete; dorsal epidermal cells dilated; ventral epidermal cells ±enlarged; usually with marginal sclerenchyma. Inflorescence terminal, cymose; flowers usually sessile, borne singly or in few-flowered, mostly distal loose clusters; floral bracteoles present. Stamens 6, rarely 3. Seed without distinct outer seed coat, small; appendages absent.

A section of 11 species with its centre of diversity in the W Mediterranean region but some species are very widespread. *Juncus bufonius* s. str. and closely related species occupy large geographical ranges in Eurasia and some of them have almost cosmopolitan secondary distributions.

- | | | |
|----|--|------------------------------|
| 1 | Capsule subglobose to globose (slightly subtrigonus), to 3 mm long | |
| 2 | Inflorescence constitutes (1/2–) 2/3–9/10 of plant height; auricles absent | |
| 3 | Stems erect to erecto-patent, usually taller than 8 cm; branches suberect; capsule 2–3 mm long; seeds usually 0.4 × 0.3 mm | 205. J. sphaerocarpus |
| 3: | Stems subprostrate to ascending, to 7 (–10) cm long; branches often declinate; capsule to c. 2 mm long; seeds c. 0.3 × 0.2 mm | 204. J. amuricus |
| 2: | Inflorescence constitutes up to 1/3 of plant height; auricles present | 203. J. tenageia |
| 1: | Capsule ±ovoid to ellipsoid, (2.5–) 3.0–6.0 mm long | |
| 4 | Seeds distinctly reticulate | |
| 5 | Basal leaves bright green, 1.5–4.0 mm wide; tepals with central band bordered with brown to blackish line; anthers longer than filaments | 202. J. foliosus |
| 5: | Basal leaves mid-green to paler green, to c. 0.7 mm wide; tepals with central band unbordered; anthers shorter than filaments | 201. J. rechingeri |
| 4: | Seeds ±smooth to very faintly reticulate | (J. bufonius agg.) |
| 6 | Capsule 2.5–3.0 mm long; stamens usually 3; tepals usually shorter than 4 mm | 207. J. minutulus |

JUNCACEAE (*Juncus*)

- 6: Capsule longer than 3 mm; stamens usually 6; tepals usually longer than 4 mm
- 7 Capsule shorter than inner tepals by 1.5 mm or more; inflorescence composed of 1–3 (–5) large densely congested clusters; outer tepals distinctly acuminate(–aristate) 210. *J. sorrentinii*
- 7: Capsule \pm longer than, equalling or shorter than inner tepals (by up to 1 mm), inflorescence loose or partially contracted but clusters more than 5, usually few-flowered; outer tepals acute to \pm acuminate, without elongated subaristate tip
- 8 Capsule top \pm truncate, usually exceeding inner tepals; inner tepals obtuse 211. *J. ranarius*
- 8: Capsule top acute to obtuse, usually shorter than or equalling inner tepals; inner tepals acute to subobtuse
- 9 Inflorescence loose, with widely spaced flowers, or if some flowers in 2–3-flowered clusters then capsule \pm acute and inner tepals acute, longer than capsule 206. *J. bufonius*
- 9: Inflorescence composed of 2–6-flowered clusters or proximal flowers borne singly; capsule obtuse to subacute; inner tepals subacute, equalling or slightly longer than capsule
- 10 Flowers in 2–6-flowered clusters throughout; plants usually taller than (10–) 15 cm; outer tepals usually 5.0–7.5 mm long, distinctly (by c. 1 mm) longer than the inner tepals; seeds c. 0.3–0.4 mm long 208. *J. hybridus*
- 10: Flowers borne singly near plant base, distally in 2–5-flowered clusters; plants usually 3–15 cm tall; outer tepals 3.5–6.0 mm, slightly longer than the inner tepals; seeds c. 0.4–0.5 mm long 209. *J. turkestanicus*

201. *Juncus rechingeri* Snogerup, in K.H.Rechinger, *Fl. Iranica* 75: 19 (1971)

Juncus bufonius var. *rechingeri* (Snogerup) Jafri, in S.I.Ali & M.Qaiser (eds), *Fl. Pakist.* 138: 6 (1981). T: Afghanistan, Ghazni, Sar-i Ab, 17 Jul 1967, *K.H.Rechinger 37174B*; holotype: W; isotype: LD.

Illustration: S.Snogerup, in K.H.Rechinger, *Fl. Iranica* 75: tab. 3 (1971)

Annuals, to (6–) 10 cm tall, single-stemmed to caespitose. Basal leaves sometimes reduced to sheaths, usually 2–4 cm long, 0.3–0.7 mm wide, flat to subterete, acute; cauline leaves \pm absent. Basal bracts leaf-like; upper bracts scarious, broadly ovate. Bracteoles scarious, broadly ovate, subacute to obtuse, 0.8–2.0 mm long. Inflorescence a single simple sickle-shaped cyme or several loosely branched unilateral cymes with remote individual flowers; pedicels c. 0.1–0.3 mm long. Flowers sometimes cleistogamous. Tepals \pm unequal. Outer tepals (2.5–) 3.0–4.0 (–5.0) mm long, lanceolate to narrowly ovate, apiculate; central band greenish or stramineous; margins broad, membranous. Inner tepals (1.7–) 2.0–3.0 (–4.0) mm long, \pm narrowly ovate. Stamens 6, less than half as long as tepals; anthers 0.35–0.55 mm long; filaments c. 1 mm long; style 0.2–0.3 mm long; stigmas recurved, 0.4–0.6 mm long. Capsule ellipsoid, slightly subtrigonal above, c. 2.0–3.0 mm long, shorter than outer tepals, \pm equalling inner ones, obtuse. Seeds 0.45–0.55 \times 0.25–0.30 mm, obliquely ovoid, with dark apices, with prominent reticulation of 11–14 longitudinal ridges and 30–40 thinner transverse ones; appendages absent. $2n = 30$, *fide* S.Snogerup, in K.H.Rechinger, *Fl. Iranica* 75: 20 (1971).

From E Turkey to Iran and Middle Asia, with an outlier in Morocco. 20: MOR. 32: KAZ. 33: TCS. 34: AFG, IRN, LBS, TUR. 40: PAK. Open, usually temporarily wet, often subsaline ground. Map 405.

20. MOROCCO: Gr. Atlas, 3–5 km from Oukaimeden to Ait-Lekak, 2500–2600 m, *P.H.Davis 67590* (E). 34. AFGHANISTAN: Gardez, 10–20 km SE from Gardez to Khost, 2400–2700m, *K.H.Rechinger 32078b* (W); Paghman Mtns, Beg tut, 2900 m, *A.Gilli 221 p.p.* (W). IRAN: Fars, Kuh Delu, *C.G.T.Kotschy 501, 502* (BM, G, K, PR). TURKEY: Bitlis, Pelli, 2200 m, *P.H.Davis & O.Polunin 22398 p.p.* (E); Sivas, from Gürün to Pinarbasi, 1700 m, *J.D.A.Stainton & Henderson 5703 p.p.* (BM); Ankara, N of Kizilcahamam, *F.Sorger 71-3-30B* (W). LEBANON-SYRIA: Antilebanon, above Bludan, *P.H.Davis 10000A p.p.* (K).

202. *Juncus foliosus* Desf., *Fl. Atlant.* 1: 315, tab. 92 (1798)

Juncus bufonius var. *major* Boiss., *Voy. Bot. Espagne* 2: 624 (1841); *Juncus bufonius* var. *foliosus* (Desf.) Buchenau, *Bot. Jahrb. Syst.* 7: 157 (1885), *nom. superfl.*; *Juncus bufonius* subsp. *foliosus* (Desf.) Arcang., *Comp. Fl. Ital.* 718 (1882). T: Algeria in paludibus, *R.Desfontaines*; holotype: P-DESF742.

Juncus bufonius var. *jadarensis* Bryhn, *Nyt Mag. Naturvidensk.* 22: 282 (1876). T: [Norway] Vistvik; Orre; Naerland; *syn: n.v.*

Juncus rhiphaenus Pau & Font-Quer, in P.Font-Quer, *Iter Maroc.* (Sched. 1929), no. 64 (1930); *Juncus tenageia* var. *rhiphaenus* (Pau & Font-Quer) Maire, *Cavanillesia* 4: 97 (1931); *Juncus bufonius* var. *rhiphaenus* (Pau & Font-Quer) Maire & Weiller, in R.Maire, *Fl. Afr. Nord.* 4: 264 (1957). T: Morocco, Rif, Asibe de Ktama, 1450 m, *P.Font-Quer [It. Maroc.]* 64; *syn: BM, MA.*

Juncus bufonius var. *flaccidus* Maire, in R.Maire, *Fl. Afr. Nord.* 4: 264 (1957), *nom. inval.* Authentic material: Tunisia, Kroumirie, Fedj-es-Saha, 30 Jun 1883, *E.Cosson* 4428 (P).

Illustrations: T.A.Cope & C.A.Stace, *Watsonia* 12: 118, fig. 1 (1978); S.Pignatti, *Fl. Ital.* 3: 433 (1982).

Map: T.A.Cope & C.A.Stace, *Watsonia* 12: 124, fig. 6 (1978).

Annuals, (10–) 20–30 (–45) cm tall, robust, caespitose, with erect or ascending stems. Basal leaves light green, to 20 cm long, c. 1.5–4.0 mm wide, flat; cauline leaves 1–2; auricles absent. Basal bract leaf-like; upper bracts mostly scarious. Bracteoles ovate, scarious, c. 1.5 mm long. Inflorescence lax; branches \pm straight, often erecto-patent to almost patent; many-flowered; flowers in 1–3 (–5)-flowered clusters. Tepals unequal; central band pale green to stramineous, bordered with brown to blackish line; margins membranous; outer tepals 4.5–6.5 mm long, \pm lanceolate, acute; inner tepals subacute to acute, c. 3.5–5.5 mm long. Stamens 6, shorter than perianth; anthers 0.9–2.0 mm long, longer than 0.4–0.8 mm filaments; style 0.2–0.45 mm long; stigmas recurved, to 0.5 (–1) mm long. Capsule obovoid, 3.7–5.3 mm long, \pm equalling inner tepals, subobtusate to subacute. Seeds obovoid, 0.45–0.65 \times 0.25–0.40 mm, \pm truncate at one end, distinctly reticulate with 20–25 prominent longitudinal ridges and weaker transverse striae. $2n = 26$, *fide* T.A.Cope & C.A.Stace, *Watsonia* 12: 120 (1978); T.A.Cope & C.A.Stace, *Watsonia* 15: 311 (1985).

SW and W Europe to S Norway, Great Britain and Ireland, NW Africa and Madeira. 10: DEN, GRB, IRE, NOR. 12: COR, POR, SAR, SPA. 13: ITA, SIC. 20: ALG, MOR, TUN. 21: MDR. On open wet ground, muddy pool margins, along streams, wet fields, ditches. Map 406.

10. GREAT BRITAIN: Cornwall, Sennen Cove, 14 Jun 1956, *Pearson* 52 (K). 12. PORTUGAL: Algarve, Serra do Monchique, 23 Jun 1853, *E.Bourgeau [Pl. Esp. & Portug.]* 2046 (K, P). SPAIN: Asturias, Laurca, NE of Estoupo, 750 m, 2 Jul 1974, *Diaz* (FCO). 20. ALGERIA: Bou-Ismael, 14 Aug 1859, *Clauson* (P). MOROCCO: Boulhaut, 20 Apr 1924, *R.Maire* (P); Tanger, Djebel Kebir, 2 May 1912, *C.-J.M.Pitard* 1339 (NSW, P). TUNISIA: Ain Kabouch, 13 May 1888, *E.Cosson* (P); Ain-Draham, *C.-J.M.Pitard [Pl. Tunis.]* 912 (NSW, P).

Substantially aberrant plants were recently (June 2002) collected in Tanger Peninsula, N Morocco by J.Kirschner. They lack or almost lack the tepal coloration of *Juncus foliosus*, the shape of their inflorescence is different, floral parts much smaller, and in general appearance they approach *Juncus tenageia* from which they differ in their oblong to narrowly ovoid capsules. In most characters these plants resemble a taxon described from the Rif under the name *Juncus rhiphaenus*. The inclusion of *Juncus rhiphaenus* and our Moroccan plants in *Juncus foliosus* is very provisional, and further study is in progress.

203. *Juncus tenageia* Ehrh. ex L.f., *Suppl. Pl.* 208 (1781)

Juncus tenageia var. *brunneus* Neilr., *Fl. Nied.-Oesterr.* 1: 150 (1859). T: [Germany] Hannoverae, *F.Ehrhart [Phytophylacium]* 63; *syn: LINN-SMITH* [authentic material in G selected as lecto ('holo') by K.A.Lye, in S.Edwards, D.Sebebe & I.Hedberg, *Fl. Ethiop. Eritr.* 6: 387 (1997) is probably not eligible].

Annuals, (0.5–) 5–20 (–35) cm tall, one-stemmed or caespitose. Basal leaves numerous, c. 2–10 cm long, (0.1–) 0.3–0.8 mm wide, \pm canaliculate, acute; auricles developed, c. 0.5–1.0 mm long, oblong, obtuse; cauline leaves (0–) 1–2 (–3). Lower bract usually subherbaceous, to 1.5 cm long; middle bracts short, brownish membranous. Inflorescence constituting up to $\frac{1}{3}$ of plant height, of umbelloid loose to subdense erecto-patent sickle-shaped cymes; flowers borne singly. Bracteoles ovate, obtuse, to c. 1 mm long, brownish, distally membranous. Tepals equal or outer ones slightly longer, ovate-lanceolate, \pm acute to

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mucronate, c. 1.7–2.3 (–2.7) mm long. Inner tepals obtuse to mucronate, brown to castaneous-brown; central band often greenish or brownish; margins membranous. Stamens 6, c. half as long as tepals; anthers 0.2–0.5 mm long; filaments 0.4–0.6 (–0.8) mm long; style c. 0.1 mm long; stigmas c. 0.6 mm long. Capsule (subtrigonus-)globose, c. 1.5–2.1 mm long, obtuse to retuse, brown, usually shining. Seeds ovoid, 0.3–0.6 × c. 0.3 mm, distinctly longitudinally striate, ±reticulate.

S, E and C Europe, NW Africa, Turkey, Cyprus. Open, wet or temporarily wet habitats, usually nutrient and mineral poor, sandy or clayey soils. Two subspecies are recognized.

Plants c. 5–35 cm tall; flowers numerous per stem; seeds 0.3–0.4 (–0.45) mm long **203a.** subsp. **tenageia**

Plants c. 0.5–4.0 cm tall; flowers 1–2 (3) per stem; seeds 0.45–0.60 mm long **203b.** subsp. **perpusillus**

203a. *Juncus tenageia* Ehrh. ex L.f. subsp. *tenageia*

Juncus vaillantii Thuill., *Fl. Env. Paris* 177 (1790); *Tenageia vaillantii* (Thuill.) Rchb., *Icon. Fl. Germ.* 9: 29, tab. 416 (1847) [doubtfully valid]. T: [France, Paris], *J.L.Thuillier*; syn: P; S.Vaillant, *Bot. Paris.*, tab. 20, fig. 1 (1727); syn: *n.v.*

Juncus gracilis Lej., *Fl. Spa* 1: 166 (1811), *nom. illeg., non* Roth. (1787). T: France, entre Disson et Thimister, *A.L.S.Lejeune*; syn: *n.v.*

Juncus tenageia γ [unranked] *strictus* Gaudin, *Fl. Helv.* 2: 559 (1828). T: [SW France] *J.Gay*; holo: *n.v.*

Juncus tenageia δ [unranked] *racemosus* Gaudin, *Fl. Helv.* 2: 559 (1828). T: [SW France] *J.Gay*; holo: *n.v.*

Juncus tenageia ε [unranked] *filiformis* Gaudin, *Fl. Helv.* 2: 551 (1828). T: [Switzerland] ad lacum Verbanum prope Mergozzo, *E.Thomas*; holo: *n.v.*

Juncus tenageia f. *pauciflorus* Albert, in A.Albert & E.Jahandiez, *Cat. Pl. Vasc. Dép. Var* 501 (1908). T: France, Var, Aiguines, Artuby, *A.Albert*; syn: *n.v.*

Illustrations: T.Szynal & J.Ładalski, *Atlas Fl. Pol.* 2(2): 122 (1931); T.J.Reichgelt, *Fl. Neerl.* 1 (6): 169, fig. 41 (1964); O.Sebold & al., *Farn- u. Blütenpfl. Baden-Württembergs* 8: 18 (1998).

Plants usually 5–35 cm tall; leaves c. 0.4–1.0 mm wide; cauline leaves usually 1–2; flowers numerous per stem. Tepals usually 2.0–2.4 (–2.7) mm long; anthers c. 0.3–0.5 mm long; filaments 0.5–0.8 mm long. Seeds 0.3–0.4 (–0.45) mm long. Fig. 118.

SW, S, SE, C and E Europe, NW Africa, Turkey and Cyprus, Caucasus. Material from Kazakhstan not seen. 11: AUT, BGM, CZE, GER, HUN, NET, POL, SWI. 12: COR, FRA, POR, SAR, SPA. 13: BUL, ITA, SIC, TUE, YUC. 14: KRY, RUS, UKR. 20: ALG, MOR, TUN. 32: KAZ. 33: NCS, TCS. 34: CYP, TUR. Wet open ground, sandy shores of pools and ponds, muddy tracks, wet fields etc. Map 407.

11. GERMANY: Schleswig-Holstein, Neumünster, Einfelder See, *E.Ohl* [*A.Kneucker, Cyper. Junc. Exs.*] 76 (PR).

12. FRANCE: Calvados, Lisieux, *R.Lenormand* [*Fl. Gall. Germ. Exs.*] 554bis (K); Deux-Sèvres, Saint-Pardoux, Chateau-Bourdin, *R.Litardiere* [*Soc. Franc.*] 7850 (P, PR). PORTUGAL: Cascaes, Bissesse, 1869, *A.X.Pereira Coutinho* (WU). SARDINIA: Santa Teresa, *Kreuterger* (WU). SPAIN: Alava, Villareal, *G.Montserrat* [*Pl. País Vasco & Alto Ebro*] 186 (WU). 13. HERZEGOVINA: Neverinsko Polje, Žiljevo, 29 Jul 1889, *S.Murbeck* (LD). ITALY: Calabria, Neto R. SE of Belvedere di Spinello, *B.Snogerup & S.Snogerup* 2023 (LD). 20. ALGERIA: Great Atlas, Djebel Timuikar, Ifrouane, 2050 m, 28 Jul 1922, *R.Maire* (P). MOROCCO: Djebel Kibir, *C.-J.M.Pitard* 1358 (K). 34. TURKEY: Mughla, Sandras Dagh, *A.Strid & al.* 23304 (C).

203b. *Juncus tenageia* subsp. *perpusillus* Fern.-Carv. & Navarro, *Publ. Dep. Bot. Fac. Farmac. Salamanca* 1: 28 (1979)

Juncus perpusillus (Fern.-Carv. & Navarro) Rivas Mart., Fern.Gonz. & Sánchez Mata, in J.E.Hernández Bermejo & al., *Conserv. Techn. Bot. Gard.* 183 (1990), *nom. illeg., non* Sam. (1936). T: Spain, Serra Bejar, El Trampal, 2100–2250 m, 27 Jul 1978, *F.Navarro, J.A.Sánchez & C.Valle*; holo: FCO.

Juncus tenageia f. *depauperatus* Cout., *Bol. Soc. Brot.* 8: 101 (1890). T: Portugal, Serra da Estrella, Fonte do Selim, Aug 1881, *J.Henriques*; syn: COI; Serra da Estrella, Lagoa Secca, Jul 1880, *A.Moller*; syn: COI; Serra da Estrella, Lagoa da Salzadeire, Aug 1881, *J.Daveau*; syn: COI. [doubtfully valid, perhaps not meant as a name].

Juncus tenageia f. *nanus* Cout., *Fl. Portug.*, 2nd edn, 140 (1939), *nom. inval.*

Juncus tenageia var. *minutus* Esteve & Prieto, in P.Prieto, *Veg. Sierra Nevada* 82, 185 (1971), *nom. inval.*

Illustration: M.C.Fernández-Carvajal & F.Navarro, *Publ. Dep. Bot. Fac. Farmac. Salamanca* 1: 29, fig. 1 (1979).

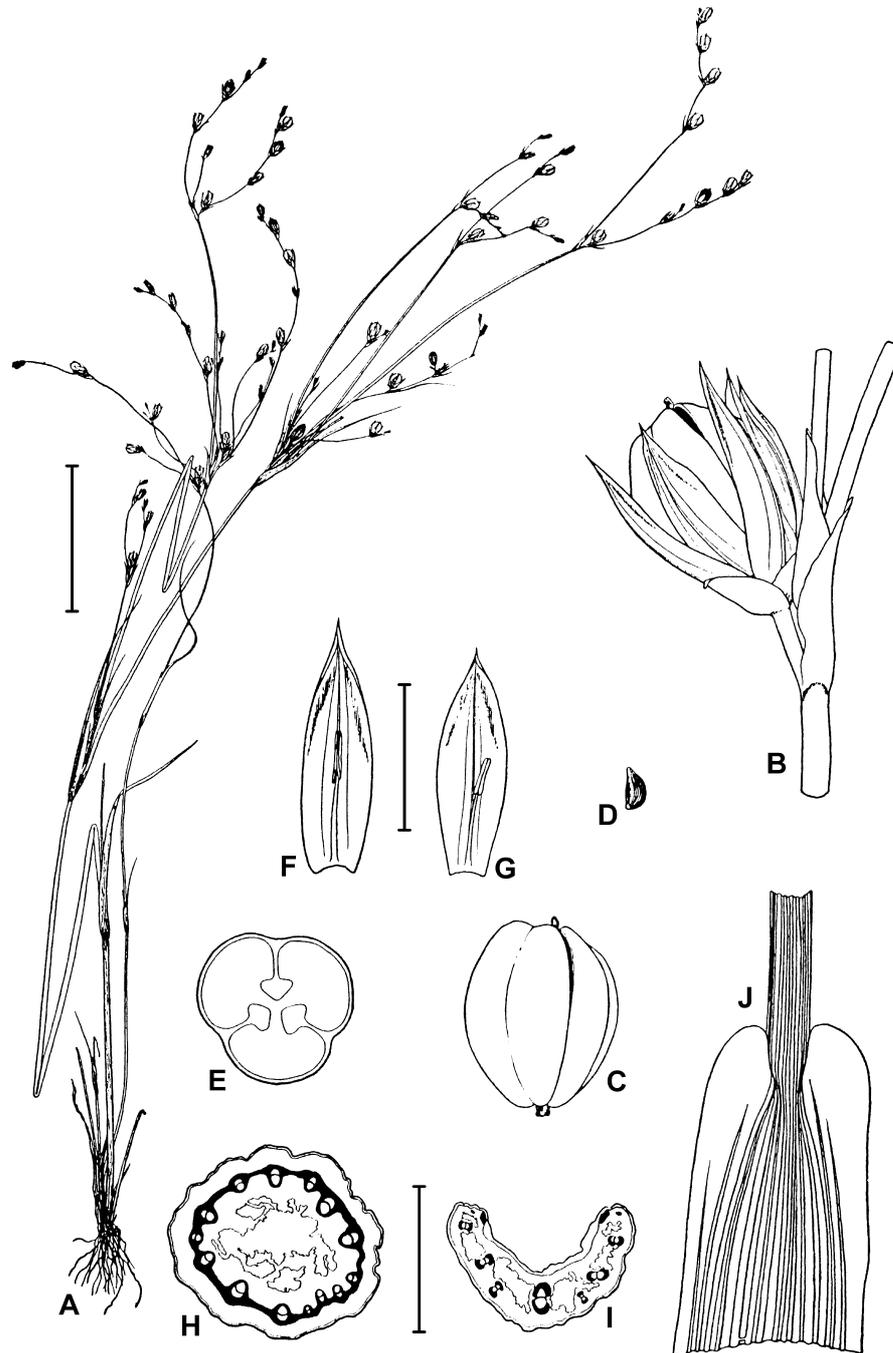


Figure 118. *Juncus tenageia* subsp. *tenageia*. **A**, habit; **B**, perianth with capsule; **C**, capsule; **D**, seed; **E**, capsule T.S.; **F**, outer tepal; **G**, inner tepal; **H**, stem T.S.; **I**, leaf blade T.S.; **J**, leaf sheath distal part (**A–J**, D. Wąsowicz, KRA). Scale bars: **A** = 3 cm; **B–G**, **J** = 2 mm; **H**, **I** = 1 mm. Drawn by T. Szynal. Reproduced with permission from T. Szynal & J. Mądalski, *Atlas Fl. Pol.* 2/2: 122 (1931).

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Plants usually 0.5–4.0 cm tall; leaves 0.1–0.3 (–0.4) mm wide; cauline leaves absent; flowers 1–2 (–3) per stem. Tepals usually 1.7–2.0 mm long; anthers 0.2–0.4 mm long. Seeds 0.45–0.60 mm long.

Confined to the mountains of Portugal, Spain and Morocco. 12: POR, SPA. 20: MOR. Gravelly and sandy seepage areas, acidic substrates above 1600 m. Map 408.

12. SPAIN: Salamanca, Candelario, Sierra de Béjar, Hoyamoro, 1850 m, *Amich Elias & Sánchez Rodriguez [Exs. Select. Fl. Iber.] 96* (K, SALA); Soria, Urbión, Laguna Larga, 2000 m, *P.Montserrat* (JACA); Avila, Sierra de Gredos, Circo, Club Alpino, 2200 m, *D.W.Dresser 959* (LD).

204. *Juncus amuricus* (Maxim.) V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl SSSR* 3: 623 (1935)

Juncus bufonius var. *amuricus* Maxim., *Mem. Sav. Etr. Petersb.* 9: 294 (1859); *Juncus sphaerocarpus* var. *amuricus* (Maxim.) Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 108 (1906). T: Russia, Amur, Monglomain, 2 Sep 1855, *C.J.Maximowicz*; lecto: LE, designated here by V.S.Novikov; iso: G, K, L, P.

Juncus bufonius var. *occidentalis* F.J.Herm., *Madroño* 25: 104 (1978). T: USA, Oregon, Crook Co., Grizzly Butte, *J.B.Leiberg 256*; holo: US; iso: MICH [see also W.Greuter & al., *Internat. Code Bot. Nomencl.*, Art. 33.5, Ex. 9 (2000)].

Illustrations: C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 190 (1969), as *J. sphaerocarpus*; V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 61, tab. 3 (1985).

Map: V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 62, fig. 14 (1985) [the Russian Far East].

Annuals, 3–7 (–10) cm tall, loosely fasciculate. Stems subprostrate to ascending, less often \pm erect; branches often declinate. Cataphylls pale greenish to stramineous, 5–7 mm long. Basal leaves c. 1–3 cm long, 0.2–0.3 mm wide, canaliculate; sheath dilated; margins brownish-membranous; auricles absent; apex acute. Lower bracts leaf-like, to 1.5–2.0 cm long. Flowers borne singly from plant base, in loose sickle-shaped cymes. Bracteoles subacute, to 1 mm long, scarious. Tepals \pm unequal, \pm lanceolate, acute; outer tepals 2.3–2.6 mm long; inner tepals c. 2.0–2.2 mm long; central band stramineous or pale greenish; margins membranous. Stamens (4 or 5–) 6; anthers 0.2–0.3 mm long; filaments 0.5–0.6 mm long; style c. 0.2 mm long; stigmas c. 0.4–0.7 mm long. Capsule subglobose, obtuse, minutely mucronate, 1.8–2.0 mm long, shorter than inner tepals, usually castaneous-brown. Seeds \pm ovoid, c. 0.3 \times 0.2 mm, pale brown, very faintly reticulate; appendage absent.

Russian Far East and Pacific North America. Very probably also in Manchuria, China, and Korea but material not seen. 31: AMU, KHA, PRM. 71: BRC. 73: COL, IDA, ORE, WAS. 76: ARI, CAL. Coastal sands, along rivers, mud flats, lake borders. Map 409.

71. BRITISH COLUMBIA: Vancouver Is, Cedar Hill, 16 Jun 1887, *J.Macoun* (BM, K). **73.** OREGON: Crook Co., Indiana Creek, *A.Cronquist 7427* (LD). WASHINGTON: Klickitat Co., Bingen, *W.Suksdorf 5985* (K). **76.** CALIFORNIA: Rocky Mountain Flora, 39°–41°N, *E.Hall & J.P.Harbour 559 p.p.* (BM, PR).

Very closely related to *Juncus sphaerocarpus*; main differences are smaller size of floral parts, and subprostrate growth with declinate branches. Probably better treated as a subspecies or variety of *J. sphaerocarpus* but further study is necessary.

205. *Juncus sphaerocarpus* Nees, in H.C.Funck, *Flora* 1(1): 521 (1818)

Juncus tenageia var. *sphaerocarpus* (Nees) Cariot & St.-Lager, *Étude Fl.*, 8th edn, 2: 843 (1889); *Tenageia sphaerocarpa* (Nees) Rchb., *Icon. Fl. Germ.* 9: pl. 416, fig. 924 (1847); *Juncus tenageia* subsp. *sphaerocarpus* (Nees) Trab., in J.A.Battandier & L.C.Trabut, *Fl. Alger.*, *Monocot.* 90 (1895). T: [Germany] in monte Hohe Rhoen prope Wirceburgam, *F.X.Heller*; syn: LD, BM.

Juncus tenageia β [unranked] *intermedius* Gaudin, *Fl. Helv.* 2: 559 (1828). T: N.T.Host, *Gram. Austr.* 3: tab. 91 (1805); syn.

Juncus tenageia β [unranked] *pallidus* Neilr., *Fl. Nied.-Oesterr.* 1: 150 (1859). T: [numerous syntypes, mostly W]; N.T.Host, *Gram. Austr.* 3: tab. 91 (1805); syn.

Juncus acicularis H.Roux, *Catal. Pl. Provence* 573 (1881–1892); *Juncus tenageia* subsp. *acicularis* (H.Roux) Bonnier & Layens, *Fl. France* 321 (1894). T: France, dans les gravières de l'Arx pres d'Aix, 12 Aug 1855, *H.Roux*; syn: *n.v.*; Saint-Pons de Roquefavor, 29 Sep 1867, *H.Roux*; syn: *n.v.*

Juncus haussknechtii Ruhmer, *Jahrb. Königl. Bot. Gart. Berlin* 1: 257 (1881), *pro hybr.* T: [Germany] Weimar, *H.C.Haussknecht*; syn: JE, PR.

Juncus subglobosus K.F.Wu, *Acta Phytotax. Sin.* 32: 451 (1994), *nom. illeg., non* Adamson (1935); *Juncus amuricus* var. *wui* Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 103(4): 66 (1998). T: China [Xinjiang], Burqin, 500 m, 1 Aug 1972, *Anonymous A72-3073*; holotype: XJA.

Illustrations: H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 3: 504 (1967); Wu Kuofang, *Fl. R. P. Sinicae* 13(3): 175, tab. 40 (1997), as *J. subglobosus*; O.Sebold & al., *Farn- u. Blütenpfl. Baden-Württembergs* 8: 20 (1998).

Annuals, (4–) 8–14 (–30) cm tall, caespitose; stems erect to suberect. Cataphylls c. 1–3, stramineous-brownish. Cauline leaves sub-basal, usually 1–2, 1–5 cm long, 0.5–1.3 mm wide, ±canaliculate; auricles absent. Lower bracts leaf-like, to c. 3 cm long. Bracteoles ovate, c. 1.0–1.3 mm long, ±acute, scarious. Inflorescence constitutes (1/2–) 3/4–9/10 of plant height; flowers borne singly, remote; inflorescence branches erecto-patent. Tepals unequal. Outer tepals ±lanceolate, (2.5–) 2.7–3.4 (–4.0) mm long, acute; central band stramineous to pale green; margins membranous. Inner tepals c. 2.0–3.2 mm long, ±acute; midrib narrow; margins broad, membranous. Stamens 6; anthers (0.2–) 0.3–0.5 (–0.6) mm long; filaments c. 0.6–1.0 mm long; style 0.1–0.2 mm long; stigmas recurved, 0.4–0.8 mm long. Capsule subglobose, slightly subtrigonal, obtuse, minutely mucronate, c. 2.0–2.5 (–3.0) mm long, shorter than outer tepals, ±equalling the inner ones, usually pale brown. Seeds ±ovoid, 0.35–0.45 × c. 0.3 mm, pale castaneous-brown, almost smooth or very faintly reticulate. 2n = 36, *vide* S.Snogerup, *Bot. Not.* 111: 249 (1958).

Centred in the Mediterranean and C and SE Europe, reaching NE Africa in the south and Middle Asia and NW China in the east. 11: AUT, CZE, GER, HUN, SWI. 12: FRA, POR, SPA. 13: GRC, YUC. 14: KRY, RUS, UKR. 20: ALG, MOR, TUN. 24: ETH, SOM. 30: ?ALT, TVA. 32: KAZ, TKM, UZB. 33: TCS. 34: AFG, CYP, IRN, IRQ, LBS, PAL, TUR. 36: CHX. 40: WHM. Wet open ground, mud flats, lake shores, sands. Usually a rare plant, localities temporary. Map 410.

11. AUSTRIA: Wien, Laxenburg, Jun 1897, *O.Krebs* (PR); Nieder Österreich, S of Berndorf, 380 m, 6 Jul 1996, *W.Till s.n.* (WU). HUNGARY: Ercsi, Malonta, *G.Tauscher [Fl. Exs. Austro-Hung.] 274/I* (L, PR). 12. SPAIN: Burgos, Valle de la Hoz, 650 m, *Elias [E.M.Sennen, Pl. Esp.] 3861* (K, LD, MA, PR); Granada, Antequera, Sierra de las Cabras, 1100–1200 m, *R.Huter, P.Porta & G.Rigo [It. Hisp.] 644* (PR). 20. MOROCCO: Setlat, Si Senhadj, 27 May 1912, *C.-J.M.Pitard 1354 p.p.* (P). TUNISIA: Ain Bon Saadia, 20 May 1903, *S.Murbeck* (LD, UPS). 24. SOMALIA: SE of Laasqoray, near Ragad, 1300 m, *M.Thulin 9103* (UPS). 34. IRAN: Shiraz, Kotal Dokhtar, *R.Alava 10666* (W). TURKEY: Mersin, Çavusli, 1855, *B.Balansa* (K); Izmir, 3 km NE of Bornova, *S.Snogerup & B.Snogerup 12311* (LD).

206–211. *Juncus bufonius* agg.

Juncus bufonius var. *procerior* Roth, *Tent. Fl. Germ.* 1: 156 (1788). T: Leers, Herb. [J.D.Leers, *Fl. Herborn.*, 2nd edn, tab. xiii, fig. 8 (1789) or a reference to 1st edn, *n.v.*]; syn.

Juncus bufonius var. *grandiflorus* Schult. & Schult.f., *Syst. Veg.* 7(1): 227 (1829). T: [South Africa] 'in Prom. b. spei' [Cape of Good Hope], *C.P.Thunberg*; holotype: *n.v.*

Juncus bufonius var. *compactus* Čelak., *Prodr. Fl. Böhm.* 1: 83 (1867). T: [Bohemia, otherwise not indicated]

Juncus istriacus Gand., *Contrib. Fl. Terrae Slav. Merid.* 1: 28 (1883). T: Istria, ad Fasana, *J.Frey*; syn: *n.v.*

Juncus bufonius [Unterabart] *parviflorus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 421 (1904). T: [not indicated, no locality cited].

Juncus bufonius [Abart] *scoparius* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 421 (1904); *Juncus bufonius* f. *scoparius* (Asch. & Graebn.) Nyár., *Kv. Fl.* 109 (1944), *n.v.*; & I.Grintescu, in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 535 (1966). T: Germany, Oberpfalz, Wöllershof, *H.Müller*; syn: *n.v.*

Juncus fasciatus Lojac., *Fl. Sicula* 3: 164, plate ix, fig. 1 (1908). T: Sicilia, *M.Lojacono Pojero*; holotype: PAL, *n.v.* [possibly a synonym of *Juncus bufonius* s. str.]

Juncus bufonius var. *tuberiferus* Krylov, *Fl. Alt.* 6: 1405 (1912). T: [the Altai, otherwise not indicated]

Juncus bufonius var. *susianus* Nábělek, *Spisy Pfir. Fak. Masarykovy Univ.* 105: 43, tab. iv, fig. 2 (1929). T: [Iran] Persia austro-occidentalis, ad ruinas Susorum, *F.Nábělek 876*; holotype: SAV. [Probably a form of *J. hybridus* with ±solitary flowers].

Maps: E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 92, map 183 (1986); E.Hultén, *Fl. Alaska* 295 (1968).

JUNCACEAE (*Juncus*)

An intricate complex of very similar and closely related taxa. Differences of a qualitative nature are few, and quantitative character ranges frequently overlap. Another difficulty is the occasional occurrence of hybrids. However, a good correlation between chromosome numbers and morphological characters, differences in phenology and (often) distribution, and prevailing autogamy (cleistogamy) in some species represent arguments in favour of specific treatment of most of the taxa recognized.

206. *Juncus bufonius* L., *Sp. Pl.* 328 (1753)

Tenageia bufonia (L.) Fourr., *Ann. Soc. Linn. Lyon*, sér. 2, 17: 172 (1869); *Juncus bufonius* var. *vulgaris* Boiss., *Voy. Bot. Espagne* 2: 624 (1841), *nom. inval.*; *Juncus bufonius* var. *genuinus* Cout., *Bol. Soc. Brot.* 8: 102 (1890), *nom. inval.*; *Juncus bufonum* Bubani, *Fl. Pyren.* 4: 187 (1901), *nom. illeg.*; *Juncus bufonius* var. *typicus* Husn., *Joncées* 18 (1908). T: 'in Europae inundatis', *Van Royen*; lecto: L904145–433, *fide* T.A.Cope & C.A.Stace, *Watsonia* 2: 121 (1978). A.A.Obermeyer, in A.A.Obermeyer, J.Lewis & R.B.Faden, *Fl. S. Afr.* 4(2): 76 (1985), selected LINN449.24 as a later, and therefore unacceptable, lectotype.

Juncus plebeius R.Br., *Prodr.* 1: 259 (1810). T: [Australia, New South Wales] 'J' [=Port Jackson], *R.Brown*; lecto: BM, *designated here*; iso: W

Juncus prolifer Humb., *Bonpl. & Kunth, Nov. Gen. Sp.* 1: 236 [Quarto], 1: 190 [Folio] (1816). T: Colombia, Tolima, Quindion near Paso de Machin, *F.W.H.A.Humboldt & A.J.A.Bonpland s.n.*; lecto: P, *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 77 (1996); iso: B-W6890.

Juncus bufonius var. *congestus* Wahlenb., in C.P.Thunberg, *Fl. Gothob.* 38 (1820), *n.v.* T: *n.v.*

Juncus bufonius var. *capillaris* Rchb., *Icon. Fl. German. Helvet.* 9: 22 (1847). T: [Romania] Orawicza in Bannatus, [collector not given]; fig. 875 with details; syn.

Juncus bufonius b. [unranked] *frondescens* Döll, *Fl. Baden* 1: 336 (1857). T: Mannheim am Altneckar, *J.C.Döll*; syn: *n.v.*

Juncus bufonius var. *alpinus* Schur, *Enum. Pl. Transsilv.* 688 (1866); *Juncus bufonius* f. *alpinus* (Schur) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 535 (1966). T: [Romania], [Mt] Arpás, Jul 1846, *F.Schur*; syn: W.

Juncus bufonius var. *laxus* Čelak., *Prodr. Fl. Böhm.* 1: 83 (1867). T: [Bohemia, otherwise not indicated].

Juncus bufonius var. *pumilio* Griseb., *Symb. Fl. Argent.* 316 (1879). T: Argentina, Puna [Cangrejas], May 1873, *P.G.Lorentz & G.H.E.W.Hieronymus* 826; lecto: GOET, *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 77 (1996); iso: SI, CORD, photo AAU.

Juncus bilineatus Gand., *Contrib. Fl. Terrae Slav. Merid.* 1: 29 (1883). T: *n.v.* [syntypes from Croatia and France cited].

Juncus bufonius f. *divaricatus* [Gilib. ex] Racib., *Sprawozd. Kom. Fizyogr. Akad. Umiej.* 22(2): [p. separ.] 4 (1888). T: not indicated.

Juncus bufonius f. *filiformis* Klinge, *Sitzungsber. Nat. Ges. Univ. Dorpat* 6: 182 (1882), *n.v.*, sec. Racib., *Sprawozd. Kom. Fizyogr. Akad. Umiej.* 22(2): [p. separ.] 4 (1888). T: *n.v.*

Juncus bufonius A.II [unranked] *leucanthus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 422 (1904). T: [S Europe, otherwise not indicated].

Juncus bufonius A.II [unranked] *giganteus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 422 (1904); *Juncus bufonius* f. *giganteus* (Asch. & Graebn.) Nyár., *Kv. Fl.* 109 (1944), *n.v.*; & I.Grintescu, in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 535 (1966). T: [C Europe, otherwise not indicated].

Juncus bufonius var. *dolichophyllus* Zapał., *Consp. Fl. Galic.* 1: 129 (1906). T: [numerous syntypes cited].

Juncus bufonius f. *frondescens* Miszczenko, *Fl. Caucas. Crit.* 4 (2): 37 (1906). T: [the Caucasus, Georgia] *Abkhasia*; syn: LE, *n.v.*

Juncus bufonius var. *subauriculatus* Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 106 (1906). T: Italy, Fucecchio, Etrurien, *Sommier*; syn: *n.v.*; 'Nafeh, Arabia petraea', *Schimper* 113; syn: P, PR; 'Oase Firan, Sinai', *A.Kneucker [Cyper. Junc. Exs.]* 169; syn: L [the plant in K is *Juncus hybridus*].

Juncus bufonius var. *gramineus* Lojac., *Fl. Sicul.* 3: 161 (1909). T: numerous syntypes from Sicily.

Juncus bufonius var. *suffocatus* Lojac., *Fl. Sicul.* 3: 161 (1909). T: numerous syntypes from Sicily, e.g. Alcamo, *V.Tineo*; syn: *n.v.*

Juncus bufonius var. *filiformis* Lojac., *Fl. Sicul.* 3: 161 (1909). T: numerous syntypes from Sicily.

Juncus leptocladus Hayata, *Ic. Pl. Formos.* 6: 100 (1916). T: Formosa [Taiwan], Mt Arisan, 1914, *U.Faurie* 147; holo: TI, also photo Y.Satake, *J. Jap. Bot.* 9: 374 (1933).

Juncus erythropodus V.I.Krecz., *Bull. Univ. As. Med.* 21: 176 (1935), *n.v.* T: Kirgizistan, lacus Issik-Kul, *Bazzino*; holo: TAK, *n.v.*

Juncus juzepczukii V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 625 (1935); *Juncus bufonius* subsp. *juzepczukii* (V.I.Krecz. & Gontsch.) Sóo, *Acta Bot. Acad. Sci. Hung.* 16: 366 (1971); *Juncus bufonius* var. *juzepczukii* (V.I.Krecz. & Gontsch.) Vorosch., in A.K.Skvortsov, *Florist. Issled. Raz. Raion. SSSR* 157 (1985). T: Russia, Ingria, Tzarskoe Selo, ad ripam fl. Kurminka, 15 Sep 1915, S.V.Juzepczuk; holotype: LE.

Juncus bufonius f. *bracteatus* Pamp., *Arch. Bot.* 12: 21 (1936). T: [Tunisia] Ain Mara, R.Pampanini; syn: FI, n.v.

Juncus aletaiensis K.F.Wu, *Acta Phytotax. Sin.* 32: 450 (1994). T: China, Xinjiang, Altay, 600 m, 19 Jul 1972, [Anonymous] A72-2302; holotype: XJA.

Juncus divaricatus Gilib., *Exerc. Phyt.* 2: 506 (1792), *nom. inval.*

Illustrations: T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2(2): 120 (1931); H.Balslev, *Fl. Neotrop. Monogr.* 68: 76, fig. 38F, G (1996).

Annuals, (2–) 5–40 (–45) cm tall, caespitose; stems erect to ±ascending. Basal leaves few, often cataphyllous; cauline leaves 1–3 (–5), 1–12 cm long, c. 0.5–1.5 mm wide, flat to subcanaliculate; auricles absent. Lower bracts herbaceous, usually shorter than or rarely exceeding inflorescence. Inflorescence constitutes c. $\frac{1}{2}$ – $\frac{3}{4}$ of plant height, usually ±lax, open, rarely subcontracted; branches ±suberect; flowers borne singly or seldom in few-flowered loose clusters. Bracteoles ovate, c. 1.5–2.5 mm long, acute, scarious. Tepals unequal, broadly lanceolate; central band usually greenish; margins broad, membranous; outer tepals longer, acuminate, 4.0–7.5 mm long; inner tepals acute, c. 3.5–6.0 mm long. Flowers cleistogamous or chasmogamous. Stamens 6, rarely to 3, usually less than $\frac{1}{2}$ as long as tepals; anthers variable in length, (0.3–) 0.5–1.0 (–1.2) mm long, c. 0.5–1.0× as long as c. 0.7–0.9 mm filaments; style c. 0.4–0.5 mm long; stigmas ±patent, c. 1.0–1.5 mm long. Capsule narrowly ovoid to subellipsoid, c. 3.5–5.0 mm long, usually shorter than inner tepals, usually acute to subacute, with mucro c. 0.1–0.2 mm long. Seeds barrel-shaped, 0.40–0.50 × c. 0.25–0.35 mm, usually pale brown, ±smooth or very faintly reticulate. $2n = 108$, *fide* T.A.Cope & C.A.Stace, *Watsonia* 15: 311 (1985); $2n = c. 108$ (104–110), *fide* T.A.Cope & C.A.Stace, *Watsonia* 12: 121 (1978); N.A.Harriman & D.Redmond, *Rhodora* 78: 731 (1976). Fig. 119.

Cosmopolitan. Gaps in the known distribution are more likely due to insufficient exploration rather than actual absence. Very frequent dispersal with waterfowl makes it difficult to distinguish natural occurrence from recent introductions but Europe and W Asia may be considered as the area of native distribution. 10: DEN, FIN, FOR, GRB, ICE, IRE, NOR, SWE. 11: AIL. 12: AIL. 13: AIL. 14: AIL. 20: ALG, EGY, LBY, MOR, TUN. 21: AZO, CNY, MDR. 23: RWA. 24: ETH. 25: KEN, UGA. 27: CPP, OFS. 29: MAU, MDG. 30: AIL. 31: AIL. 32: AIL. 33: AIL. 34: AIL. 35: YEM. 36: AIL. 37: MON. 38: JAP, KOR, TAI. 40: ASS, BAN, EHM, IND, NEP, PAK, SRL, WHM. 41: BMA, THA, VIE. 42: BOR, PHI. 50: NSW, NTA, QLD, SOA, TAS, VIC, WAU. 51: NZN, NZS. 63: HAW. 70: ASK, NWT. 71: ABT, BRC, MAN, SAS. 72: LAB, NFL, NSC, ONT, PEI, QUE. 73: COL, MNT, ORE, WAS, WYO. 74: AIL. 75: AIL. 76: ARI, CAL. 77: TEX. 78: ALA, ARK, FLA, GEO, LOU, NCA, TEN, VRG. 79: AIL. 80: COS, GUA. 81: BAH, CUB, JAM. 82: VEN. 83: BOL, CLM, ECU, PER. 84: BZS. 85: AIL. 90: FAL, TCD. Most frequently in open muddy flats, denuded bottoms of ponds and periodic ponds, wet tracks, wet fields, and a number of temporary wet habitats with suppressed competition. Map 411.

10. FINLAND: Helsinki, Viikintie, A.Kurto 4641 (H, NSW). 11. GERMANY: Schleswig-Holstein, Gudow, S.Jeppesen & K.Larsen [*Fl. Germ. Exs. Schl.-Holst.*] 37 (AAU, C, NSW). 27. CAPE PROVINCES: Stellenbosch, Devon Valley, 24 Oct 1984, D.L.Koutnik (BOL, MO, NSW). 63. HAWAII: E Maui, C.N.Forbes 172 (NSW).

Extremely variable in general habit as a result of a variety of habitats and probable polyploidy or agmatoploidy. Most of the literature records refer to the whole group, or even section, but it is obvious that *J. bufonius* s. str. is the most widespread taxon in the section. The most conspicuous variation within *J. bufonius* is the occasional occurrence of cleistogamous triandrous forms that may be misidentified with *J. minutulus*. The capsule size is diagnostic in this case.

207. *Juncus minutulus* (Albert & Jahand.) Prain, *Index Kew. Suppl.* 5: 143 (1921)

Juncus bufonius f. *minutulus* Albert & Jahand., *Cat. Pl. Vasc. Dép. Var* 501 (1908) [sometimes the rank is referred to as 'proles']. T: France, Var Department, 'Bormes & île de Porquerolles', E.Jahandiez; syn: n.v.

Juncus bufonius L. var. *parvulus* Hartm., *Handb. Skand. Fl.*, 7th edn, 241 (1858). T: not indicated.

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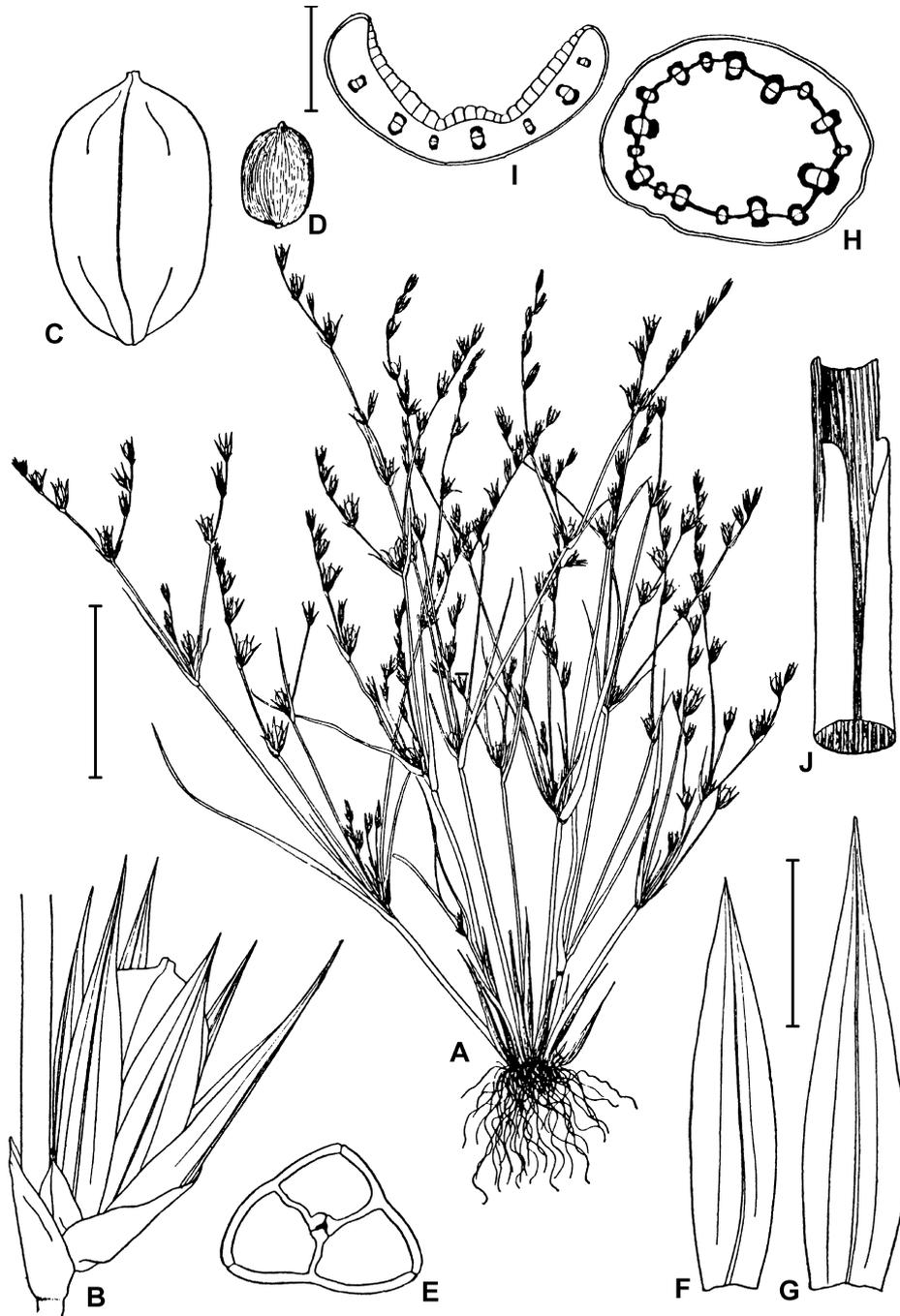


Figure 119. *Juncus bufonius*. **A**, habit; **B**, perianth with capsule; **C**, capsule; **D**, seed; **E**, capsule T.S.; **F**, inner tepal; **G**, outer tepal; **H**, stem T.S.; **I**, leaf blade T.S.; **J**, leaf sheath distal part (**A–J**, A.Rehmann, KRA). Scale bars: **A** = 3 cm; **B**, **C**, **E–G**, **J** = 2 mm; **D**, **H**, **I** = 1 mm. Drawn by T.Szynal. Reproduced with permission from T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2/2: 120 (1931).

Juncus minutulus V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 625 (1935), *nom. illeg.*; *Juncus bufonius* L. subsp. *minutulus* [V.I.Krecz. & Gontsch.] S6o, *Acta Bot. Acad. Sci. Hung.* 16: 366 (1971), *nom. illeg.* T: Russia, Sarepta, 24 May 1851, *A.Becker*; *holo*: LE.

Annuals, c. 1.5–6 (–15) cm tall, usually caespitose; stems often abbreviated. Base with brownish sheaths; basal leaves 0.5–4.0 cm long, c. 0.3–0.5 mm in diam., flat to subterete; leaf auricles absent; cauline leaves 0–2, 1–3 cm long. Basal bracts leaf-like; upper bracts gradually becoming scarious, with developed auricles. Bracteoles ovate, usually obtuse, c. 1.5–2.5 mm long, scarious. Inflorescence a loose or abbreviated sparsely branched or simple sickle-shaped cyme; flowers c. 2–15 (–30), usually borne singly. Flowers cleistogamous. Tepals usually erect, \pm unequal. Outer tepals \pm lanceolate, 3.5–4.5 (–6.0) mm long, acuminate or \pm acute; central band greenish; margins broad, membranous. Inner tepals c. 3.0–4.0 mm long, acute. Stamens usually (2 or) 3, rarely to 6, less than half as long as tepals; anthers 0.2–0.5 mm long; filaments c. 0.8–1.2 mm long; style 0.1–0.4 mm long; stigmas recurved, to 1 mm long. Capsule oblong-ovoid to ellipsoid, 2.5–3.0 mm long, (sub)obtuse, with minute mucro, shorter than or rarely as long as inner tepals. Seeds (0.30–) 0.35–0.40 (–0.45) \times c. 0.25 mm, almost smooth or very faintly reticulate; appendages absent. $2n = c.72$ (70–75), *vide* S.Snogerup, in K.H.Rechinger, *Fl. Iranica* 75: 17 (1971); K.Mičieta & L.Mucina, *Pl. Syst. Evol.* 142: 139–140 (1983).

Probably almost cosmopolitan but reliable records or representative exploration limited to a few regions. Probably native to N Eurasia. 10: DEN, fin, GRB, NOR, SWE. 11: AUT, BGM, CZE, GER, HUN, NET, POL, SWI. 12: FRA, POR, SPA. 13: GRC, ITA, SIC, TUE. 14: BLR, RUC, RUN, RUS. 30: ALT, BRY, CTA, IRK, TVA, WSB, YAK. 34: IRN, TUR. 72: NSC. 76: CAL. Open, wet or temporarily wet ground, sandy fields, mud flats etc. Map 412.

10. GREAT BRITAIN: Guernsey, L'Ancreasse Common, Jun 1894, *Lowry* (K). 11. AUSTRIA: Schönaun near Litschau, 15 Aug 1928, *E.Korb* (W). CZECH REPUBLIC: Praha, Radotín, *E.Liebaldt* (PR); Olomouc, Černovír, 220 m, Sep 1942, *J.Otruba* (PRC). POLAND: Kraków, Olszanica, *T.Tacik* [*Pl. Polon. Exs.*] 489 p.p. (KRA, PRC). 12. FRANCE: Var, 1 km NE of Frejus, *S.Snogerup* 2451 (LD). 34. IRAN: between Rasht and Lahijan, *K.H.Rechinger* 35 (W); Lahijan, *M.Lindsay* 836 (BM). TURKEY: Istanbul, Yakacik Dag, *Ertem* (ISTE 19740); Ikaria, from Frantaton to Vraches, 400 m, *P.H.Davis* 67864A (E). 72. NOVA SCOTIA: Queens Co., Charleston, *W.G.Dore* & *E.Gorham* 45959 (PR). 76. CALIFORNIA: Sonoma Co., N of Sonoma, 12 Apr 1953, *K.H.Rechinger* 119 (LD).

208. *Juncus hybridus* Brot., *Fl. Lusit.* 1: 513 (1804)

Juncus bufonius b. [unranked] *hybridus* (Brot.) Asch., *Fl. Prov. Brandenburg.* 735 (1864); *Juncus bufonius* var. *hybridus* (Brot.) Husn., *Bull. Soc. Bot. France* 55: 50 (1908) & P.T.Husnot, *Joncées* 18 (1908); *Juncus bufonius* subsp. *hybridus* (Brot.) Arcang., *Comp. Fl. Ital.* 718 (1882). T: Portugal, 'Circa Conimbricam & alibi in Beira', *F.Brotero*; *syn*: LISU, not extant.

Juncus mutabilis Savi, *Fl. Pis.* 1: 364 (1798), *nom. illeg., non* Lam. (1789); *Juncus bufonius* f. *mutabilis* [Savi] Neuman, *Sveriges Fl.* 659 (1901); *Juncus bufonius* B. [unranked] *mutabilis* (Neuman) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 422 (1904); *Juncus bufonius* subsp. *mutabilis* (Neuman) H.Lindb., *Acta Soc. Sci. Fenn.*, ser. nov., B1(2): 31 (1932). T: *n.v.*

Juncus insulanus Viv., *Fl. Cors. Prodr.* 5 (1824); *Juncus fasciculatus* Bertol., *Fl. Ital.* 4: 190 (1839), *nom. illeg.*; *Juncus bufonius* subsp. *fasciculatus* K.Richt., *Pl. Eur.* 1: 176 (1890), *nom. illeg.*; *Juncus bufonius* subsp. *insulanus* (Viv.) Briq. ex Jahand. & Maire, *Cat. Pl. Maroc* 114 (1931). T: [Corse] Bonifacio, *D.Viviani*; *syn*: *n.v.*

Juncus ambiguus Guss., *Fl. Sicul. Prodr.* 1: 435 (1827); *Juncus mutabilis* subsp. *ambiguus* (Guss.) Nyman, *Consp. Fl. Eur.* 749 (1882); *Juncus bufonius* var. *ambiguus* (Guss.) Husn., *Joncées* 18 (1908); *Juncus bufonius* subsp. *ambiguus* (Guss.) Schinz & Thell., *Fl. Schweiz* 1: 126 (1923). T: Sicily, *J.Gussone*; *lecto*: G, *designated here* by S.Snogerup.

Juncus bufonius var. *fasciculiflorus* Boiss., *Voy. Bot. Espagne* 2: 624 (1841). T: not indicated [*Juncus insulanus* Viv. and *J. hybridus* Brot. included, additional syntypes listed, all in G].

Juncus congdonii S.Watson, *Proc. Amer. Acad.* 22: 480 (1887). T: California, Mercedes Co., Chowchilla R., Jun 1885, *J.Congdon* & *W.Congdon*; *holo*: GH [the plant may represent an extreme form of *J. sorrentinii*, too].

Juncus bufonius var. *kochii* Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 106 (1906). T: South Australia, Mt Lyndhurst, Trinity Well, Oct 1899, *M.Koch* 495; *syn*: LD.

Juncus bufonius subsp. *mogadorensis* H.Lindb., *Acta Soc. Sci. Fenn.*, ser. nov., B1(2): 31, tab. 11a (1932); *Juncus mogadorensis* (H.Lindb.) A.W.Hill, *Index Kew.*, Suppl. 9 (1931–1935): 281 (1938); *Juncus bufonius*

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var. *mogadorensis* (H.Lindb.) Maire & Weiller, in R.Maire, *Fl. Afr. Nord* 4: 265 (1957). T: Morocco, Mogador, in ripa fluminis Oued Ksob, *H.Lindberg* 2131; holo: H; iso: LD.

Juncus dinteri Poelln., *Repert. Spec. Nov. Regni Veg.* 48: 173 (1940). T: Namibia, Garies, *M.K.Dinter* 4254; holo: B; iso not located in SAM, herbarium *Dinter*. [A rather depauperate specimen of *J. hybridus*. Recently equated with *J. bufonius* by A.A.Obermeyer, in A.A.Obermeyer, J.Lewis & R.B.Faden, *Fl. S. Afr.* 4(2): 76 (1985)].

Illustrations: H.Lindberg, *Acta Soc. Sci. Fenn.*, ser. nov., B1(2): pl. 11a, b (1932); M.Barros, *Darwiniana* 10: 364, fig. 27 (1953), as *J. bufonius* var. *condensatus*; T.A.Cope & C.A.Stace, *Watsonia* 12: 119, fig. 4 (1978).

Map: T.A.Cope & C.A.Stace, *Watsonia* 12: 125, fig. 8 (1978) [Europe].

Annuals, (5–) 14–20 (–30) cm tall, dark green, usually caespitose, ±robust, seldom one-stemmed. Basal leaves usually 2–8 cm long, c. 0.6–1.1 mm wide, flat to canaliculate. Cauline leaves usually 1–3, often equalling to exceeding inflorescence; auricles absent in leaves, sometimes developed in lower bracts. Lower bracts leaf-like, long. Inflorescence usually constitutes only $\frac{1}{3}$ – $\frac{2}{5}$ of plant height, usually many–50-flowered, of several sickle-shaped cymes, in 2–6-flowered fan-shaped clusters. Bracteoles ovate, 1.5–2.5 mm long, scarious. Tepals broadly lanceolate, unequal. Outer tepals acute to acuminate, 4.9–7.5 mm long; central band pale green to stramineous; margins broad, membranous. Inner tepals c. 4.0–6.0 mm long, subobtuse to ±acute. Stamens 6, less than $\frac{1}{2}$ as long as tepals; anthers 0.4–0.8 (–1.0) mm long; filaments c. 0.7–2.0 mm long; style 0.2–0.5 mm long; stigmas 0.5–1.0 mm long. Capsule oblong(–ovoid) to ±ellipsoid, subtrigonous, c. 3.5–4.5 mm long, slightly shorter than inner tepals, usually subacute, less often ±acute to obtuse. Seeds ±ovoid, 0.3–0.4 × 0.2–0.3 mm, almost smooth, very faintly reticulate; appendages absent. $2n = 34$, *fide* S.Snogerup, in K.H.Rechinger, *Fl. Iranica* 75: 17 (1971); T.A.Cope & C.A.Stace, *Watsonia* 15: 311 (1985).

S Europe and the Mediterranean, Macaronesia, Turkey and the Near East (Iraq, Iran, Afghanistan), Middle Asia; introduced to Britain, South Africa, W North America, South America and Australia, probably also in New Zealand. 10: grb. 12: BAL, COR, FRA, POR, SAR, SPA. 13: ALB, GRC, ITA, KRI, SIC, TUE, YUC. 20: ALG, EGY, LBY, MOR, TUN. 21: AZO, CNY, MDR. 27: cpp, nam. 32: TKM. 33: TCS. 34: AFG, IRN, IRQ, PAL, TUR. 50: nsw, soa, wau. 51: nzn? 76: cal. 85: ags, agw, clc. Wet or temporarily wet open ground usually on subsaline soils. Map 413.

12. BALEARES: Mallorca, Puerto de Soller, 11 Jun 1885, *P.Porta & G.Rigo* (PR). PORTUGAL: Algarve, Quinta do Lago, *Townsend* 89/88 (K). SARDEGNA: Tempio, Santa Teresa Gallura, *E.Reverchon* [*Pl. Sard. 1881*] 103 (P, PR). 13. GREECE: Naxos, *C.Leonis* [*J.Dörfler, Fl. Aegea*] 16 (PR). SICILIA: Porto Empedocle, *R.K.Brummitt, Hunt & O.A.Leistner* 5220 (K). 20. ALGERIA: Baniane, *M'Chounech, A.H.G.Alston & D.Simpson* 210 (BM). LIBYA: Tripolis, Tadqura, *E.Vogel s.n.* (P). TUNISIA: Maktar, 3 Jun 1896, *S.Murbeck* (LD). 34. IRAN: between Zahedan and Khash, 1300–1600 m, *K.H.Rechinger* 4260 (W). ISRAEL: Ain Hesban, 660 m, *F.S.Meyers* 957 & *J.E.Dinsmore* (L). 50. SOUTH AUSTRALIA: Adelaide, Grange, *T.J.Smith* 1045 (NSW). WESTERN AUSTRALIA: W of Northam, *H.Salasoo* 277 (NSW). 51. NEW ZEALAND: [without locality], *J.D.Hooker* (P). 85. URUGUAY: Montevideo, Carrasco, *C.Osten* 4683 (NSW).

209. *Juncus turkestanicus* V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 625 (1935)

Juncus bufonius subsp. *turkestanicus* (V.I.Krecz. & Gontsch.) Sóo, *Acta Bot. Acad. Sci. Hung.* 16: 366 (1971); *Juncus ambiguus* subsp. *turkestanicus* (V.I.Krecz. & Gontsch.) Novikov, *Nov. Sist. Vyssh. Rast.* 23: 60 (1987). T: Kazakhstan, Bien-Aksu, in planitie Istyk, 3–27 Jul 1928, *M.N.Smirnov* 503; holo: LE.

Annuals, 3–15 (–25) cm tall, caespitose, often densely fasciculate, usually many-stemmed, whitish green; stems ±erect. Leaves 2–4, sub-basal, c. 1–5 cm long, 0.2–0.5 (–1.0) mm wide, flat to canaliculate; leaf sheath auricles absent but often present in bracts. Bracteoles whitish scarious, 1.5–2.5 mm long. Inflorescence constitutes $\frac{1}{4}$ – $\frac{2}{3}$ of plant height; flowers borne singly in lower part; ultimate branches usually with 2–4 (–5)-flowered clusters. Flowers probably frequently cleistogamous. Tepals ±unequal. Outer tepals ±lanceolate, 3.5–5.0 (–6.0) mm long; central band narrow, ±pale green; margins broad, silvery-white. Inner tepals c. 3.5–5.0 mm long, ±subacute, less often obtuse, rarely distinctly acute. Stamens 6, to $\frac{2}{3}$ as long as inner tepals; anthers 0.4–0.8 mm long; filaments c. 0.6–1.0 mm long; style 0.2–0.5 mm long; stigmas 0.5–1.0 mm long, recurved. Capsule ±ellipsoid, obtuse, c. 3.0–4.5 mm long, castaneous-brown, ±equalling inner tepals. Seeds narrowly ovoid to ovoid, 0.35–0.45 (–0.5) mm long,

almost smooth, pale brown; appendages absent. $2n = 30$, *vide* D.Podlech & A.Dieterle, *Candollea* 24: 193 (1969).

From E Turkey and SE European Russia to Iraq, Iran, Afghanistan and Pakistan, Middle Asia, SW Siberia, Mongolia and NW China. Distribution imperfectly known. 14: RUS. 30: WSB. 32: KAZ, KGZ, TKM, TZK, UZB. 33: TCS. 34: AFG, IRN, IRQ, TUR. 36: CHX. 37: MON. 40: PAK. Wet, open habitats, usually at higher elevations. Map 414.

32. TADZHIKISTAN: Hissar Range, below Anzob Pass, Siyakukh Research Station, Jul 1975, *L.A.S.Johnson & B.G.Briggs* (NSW). 34. AFGHANISTAN: Badakshan, 8 km S of Ishkamish, 1180 m, *D.Podlech 10729* (M); Bamian, Band-i Amir, Band-i Zolfikar, *K.H.Rechinger 18466* (W). IRAN: Khorasan, Hazar Masjed, 2000 m, *K.H.Rechinger 5104* (W); Markazi, 4 km E of Uzne, 2200 m, *B.Bothmer & K.P.Buttler 1758* (LD); Azerbaijan, Rezaiyeh (Urmia) Lake, *K.H.Rechinger 43652* (W). IRAQ: Shabicha, 16 Mar 1955, *Ali Rawi 14832* (K). 40. PAKISTAN: Chitral, Laspur Gol, Mastuj, 3600 m, *J.D.A.Stainton 3099* (BM).

Similar to *Juncus bufonius* and *J. hybridus*; difficult to distinguish from the latter in NW Iran and adjacent regions, and may be better treated as a subspecies.

210. *Juncus sorrentinii* Parl., *Fl. Ital.* 2: 356 (1857)

Juncus bufonius var. *sorrentinii* (Parl.) Husn., *Bull. Soc. Bot. France* 55: 50 (1908), & P.T.Husnot, *Joncées* 19 (1908). T: Sicily, Alcamo, Aug 1853, *Duca da Sorrento*; lecto: FI, *vide* T.A.Cope & C.A.Stace, *Watsonia* 12: 127 (1978).

Juncus bufonius var. *condensatus* Cout., *Bol. Soc. Brot.* 8: 102 (1890). T: Caparide, Cascaes, Sep 1889, *A.X.P.Coutinho 337*; lecto: LISU, *vide* M.C.Fernández Carvajal, *Stud. Bot. (Salamanca)* 18: 152, fig. 1 (1999); Serra de Monsanto, pr. a Bemfica, Apr 1840, *F.M.J.Welwitsch* [one of the residual original syntypes]; syn: COI.

Juncus sorrentinii var. *bicephalus* Lojac., *Fl. Sicula* 3: 165, pl. xi, fig. 3 (1909). T: [Sicily] ad Alcamo, *Duca da Sorrento*; holo: PAL, *n.v.*

Illustrations: T.A.Cope & C.A.Stace, *Watsonia* 12: 120, fig. 5 (1978); S.Pignatti, *Fl. Ital.* 3: 433 (1982); M.C.Fernandez-Carvajal, *Stud. Bot. (Salamanca)* 18: 151, fig. 1 (1999).

Map: T.A.Cope & C.A.Stace, *Watsonia* 12: 125, fig. 9 (1978).

Annuals, 8–14 (–20) cm tall, usually caespitose. Leaves basal and sub-basal, usually to 8 cm long, 0.5–0.8 mm wide, slightly canaliculate; sheaths abruptly dilated in broad membranous margins; free auricles absent; apex acute-acuminate. Lower bracts usually filiform, c. 2.0–6.5 cm long, exceeding inflorescence. Inflorescence of 1–5 dense congested to subcongested fan-shaped heads, each composed of 4–6 abbreviated 3–6-flowered branches. Bracteoles membranous-scarious, c. 2.0–2.5 mm long. Tepals conspicuously unequal. Outer tepals longer acuminate-aristate, c. 5.5–8.2 (–8.5) mm long; central band yellowish green to stramineous, densely veined; margins scarious, c. 0.3–0.4 mm wide. Inner tepals c. 4.5–5.5 (–6.5) mm long, acute or subacute, with a broad membranous margin. Stamens 6; anthers c. 0.7–1.2 mm long, usually slightly shorter, rarely longer than c. 0.8–1.1 mm filaments; style c. 0.2–0.4 mm long; stigmas c. 0.5–0.7 mm long. Capsule oblong-ovoid to oblong-subtrigonal, 3.0–4.5 mm long, substantially ($2/3$ – $4/5$) shorter than inner tepals, subabruptly contracted in a \pm conical apex. Seeds \pm broadly ovoid, 0.35–0.45 \times c. 0.3–0.4 mm, very finely and minutely reticulate; appendages absent. $2n = 28$, *vide* T.A.Cope & C.A.Stace, *Watsonia* 12: 127 (1978); T.A.Cope & C.A.Stace, *Watsonia* 15: 311 (1985).

Most common in the W and C northern Mediterranean, scattered, obviously introduced in Madeira. 12: COR, POR, SAR, SPA. 13: GRC, SIC. 20: ALG, MOR. 21: mdr. Wet open ground, muddy shores, usually on subsaline soils. Map 415.

12. CORSE: Bonifacio, La Trinité, 15 Jun 1880, *E.Reverchon* (LD). PORTUGAL: Olisipon, *F.M.J.Welwitsch [It. Lusit.] 319 p.p.* (K). SARDEGNA: Tempio, Mt Thaghios, 17 Jun 1882, *E.Reverchon* (P); Tempio, Mt Thaghios, 18 Jun 1882, *E.Reverchon* (LD).

211. *Juncus ranarius* Songeon & E.P.Perrier, in P.C.Billot, *Annot. Fl. France Allemagne* 192 (1859)

Juncus bufonius subsp. *ranarius* (Songeon & E.P.Perrier) Hiitonen, *Suom. Putkilok. (Enum. Pl. Vasc. Fenn. Or.)* 22 (1934); *Tenageia ranaria* (Songeon & E.P.Perrier) Fourr., *Ann. Soc. Linn. Lyon*, sér. 2, 17: 172 (1869); *Juncus bufonius* var. *ranarius* (Songeon & E.P.Perrier) Farw., *Pap. Michigan Acad. Sci.* 19: 247 (1917).

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T: France, Savoie, Moutiers, 31 Jun & 21 Aug 1858, *A.Perrier*; lecto: P, *fide* T.A.Cope & C.A.Stace, *Watsonia* 12: 127 (1978); isolecto: G, K, LD, W.

Juncus bufonius var. *fasciculatus* Koch, *Syn. Fl. Germ. Helv.* 732 (1837). T: [citation: 'zwischen Mainz u. Worms']; s. loc., *W.D.J.Koch*; lecto: L, *designated here* [bigger plant].

Juncus bufonius [unranked] *congestus* [Schousb. ex] Döll, *Fl. Baden* 1: 336 (1857), *nom. illeg., non* Thunb. (1820). T: several syntypes, e.g.: Neckarsteinach, *J.C.Döll*; syn: *n.v.*; others partly belonging to other taxa; further study is needed.

Juncus bufonius var. *halophilus* Buchenau & Fernald, *Rhodora* 6: 39 (1904). T: Canada, Quebec, Riviere du Loup, 2 Aug 1902, *E.F.Williams* & *M.L.Fernald*; holo: GH; iso: K, L, P.

Juncus nastanthus V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 624, tab. 30, fig. 18 (1935); *Juncus bufonius* subsp. *nastanthus* (V.I.Krecz. & Gontsch.) Sóo, *Acta Bot. Acad. Sci. Hung.* 16: 366 (1971); *Juncus hybridus* subsp. *nastanthus* (V.I.Krecz. & Gontsch.) V.Novikov, *Nov. Syst. Pl. Vasc.* 15: 83 (1979). T: Russia, Tzarskoe Selo, ad ripam fl. Kurminka, 15 Sep 1915, *S.V.Juzepczuk*; holo: LE; iso: LD.

Juncus ranarius var. *ossoraicus* Novikov, *Nov. Sist. Vyssh. Rast.* 19: 53 (1982); *Juncus ambiguus* var. *ossoraicus* (Novikov) Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet Dal. Vost.* 1: 63 (1985). T: Kamchatka, Karaginsk, Ossora, 6 Aug 1976, *S.S.Kharkevich* & *T.Bucz*; holo: VLAD; iso: MW.

[*Juncus ambiguus* auct. non Guss. (1827): T.A.Cope & C.A.Stace, *Watsonia* 12: 127 (1978)].

Illustrations: F.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 106, fig. 59 (1906), as *J. bufonius* var. *halophilus*; T.J.Reichgelt, *Fl. Neerl.* 1 (6): 167, fig. 40 (1964), as *J. bufonius* subsp. *ambiguus*; T.A.Cope & C.A.Stace, *Watsonia* 12: 119, fig. 3 (1978), as *J. ambiguus*.

Map: T.A.Cope & C.A.Stace, *Watsonia* 12: 124, fig. 7 (1978) [Europe]; N.K.Kovtonyuk, in L.I.Malyshev & G.A.Peshkova, *Fl. Sibiri 4 (Araceae – Orchidaceae)*: 160, map 25 (1987) [Siberia].

Annuals, 3–20 cm tall, usually many-stemmed; stems thin, erect to ascending; plant base usually reddish. Basal leaves c. 2–10 cm long, c. 0.5–0.9 mm wide, canaliculate to subterete; cauline leaves 1–3. Basal bract leaf-like, usually 1–3.5 cm long; middle bracts membranous, short. Bracteoles ovate, obtuse, to c. 2 mm long, scarious. Inflorescence open, branched, to 10 flowers per branch; ultimate flowers usually in 2–3-flowered cluster; other flowers borne singly or less often approximated. Flowers chasmogamous or cleistogamous. Tepals unequal. Outer tepals ±broadly lanceolate, acute, 4.0–6.8 mm long; central band pale greenish or stramineous (to pale brownish). Inner tepals shorter, 3.3–5.3 mm long, usually obtuse, often ±mucronate; membranous margins broad. Stamens 6, less than ½ as long as tepals; anthers 0.4–0.8 mm long; filaments 0.7–1.5 mm long; style c. 0.3–0.4 mm long; stigmas c. 0.5–0.7 mm long. Capsule subcylindrical-subtrigonous, truncate to subtruncate-obtuse, 3.3–5.3 mm long, subequalling or exceeding inner tepals, usually deep brown when ripe. Seeds ±ovoid, 0.35–0.50 × 0.25–0.35 mm, almost smooth, indistinctly reticulate; appendages absent. 2n = 34, *fide* T.A.Cope & C.A.Stace, *Watsonia* 12: 127 (1978); S.Snogerup, in K.H.Rechinger, *Fl. Iranica* 75: 17 (1971); K. Mičieta & L.Mucina, *Pl. Syst. Evol.* 142: 139–140 (1983); T.A.Cope & C.A.Stace, *Watsonia* 15: 311 (1985). Fig. 120.

A widely distributed species, probably native to Europe, N Africa and W North Asia, probably introduced to many parts of North America and Asia (distribution / indigenous distribution imperfectly known). Reported from China, Japan, New Zealand; probably also in Australia, but material not seen. Very probably introduced to temperate South America. 10: DEN, FIN, GRB, ICE, IRE, NOR, SWE. 11: AUT, BGM, CZE, GER, HUN, NET, POL, SWI. 12: BAL, COR, FRA, SAR, SPA. 13: BUL, GRC, ITA, ROM, SIC. 14: BLR, BLT, KRY, RUC, RUN, RUS, RUW, UKR,. 20: ALG, MOR. 30: ALT, BRY, CTA, IRK, KRA, TVA, WSB, YAK. 31: AMU, KAM, KHA, KUR, MAG, PRM, SAK. 33: TCS. 36: ?CHI, ?CHM, ?CHX. 37: MON. 71: MAN. 72: PEI, QUE. 75: MAI, MAS. 76: CAL. A facultative halophyte, usually but not always on saline muddy margins of pools and ponds, sand-flats, saline coastal habitats, wet open places in the vicinity of springs, temporarily wet tracks. Map 416.

10. GREAT BRITAIN: N Devon, Croyde Bay, *W.B.Turrill* 2053 (K); Scotland, Skye, W Penecorian, *H.Montford* 9574 (K). **11.** THE NETHERLANDS: Handermeele, *Ballard* 738 (K). POLAND: Świnoujście, Sep 1903, *A.Lüderwaldt* (NSW, PR). **14.** UKRAINE: Kiev, Trukhaniv ostriv, 3 Oct 1937, *A.Lonaczewski* 114 (P). **30.** RUSSIA: the Altai, Ongudai, Inya, 26 Aug 1972, *V.Vašák* (PR). **37.** MONGOLIA: W Mongolia, Gobi, 1879, *N.M.Przewalski* (P). **72.** QUEBEC: Cacouna, St. Lawrence R., *J.F.Collins* & *M.L.Fernald* [*Pl. Exs. Gray.*] 178 (L).



Figure 120. *Juncus ranarius*. A, habit; B, perianth with capsule; C, capsule; D, seed; E, capsule T.S.; F, outer tepal; G, inner tepal; H, stem T.S.; I, leaf blade T.S. (A–I, F.F.Schulz, Aug 1901, KRA). Scale bars: A = 3 cm; B, C, E–G = 2 mm; D, H, I = 1 mm. Drawn by T.Szynal. Reproduced with permission from T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2/2: 121 (1931).

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Juncus nastanthus V.I.Krecz. & Gontsch. is based on plants from NW Russia: the isotype (LD) clearly belongs to *J. ranarius*. However, the name was widely used in Russian literature and probably covered parts of other species (*Juncus turkestanicus*, *J. hybridus*).

Presumed Hybrids

Both intermediate morphology and chromosome numbers indicate the occurrence of hybridization in the section, with two hybrid combinations reasonably proven:

Juncus bufonius L. × *Juncus ranarius* Songeon & E.P.Perrier

Intermediate and sometimes partly sterile. Until now only detected in Norway but probably found in other regions, too.

Juncus bufonius L. × *Juncus minutulus* (Albert & Jahand.) Prain

Intermediate and very difficult to identify without chromosome counting because of the existence of triandrous smaller forms of the first parent. Identified in material from Siberia [Irkutsk, V.Vašák (PR)]. Local hybrid swarms observed in Sweden (S.Snogerup, unpubl.). Further study needed.

Doubtful Names

Juncus bufonius var. *gracilis* St.-Amans, *Fl. Agenaise* 149 (1821), *n.v.*

T: *n.v.*

Juncus creticus Raf., *Autik. Bot.* 196 (1840)

T: Creta, Sicily, *C.S.Rafinesque*; *n.v.*

There is no specimen now extant; it belongs to the sect. *Tenageia*.

Juncus pumilus Raf., *Autik. Bot.* 196 (1840).

T: Europe and Amer. bor., *C.S.Rafinesque*; *n.v.*

There is no specimen now extant; it belongs to the sect. *Tenageia*.

Juncus cespifolius Raf., *Autik. Bot.* 196 (1840).

T: [USA] Allegh. [Alleghany, North Carolina], *C.S.Rafinesque*; *n.v.*

There is no specimen now extant; it belongs to the sect. *Tenageia*.

SECTION 8. STEIROCHLOA

Juncus sect. **Steiroidia** Griseb., *Spicil.* 2: 407 (1844)

Type: *Juncus gerardii* Loisel.; lecto, *fide* J.Kirschner & al., *Folia Geobot.* 34: 389 (1999).

Juncus [unranked] *Tenuis* Engelm., *Trans. Acad. Sci. St. Louis* 2: 434 (1866); *Juncus* sect. *Tenuis* [Engelm.] Rouy, *Fl. France* 13: 246 (1912); *Juncus* subsect. *Tenuis* [Engelm.] Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 113 (1990). T: *Juncus tenuis* Willd.

Juncus [unranked] *Compressi* Boiss., *Fl. Or.* 5: 351 (1884); *Juncus* [unranked] *Sparsiflori* Peterm., *Deutsch. Fl.* 592 (1849) [lecto, *fide* J.Kirschner & al., *Folia Geobot.* 34: 389 (1999)]; *Juncus* sect. *Compressi* (Boiss.) Rouy, *Fl. France* 13: 247 (1912); isonym: K.F.Wu, *Acta Phytotax. Sin.* 32: 445 (1994); *Juncus* subg. *Pseudotenageia* V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 527 (1935) [lecto, *fide* S.Snogerup, in K.H.Rechinger, *Fl. Iranica* 75: 11 (1971)]; *Juncus* subsect. *Compressi* (Boiss.) Novikov, *Nov. Sist. Vyssh. Rast.* 19: 53 (1982). T: *Juncus compressus* Jacq.

Juncus sect. *Squarrosi* [Fr. ex] Rouy, *Fl. France* 13: 246 (1912); *Juncus* subsect. *Squarrosi* [Rouy] Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 114 (1990). T: *Juncus squarrosus* L.

Juncus sect. *Trifidi* Rouy, *Fl. France* 13: 232 (1912). T: *Juncus trifidus* L.

Juncus subsect. *Gerardii* Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 114 (1990). T: *Juncus gerardii* Loisel.

Juncus subsect. *Oronenses* Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 113 (1990). T: *Juncus oronensis* Fernald.

Perennials, caespitose to mat-forming; rhizome well developed. Leaves ±flat to subterete, narrow, adaxially with enlarged epidermis cells; margins with sclerenchyma strands. Inflorescence terminal; flowers borne singly in usually loose cymes; rarely peduncles abbreviated; each flower subtended by two bracteoles. Seeds longitudinally alveolate-reticulate; appendages absent, rarely present.

A widespread section of 35 species native to all temperate regions except for South Africa, with main diversity centres in W and E North America, Central Asia and temperate South America. Several species approach the sect. *Juncotypus* in having ±pseudolateral inflorescence, and almost terete leaves and lower bract (*J. capillaceus*, *J. coriaceus*).

- 1 Auricles lacerate-fimbriate; leaf margins minutely serrulate; inflorescence 1–3 (–4)-flowered
- 2 Blade of uppermost cataphylls usually 6–10 cm long, one of bract-like leaves remote, 4–9 cm below the inflorescence; flowers 1 (2–3) per stem; tepals 4.0–5.2 mm long **232. *J. monanthos***
- 2: Blade of uppermost cataphylls to c. 1 cm long, the lowermost bract-like leaf 1–3 cm below the inflorescence; flowers (1–) 2–3 (–4) per stem; tepals 2.0–4.2 mm long **233. *J. trifidus***
- 1: Auricles entire or almost indistinct; leaf margins smooth, entire; inflorescence more than 3-flowered, usually more than 10-flowered
- 3 Stamens 3, rarely 4–5 in some flowers
- 4 Tepals linear-lanceolate, long acuminate, tightly adpressed to pistils, longer than 5 mm; flowers divaricate in dense (1–) 3–6-flowered clusters; outer tepals conspicuously longer than the inner **230. *J. homalocalis***
- 4: Tepals ±lanceolate, acute, not adpressed to pistils; flowers not divaricate, in loose to subdense drepania, borne singly; tepals ±equal, if outer ones longer then less than 5 mm long
- 5 Anthers longer than or ±equalling filaments
- 6 Leaves ±flat; inflorescence ±pauciflorous, to c. 10-flowered; stem thin, to 0.7 mm wide **214. *J. cordobensis***
- 6: Leaves almost terete; inflorescence multiflorous, more than 15-flowered; stem rigid, 1–2.5 mm wide **276. *J. uruguensis* (see sect. *Juncotypus*)**
- 5: Anthers shorter than filaments
- 7 Plants densely caespitose; rhizome short [South America] **215. *J. venturianus***
- 7: Plants loosely caespitose; rhizome long, creeping [China] **241. *J. taonanensis***
- 3: Stamens 6
- 8 Seeds with two appendages, each 0.2–0.5 mm long **217. *J. vaseyi***
- 8: Seeds without appendages or appendage(s) to 0.1–0.15 mm long, indistinct
- 9 Capsule ±subglobose and 3.5–5 mm long; tepals acute
- 10 Style 0.9–1.3 mm; anthers 0.5–1.1 mm long; leaves nearly terete, slightly channelled ventrally **216. *J. coriaceus***
- 10: Style 0.1–0.2 mm; anthers 0.4–0.6 mm long; leaves ±flat, with margins turned up **227. *J. interior***
- 9: Capsule narrowly ellipsoid to ovoid, if subglobose then less than 3.5 mm long and tepals obtuse

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- 11 All tepals obtuse, or outer tepals cucullate, seemingly subacute, sometimes with a short subterminal dorsal mucro
- 12 Plants densely caespitose; sheaths dilated, densely crowded at plant base **231. J. squarrosus**
- 12: Plants loosely caespitose with creeping rhizome; sheaths not dilated nor crowded
- 13 Leaves only basal or sub-basal, if a cauline leaf developed then single, usually short, inserted in lower half of stem
- 14 Capsule 4.5–5.5 mm long [Australia] **229. J. revolutus**
- 14: Capsule up to 4.0 (–4.5) mm long [Eurasia]
- 15 Flowers mostly in 2–5-flowered, ±semiglobose heads **237. J. soranthus**
- 15: Flowers borne singly in loose or dense (or even cluster-like) unilateral cymes
- 16 Capsule much exceeding perianth **240. J. heptopotamicus**
- 16: Capsule ±equalling or slightly exceeding perianth
- 17 Outer tepals with a distinct subterminal dorsal mucro 0.1–0.3 mm long, cucullate **242. J. persicus**
- 17: Outer tepals without a subterminal mucro, cucullate or not
- 18 Inflorescence subcongested, usually 3–7-flowered [Asia] **236. J. salsuginosus**
- 18: Inflorescence not subcongested, with pedunculate dense drepania, usually 5–20-flowered [Spain, Morocco] **239. J. gerardii**
- 13: Leaves basal and cauline, inserted also in the upper half of stem
- 19 Capsule subequalling to slightly exceeding perianth; bracteoles castaneous to brownish, sometimes with scarious or membranous margins; anthers 2–5 times as long as filaments **239. J. gerardii**
- 19: Capsule distinctly or much exceeding perianth; bracteoles scarious to membranous
- 20 Capsule acute to acuminate **235. J. gracillimus**
- 20: Capsule obtuse to truncate, minutely mucronate
- 21 Tepals 2.1–2.8 mm long; anthers 0.6–1.0 mm long, c. 1.5–2 times as long as filaments **234. J. compressus**
- 21: Tepals 1.6–2.0 (–2.2) mm long; anthers 0.4–0.6 mm long, ±equalling or slightly shorter than filaments **238. J. orchonicus**
- 11: All tepals acute to acuminate, if outer ones subacute then not cucullate nor mucronate
- 22 Rhizome short- to long-creeping, covered with a filamentous layer of splitting leaf bases and cataphylls; internodes short and stems in dense rows
- 23 Leaf blade flat **214. J. cordobensis**
- 23: Leaf blade ±terete or angled
- 24 Outer tepals 3.5–5 mm long; capsule thick-walled, without visible impressions of seeds, ±exceeding perianth **212. J. imbricatus**
- 24: Outer tepals to 3 mm long; capsule thin-walled, with visible impressions of seeds, subequalling perianth **213. J. capillaceus**
- 22: Rhizome densely branching; branches short or ascending, usually not creeping horizontally, not covered with filamentous remnants of leaf bases and cataphylls, internodes of variable length; stems usually densely tufted, not in rows
- 25 Anthers 2–5 times as long as filaments

- 26 Leaf blade usually to 0.7 mm wide; plants ±light green to yellowish green; inflorescence diffuse with remote flowers [SE United States] **221. J. georgianus**
- 26: Leaf blade usually 1.5–3 mm wide; plants grey-green; inflorescence with terminal drepania abbreviated, most flowers in loose 2–3-flowered groups [Middle Asia] **243. J. jaxarticus**
- 25: Anthers as long as filaments or shorter
- 27 Auricles (1.5–) 2–6 mm long, membranous to scarios
- 28 Capsules up to $\frac{3}{4}$ as long as perianth; flowers usually widely spaced in a usually diffuse inflorescence; plants usually 70–90 cm tall **225. J. anthelatus**
- 28: Capsules reach more than $\frac{3}{4}$ of perianth length; flowers in irregular groups, not widely spaced; plants usually less than 70 cm tall **224. J. tenuis**
- 27: Auricles almost absent or short, up to 2 mm, scarios or cartilaginous
- 29 Leaf blades almost terete, canaliculate, rarely canaliculate to ±flat
- 30 Capsule ±unilocular, broadly ellipsoid to subglobose, obtuse; seeds 0.3–0.4 mm long **223. J. dichotomus**
- 30: Capsule trilocular, ellipsoid with ±truncate top; seeds c. 0.5–0.7 mm long **218. J. greenei**
- 29: Leaf blades flat, sometimes with raised margins
- 31 Capsule trilocular
- 32 Inflorescence loose, of 1–4 few-flowered secund drepania with flowers regularly distributed along inner side of branches **222. J. secundus**
- 32: Inflorescence subcontracted to densely compacted, not secund, with flowers irregularly distributed
- 33 Inflorescence 3–25-flowered; anthers 0.3–0.5 mm long [W North America] **220. J. confusus**
- 33: Inflorescence (10–) 40–150-flowered; anthers 0.5–1.0 mm long [C United States] **219. J. brachyphyllus**
- 31: Capsule unilocular or triseptate
- 34 Auricles 0.5–1.5 mm long, ±membranous [W United States] **226. J. occidentalis**
- 34: Auricles 0.2–0.5 mm long, scarios or coriaceous [Outside W USA]
- 35 Auricles coriaceous, yellowish; anthers 0.6–1.0 mm long **228. J. dudleyi**
- 35: Auricles scarios, whitish; anthers usually 0.4–0.8 mm long
- 36 Capsule usually 2.8–3.5 mm long, light brown to deep brown **223. J. dichotomus**
- 36: Capsule usually 3.8–4.7 mm long, light tan **227. J. interior**

212. Juncus imbricatus Laharpe, *Essai Monog. Jonc.* 61 (1825)

T: [Argentina] Buenos-Ayres, *P. Commerson*; syn: P; Chile, Concepción, *M. Lesson*; syn: K.

Juncus chamissonis Kunth, *Enum. Pl.* 3: 348 (1841); *Juncus imbricatus* var. *chamissonis* (Kunth) Buchenau, in H.G.A. Engler, *Pflanzenr.* (iv.36) 25: 122 (1906). T: Chile, Talcaguano, *A. Chamisso*; syn: CAS, G, P, W; Uruguay, Montevideo, *F. Sellow*; syn: MO, W.

Juncus spanianthus Steud., *Syn. Pl. Glumac.* 2: 306 (1855). T: Chile, Aconcagua, *C.G.L. Bertero 348*; syn: G, MO, P.

Juncus collinus Steud., *Syn. Pl. Glumac.* 2: 306 (1855). T: Chile, Juan Fernández, *C.G.L. Bertero 1469*; holo: P; iso: G, K, MO, P.

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Juncus lechleri Steud., *Syn. Pl. Glumac.* 2: 306 (1855); *Juncus imbricatus* var. *lechleri* (Steud.) Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 122 (1906). T: Chile, *W.Lechler* 339; holo: P; iso: G, GOET, K, P, W.

Juncus urvillei Steud., *Syn. Pl. Glumac.* 2: 306 (1855). T: Chile, Concepción, *D.D'Urville*; holo: P.

Juncus capillaceus var. *chilensis* Buchenau, *Junc. S. Amer.* 377 (1879). T: Chile, *A.Chamisso*; syn: W; Concepción, *K.H.Mertens*; syn: BR.

Juncus chamissonis f. *pusillus* Buchenau, in O.Kuntze, *Revis. Gen. Pl.* 3/2: 320 (1898). T: [Uruguay] Cerro de Montevideo, [collector not given]; holo: *n.v.*

Juncus pringlei Fernald, *Proc. Amer. Acad. Arts* 45(17): 416 (1910). T: Mexico, Oaxaca, Cuesta de San Juan del Estado, 2125 m, 21 Aug 1894, *C.G.Pringle* 5818; holo: GH.

Illustrations: F.Buchenau, *Junc. S. Amer.* tab. 4 (1879); M.Barros, *Darwiniana* 10: 376, fig. 31 (1953); M.C.Fernández-Carvajal, *Anales Jard. Bot. Madrid* 39: 117, fig. 47 (1982); H.Balslev, *Fl. Neotrop. Monogr.* 68: 76, fig. 38A, B (1996).

Map: H.Balslev, *Fl. Neotrop. Monogr.* 68: 85, fig. 42 (1996).

Perennials, 15–45 cm tall, caespitose; rhizome creeping, 2–3 mm in diam., with filamentous cover of remains of old cataphylls; internodes short; stems in dense rows, ±canaliculate, erect, 0.5–1.5 (–2.0) mm in diam. Cataphylls 3–4 per stem, to 5 cm long, dark brown; upper cataphylls sometimes stramineous-brown. Leaves basal, 1–2 per stem, 10–35 cm long, filiform, 0.6–1.0 mm in diam., canaliculate and obtuse-angled; sheaths 1.5–6 cm long; margins scarious; auricles cartilaginous, 0.3–0.5 mm long. Lower bract leaf-like, to 8 cm long, exceeding inflorescence. Inflorescence compound, 1–30-flowered, of (1–) 2–4 clustered unilateral cymes. Bracteoles 1.5–2.0 mm long. Tepals unequal, lanceolate, acute; midrib green turning castaneous; margins castaneous, later scarious; outer tepals 3.5–5 mm long; inner tepals 3–4 mm long. Stamens 6, 1.7–2.1 mm long; anthers 0.8–1.0 mm long; filaments c. 1.0–1.2 mm long; style c. 0.1–0.2 mm long; stigmas c. 0.4–0.8 mm long. Capsule triseptate, ellipsoid-trigonous, gradually narrowing into obtuse to truncate apical part with sides slightly concave, 3.5–5.0 × 1.8–2.5 mm, ±exceeding perianth, castaneous, glossy, thick-walled. Seeds broadly obliquely ovoid, apiculate, brown, rugose, 0.4–0.6 × 0.2–0.3 mm; appendages absent. Fig. 121 [indigenous], 122 [introduced].

Native in South America, in the Andes from Colombia to N Argentina, and in Chile, Uruguay, E and C Argentina. Probably an established alien in Mexico, introduced in South Africa, New Zealand, Australia, Spain and Portugal. 12: por, spa. 27: cpp. 50: nsw, vic. 51: nzs. 79: mxc, mxs, mxg, mxs. 83: BOL, CLM, ECU, PER. 84: BZS. 85: AGE, AGW, CLC, CLS, JNF, URU. Dry places, disturbed grasslands, road verges, abandoned fields, ruderal sites, usually at lower altitudes, in the Andes reaching 3800 m. Map 417.

50. NEW SOUTH WALES: Northbridge N of Sydney, *H.S.McKee* 20688 (L). 79. MEXICO NORTHEAST: Hidalgo, Apam, Hacienda Tetlapayac, 2600 m, *R.C.West* F28 (WIS). 83. BOLIVIA: Chuquisaca, Pomabamba, *M.H.A.Weddell* 3815 (P). COLOMBIA: Valle, Loma de Barragan, 2700 m, *J.Cuatrecasas* 20674A (F, US). ECUADOR: Chimborazo, Riobamba, 3050 m, *H.Balslev* 1047 (AAU, NY). PERU: Lima, Madean, Hortigal, 3600 m, *J.Brandbyge* 231 (AAU). 84. BRAZIL SOUTH: Rio Grande do Sul, Porto Alegre, 17 Nov 1948, *B.Rambo* 38098 (LIL, W). 85. ARGENTINA NORTHWEST: Salta, Orán, San Andrés, 1800 m, *S.A.Pierotti* 1380 (NY). CHILE SOUTH: Los Lagos, Valdivia, Niebla, 17 Jan 1904, *O.Buchtien* (L). JUAN FERNÁNDEZ IS.: Cerro Alto, c. 300 m, *F.G.Meyer* 9555 (K). URUGUAY: *A.St.-Hilaire* 2299 (K, P).

213. *Juncus capillaceus* Lam., *Encycl.* 3: 266 (1789)

Juncus capillaceus var. *montevideensis* Buchenau, *Junc. S. Amer.* 377 (1879). T: Uruguay, Montevideo, *P.Commerson*; holo: P; iso: B-W6848, MO, P.

Juncus tenuifolius Steud., *Syn. Pl. Glumac.* 2: 306 (1855). T: Chile, *C.G.L.Bertero* 1062; holo: P; iso: MO, P, W.

Illustrations: F.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 122, fig. 67 (1906); M.Barros, *Darwiniana* 10: 378, fig. 32 (1953); H.Balslev, *Fl. Neotrop. Monogr.* 68: 76, fig. 38E (1996).

Map: H.Balslev, *Fl. Neotrop. Monogr.* 68: 87, fig. 43 (1996) [Neotropical region].

Perennials, 5–30 cm tall, caespitose; rhizome creeping, 1.5–2.0 mm in diam., with filamentous cover of remains of old cataphylls; internodes abbreviated; stems in dense rows, erect, ±canaliculate, 0.4–0.7 mm in diam. Cataphylls 1–3 per stem, to 1.5 cm long, yellowish

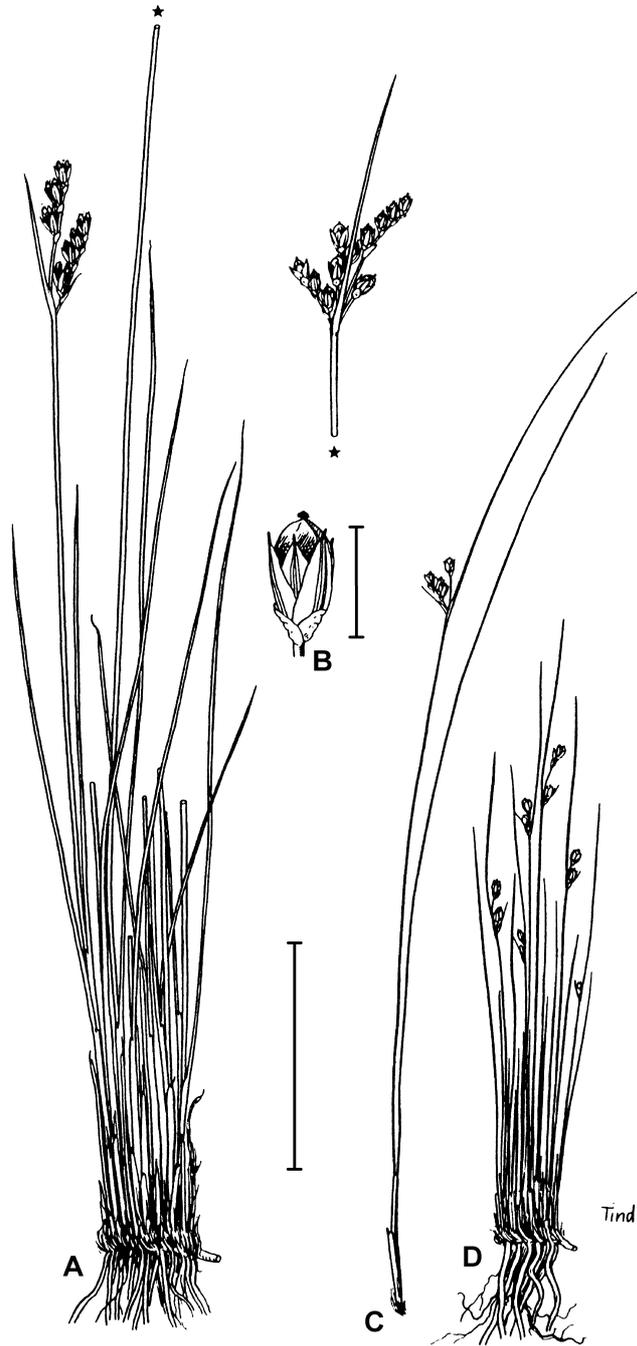


Figure 121. *Juncus imbricatus*. **A**, habit; **B**, perianth with capsule (**A**, **B**, E.Asplund 6996, S). *Juncus capillaceus*. **C**, **D**, habit. (**C**, J.N.Rose 23073, GH; **D**, E.Asplund 16151, S). Scale bar: **A**, **C**, **D** = 5 cm; **B** = 2 mm. Drawn by K.Tind. Reproduced with permission from H.Balslev, *Fl. Neotrop. Monogr.* 68: 76, fig. 38 (1996), © 1996, The New York Botanical Garden.

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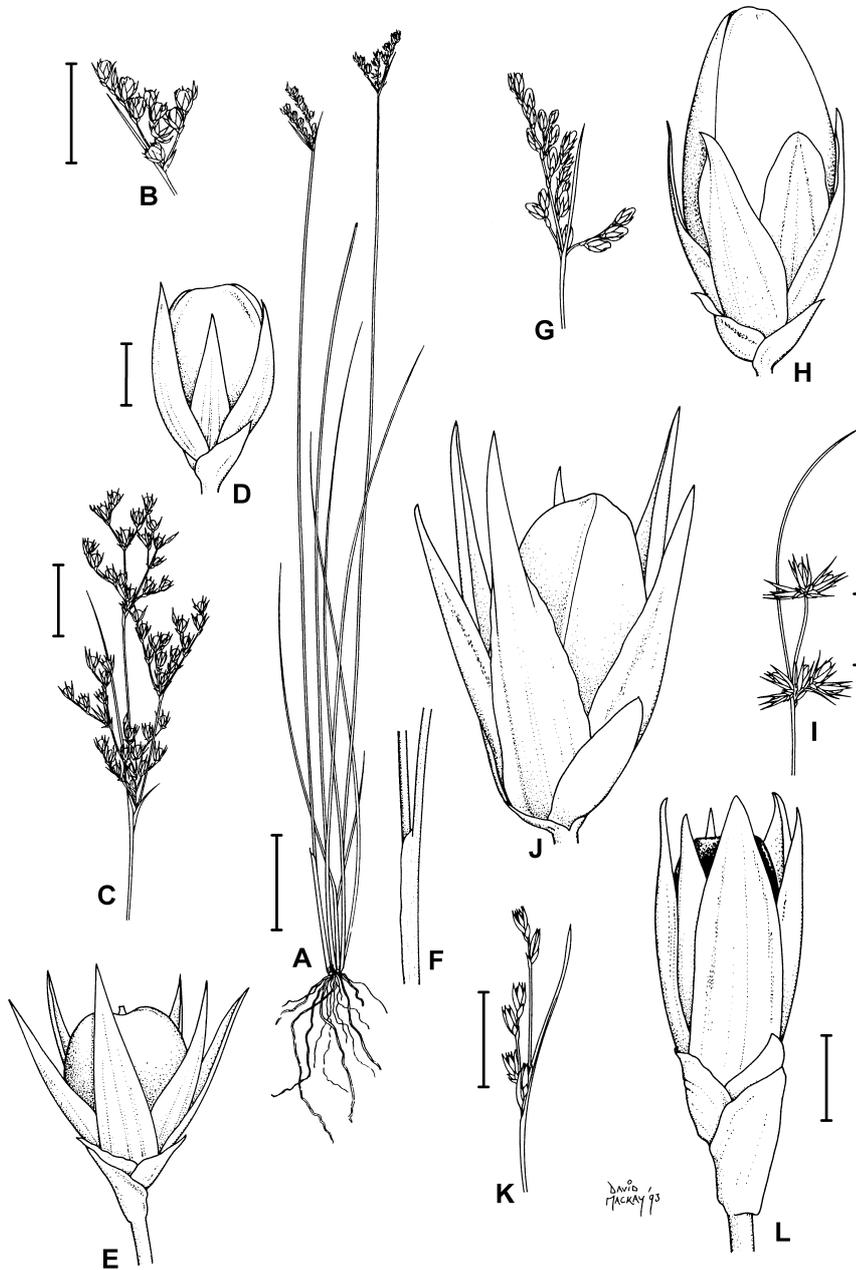


Figure 122. *Juncus dichotomus*. **A**, habit; **B**, **C**, inflorescence; **D**, **E**, perianth and capsule; **F**, sheath with auricle (**A**, **B**, **D**, **F**, P.D.Hind 6003, NSW; **C**, **E**, J.Davis 2090, NSW). *Juncus imbricatus*. **G**, inflorescence; **H**, perianth with capsule (**G**, **H**, H.S.McKee, NSW20688). *Juncus homalocaulis*. **I**, inflorescence; **J**, perianth with capsule (**I**, **J**, K.L.Wilson 6357, NSW). *Juncus revolutus*. **K**, inflorescence; **L**, perianth with capsule (**K**, **L**, A.C.Beaglehole 63064, NSW). Scale bars: **A** = 2 cm; **B** = 1 cm; **C**, **G**, **I**, **K** = 1 cm; **F** = 0.5 cm; **D**, **E**, **H**, **J**, **L** = 1 cm. Drawn by D.Mackay. Reproduced with permission of the authorities of Royal Botanic Gardens, Sydney.

brown; blade rudimentary, to 5 mm long. Leaves basal, 1–2 per stem, 5–20 cm long, 0.3–0.6 mm in diam., obtuse-angled, with a basal adaxial groove; sheaths 0.7–1.7 cm long; auricles rounded, c. 0.3 mm long. Lower bract 1.5–5.0 cm long, leaf-like, apparently as a continuation of stem, exceeding inflorescence; middle bracts filiform, shorter. Inflorescence terminal to \pm pseudolateral, compound, 2–10-flowered, of 2–3 short unilateral cymes. Bracteoles c. 1 mm long. Tepals unequal, lanceolate, acute, light green becoming brown to stramineous-brown; margins scarious; outer tepals 2.3–3.0 mm long; inner tepals 2.0–2.5 mm long. Stamens 6; anthers 0.3–0.4 mm long; filaments 0.8–1.0 mm long. Capsule triseptate, ellipsoid to oblong, trigonous with \pm concave sides, apiculate, later \pm truncate, $2.3\text{--}2.6 \times 1.2\text{--}1.6$ mm, glossy, thin-walled, \pm shorter than perianth. Seeds \pm ovoid, slightly apiculate, $0.4\text{--}0.6 \times 0.3\text{--}0.4$ mm, brown, finely reticulate with narrow transverse polygonal fields; appendages absent. Fig. 121.

Native occurrence centred in the Andes from Venezuela to Bolivia and Peru, and along the E coast from Rio de Janeiro in Brazil to the Buenos Aires region in Argentina; also found in Chile. Introduced in Spain, South Africa, St Helena and Australia. 12: spa. 27: cpp. 28: sth. 50: nsw, vic. 82: VEN. 83: BOL, CLM, ECU, PER. 84: BZL, BZS. 85: AGE, AGW, CLC, JNF, URU. Disturbed dry grasslands, dry road verges, abandoned fields, ruderal situations, from sea level to c. 3500 m. Map 418.

82. VENEZUELA: Mérida, Páramo de la Negra, *J.A.Steyermark* 57071 (F, NY, VEN). **83.** BOLIVIA: Cuesta de Malpaso, Sucre, 3200 m, *C.Troll* 721 (B). COLOMBIA: Cundinamarca, Bogotá, *E.Pérez-Arbeláez* 3204 (COL, GH, US). ECUADOR: Azuay, Páramo El Angel, 3500 m, *E.Asplund* 7110 (S, UPS, US); Pichincha, Cayambe, 3000 m, *H.Balslev & F.Quintana* 962 (AAU, NY). PERU: Cajamarca, San Miguel, Agua Blanca, 3100 m, *M.Acosta-Solis* 21263 (US). **84.** BRAZIL SOUTHEAST: Rio de Janeiro, *N.J.Andersson* (S). BRAZIL SOUTH: Rio Grande do Sul, Porto Alegre, *B.Rambo* 38098 (LIL, W). **85.** ARGENTINA NORTHEAST: Corrientes, Santo Tomé, Galarza, *C.Quarín & al.* 2472 (K). JUAN FERNÁNDEZ IS.: Masatierra, Cumberland Bay, *F.G.Meyer* 9630 (K). URUGUAY: Montevideo, Cerro, *W.G.Herter* (BRNU).

214. *Juncus cordobensis* Barros, *Lilloa* 28: 279 (1957)

T: Argentina, Córdoba, San Justo, Concepción del Tío, 6 Nov 1952, *A.Castellanos* 6675; holo: LIL15398; iso: CORD.

Juncus arequipensis Balslev, *Brittonia* 35: 302 (1983). T: Peru, Arequipa, Islay, Mollandu, 7 km NE of Matarani, 850 m, 9 Aug 1974, *E.Lopez* T015; holo: MO.

Illustrations: M.Barros, *Darwiniana* 10: 360, fig. 26 (1953); M. Barros, *Lilloa* 28: 280, fig. 1 (1957).

Map: H.Balslev, *Fl. Neotrop. Monogr.* 68: 85, fig. 42 (1996) [Neotropical region].

Perennials, small, densely caespitose; stems in dense rows, filiform, slightly compressed, striate, yellowish when dry, 8–15 (–30) cm long, 0.5–0.7 (–1.1) mm in diam. Roots fasciculate, to 1 mm in diam., filiform; rhizome densely branched, short-noded, short-creeping, 1–2 (–3) mm in diam.; plant base covered with fibrous remains of old cataphylls. Cataphylls usually 0–2, yellowish brown. Leaves basal, 3–4, with blade usually short, to 5–10 (–15) cm long, c. 0.5–1.0 (–1.3) mm wide, flat, with adaxial band of membranous epidermal cells over most of leaf width; sheaths 1.5–4.0 cm long; auricles short, broadly obtuse, c. 0.2–0.5 mm long. Lower bract filiform, leaf-like, 1.5–6 cm long, \pm equalling inflorescence, sometimes shorter or longer; upper bracts scale-like. Inflorescence terminal, erect, $1.5\text{--}3.0 \times 1\text{--}2$ cm, of 1–5 loose unilateral cymes, each up to 10-flowered; flowers borne singly. Bracteoles subequal, obtuse, scarious, 1.2–1.4 mm long. Tepals \pm equal, or outer ones slightly longer, c. 4–6 mm long, lanceolate, acuminate, stramineous-brown; central band \pm greenish, distinctly veined; margins distinct, membranous, broad. Stamens 3–6; anthers c. 0.8–1 mm long; filaments c. 0.6–1.0 mm long; style c. 0.1–0.2 mm long; stigmas c. 1.0–1.5 mm long. Capsule ellipsoid, triseptate, 3–4 mm long, thin-walled, brownish, \pm obtuse, shorter than perianth. Seeds conical-ovoid, $0.30\text{--}0.4 \times c. 0.2$ mm, apiculate, slightly reticulate, castaneous; appendages \pm absent.

Known from S Brazil to N Argentina (provinces Buenos Aires, Catamarca, Chaco, Córdoba, Corrientes, Entre Ríos, Formosa and Tucumán) and from Colombia and Peru. The occurrence in Paraguay and Uruguay is probable but requires confirmation. 83: COL, PER. 84: BZS. 85: AGE, AGW. Disturbed grasslands, thickets, often on clayey soils. Map 419.

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83. COLOMBIA: Boyacá, Tunja, *R.Guarín & M.Villareal 1114* (COL); Cundinamarca, Sopo, *Ariste-Joseph* (US). PERU: La Libertad, Otusco, Motil, 3280 m, *Madueño* (MO); Puno, Juliaca, 3800 m, *D.Stafford 472 p.p.* (K). **84.** BRAZIL: Rio Grande do Sul, Ilha das Flores, prope Porto Alegre, *B.Rambo 41168* (LIL349922). **85.** ARGENTINA NORTHEAST: Buenos Aires, 30 km SE of La Plata, *W.J.Eyerdam & al. 23386* (K, UC); Prov. Córdoba, Estancia San Teodoro, *T.Stuckert 418* (CORD); Prov. Corrientes, Nueva Valencia, *T.M.Pedersen 4645* (G); Prov. Entre Ríos, Paraná, Isla Puentes, *T.Meyer 10126* (LIL 169082); Prov. Santa Fe, Rafaela, *Belgrano 629* (LIL). ARGENTINA NORTHWEST: Prov. Tucumán, Villa Nogués, *E. de la Sota 16* (LIL427162); Prov. Catamarca, Esquina Grande, *C.Osten 10644* (G).

Similar to *J. capillaceus* but much more robust. Close to *J. imbricatus* but leaf blade flat, and adaxially covered with membranous epidermal cells; auricles mostly scarious; capsule shorter than perianth.

215. *Juncus venturianus* Castillón, *Revista Univ. Tucumán* 7: 24, fig. 5–7 (1926)

T: Tucumán, Leales, Chañar Pozo, Oct 1919, *S.Venturi 427*; lecto: LIL, *fide* M.Barros, *Darwiniana* 10: 371 (1953); iso: S.

Illustration: M. Barros, *Darwiniana* 10: 367, fig. 28. (1953).

Perennials, 15–30 (–35) cm tall, densely caespitose; rhizome ascending, 2–3 mm in diam., densely branched, covered with remains of old cataphylls; stem striate. Cataphylls scaly; upper cataphylls with auriculate sheaths, 2–6 cm long; Leaves basal, 1–2 with ±reduced blades, 2–4 normally developed, to c. 30 cm long, 1.0–1.4 mm wide, ±flat (with raised margins); sheaths ±loose; auricles obtuse, short, to c. 0.8 mm long, scarious. Lower bract leaf-like, longer than or equalling inflorescence, to 10 cm long. Inflorescence terminal or ±pseudolateral, composite or decomposite, 2–8 cm long, 5–30-flowered, loose, with 1–3 primary branches bearing loose sickle-shaped cymes; flowers borne singly. Tepals ±unequal; outer tepals longer, lanceolate, c. 3.5–4.5 mm long, acuminate, greenish; central band prominently 3-veined, later bordered stramineous-brownish; margins distinct, scarious. Stamens 3–5 (rarely 6); anthers oblong, c. 0.5 mm long; filaments flattened, c. 1.5 mm long; style c. 0.1 mm long; stigmas to 2 mm long. Capsule ellipsoid, triseptate, 3.5–4.0 mm long, subacute to subobtuse, shorter than perianth. Seed obliquely ovoid to ellipsoid, c. 0.3 × c. 0.2 mm, brown, slightly reticulate; appendages indistinct, very short.

Paraguay, Uruguay and N & C Argentina.. 85: AGE, AGW, PAR, URU. Grasslands, from sea level to c. 1400 m in Salta, Argentina. Map 420.

85. ARGENTINA NORTHEAST: Prov. Buenos Aires, Chacabuco, *C.Casali 127* (BAB); Arroyo Gálves (Delta del Paraná, Primera Sección), *A.T.Hunziker 877* (CORD); Prov. Chaco, Colonia, Margarita Belén, *T.Stuckert 19209* (CORD); Prov. Córdoba, Estancia San Teodoro, *T.Stuckert 9533* (CORD); Prov. Corrientes: E of El Pollo, *T.Ibarrola s.n.* (LIL150472); Mocoretá, *C.Spegazzini s.n.* (LP19138); Prov. Entre Ríos: Concepción del Uruguay, Estancia de Cupalén, *P.G.Lorentz 1661* (CORD); Prov. Formosa, *Jørgensen 3311* (LIL50553); Prov. Santa Fe, Puerto Gaboto, *S.Gatusso 148* (CORD). ARGENTINA NORTHWEST: Prov. Salta, Ciudad de Salta, *L.Novara 1364* (MCNS, G312901).

216. *Juncus coriaceus* Mack., *Bull. Torrey Bot. Club* 56: 28 (1929)

T: USA, Arkansas, Hot Springs, 9 Jul 1896, *H.Eggert*; holo: NY.

[*Juncus setaceus* auct. non Rostk. (1801): F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 123 (1906)]

Illustrations: H.A.Gleason, *New Britton & Brown Illustr. Fl. NE. U.S.* 1: 391 (1958); R.K.Godfrey & J.W.Wooten, *Aquat. Wetl. Pl. S.E. U.S.* 548, fig. 317 (1979).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 220 (2000).

Perennials, 30–90 cm tall, caespitose. Rhizomes short, densely branching. Cataphylls 1–3, c. 3.5–5 cm long, tight, castaneous, shiny; blades sometimes reduced. Basal leaves 0–1 (–2), nearly terete but slightly channelled ventrally, 10–50 cm long, 0.7–1.8 mm wide; auricles 0.2–0.4 (–0.6) mm long, scarious to leathery. Lower bract 5–45 cm long, much exceeding inflorescence, erect; other bracts castaneous, narrowly ovate. Inflorescence a 5–35-flowered loose lax cyme 1–8 cm long. Bracteoles broadly ovate, membranous, 1.2–1.7 mm long. Tepals subequal; outer tepals slightly longer, lanceolate to broadly lanceolate, with dark green central band, paler towards margins, acute to acuminate, 3.5–5.0 mm long; inner tepals 2.5–4.5 mm long. Stamens 6, fewer in cleistogamous flowers, not exerted; anthers 0.5–1.1 mm

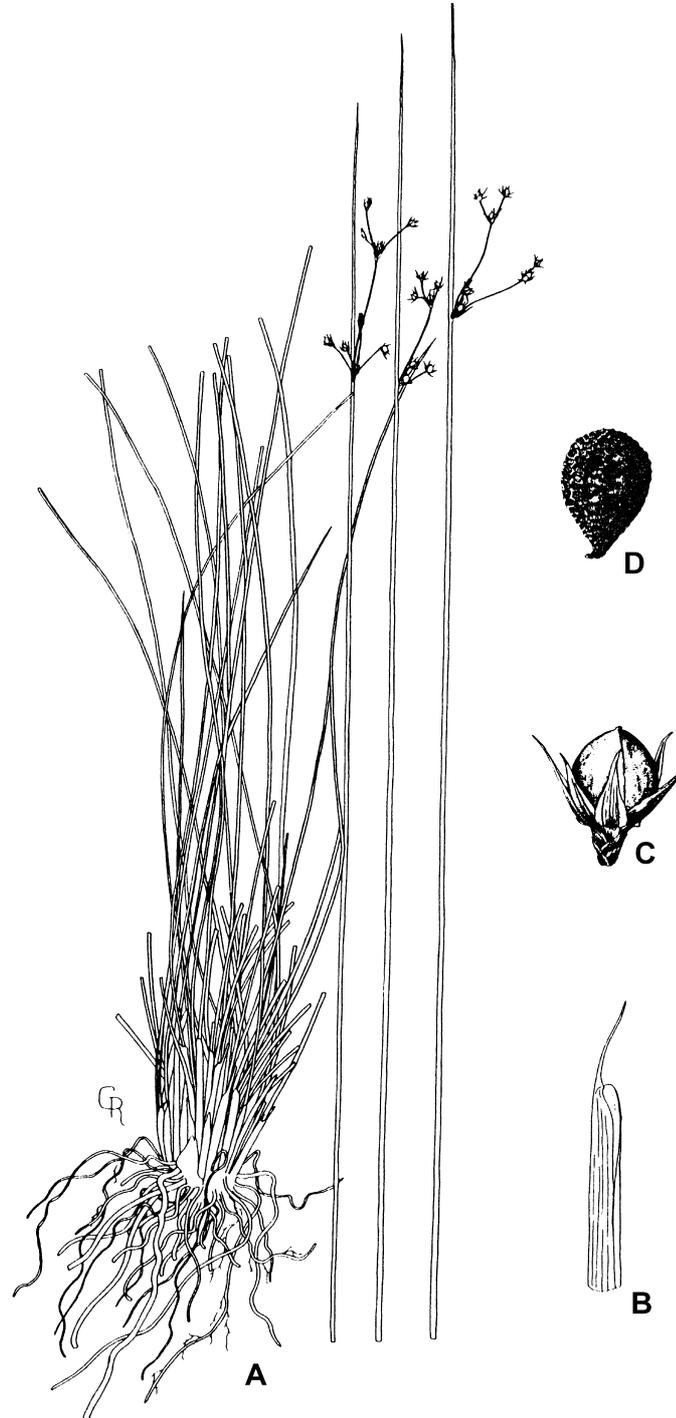


Figure 123. *Juncus coriaceus*. A, habit; B, leaf sheath; C, perianth with capsule; D, seed. Drawn by G.W.Reinert. Reproduced with permission from R.K.Godfrey & J.W.Wooten, *Aquat. Wetl. Pl. S.E. U.S.* 548, fig. 317 (1979). © The University of Georgia Press, Athens.

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long; filaments 0.8–1.2 mm long; style 0.9–1.3 mm long; stigmas pinkish, 2.0–2.5 mm long. Capsules unilocular, broadly ovoid to subglobose, subobtuse with a short mucro, 3.5–5.0 mm long, 2.6–3.2 mm wide, light to dark brown, \pm equalling perianth. Seeds 0.55–0.73 \times c. 0.3–0.5 mm; inner seed coat \pm reticulate; appendages absent. $2n = 80$, *vide* R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 2230 (2000). Fig. 123.

The eastern USA, from New Jersey to Florida, Texas and Oklahoma. 74: OKL. 75: NWJ, NWY. 77: TEX. 78: ALA, ARK, DEL, FLA, GEO, KTY, LOU, MRY, MSI, NCA, SCA, TEN, VRG. Springy, wet woodlands, stream banks, marshy areas, flatwood depressions, and shaded or exposed disturbed sites with poor drainage. Map 421.

78. FLORIDA: Wakulla Co., Newport, *N.A.Harriman 17260* (OSH); Wakulla Co., St. Marks, W Pine Drive, *R.K.Godfrey 84566* (HUH, NSW). LOUISIANA: Washington Parish, Sheridan, *Thomas & Rogers 29303* (KANU). SOUTH CAROLINA: Lexington Co., Gaston, *W.T.Batson* (IND, KANU, PAC, S, WVA). TENNESSEE: Putnam Co., Cookville City Lake, *N.A.Harriman 9461* (OSH, TENN); Blount Co., Old Hearon Place, 22 Sep 1962, *J.K.Underwood & H.L.Hoffmann* (W).

217. *Juncus vaseyi* Engelm., *Trans. Acad. Sci. St. Louis* 2: 448 (1866)

Juncus greenei var. *vaseyi* (Engelm.) B.Boivin, *Naturaliste Canad.* 94: 525 (1967). T: USA, Colorado, 1862, *E.Hall s.n.*; lecto: MO, photo KANU, *designated here* by R.E.Brooks.

Illustrations: C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 212 (1969); P.M.Catling & K.W.Spicer, *Can. J. Bot.* 65: 755, fig. 7 (1987); R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 220 (2000).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 220 (2000).

Perennials, 20–70 cm tall, caespitose; rhizome densely branched. Cataphylls 1–2 (–3). Basal leaves (1–) 2–3 per stem, subterete, 10–30 cm long, 0.5–1.0 mm wide; sheaths usually reddish; auricles 0.2–0.4 (–0.6) mm long, scarious or rarely \pm leathery. Lower bract 1–10 cm long, usually much shorter than inflorescence. Bracteoles broadly ovate, membranous, 1.2–1.7 mm long. Inflorescence of cymes c. 1–5 cm long, 5–15 (–30)-flowered. Tepals subequal; outer tepals \pm longer, lanceolate or broadly so, greenish to tan, acuminate, 3.3–4.4 mm; inner tepals 2.8–4.3 mm long. Stamens 6, not exerted; anthers 0.4–0.8 mm long; filaments 0.5–0.9 mm long; style 0.1–0.2 mm long; stigmas 1.5–2.5 mm long. Capsules trilobular, ellipsoid, (3.3–) 3.8–4.7 \times 1.1–1.7 mm, tan or light brown, subequalling perianth. Seed body (0.5–) 0.55–0.65 (–0.70) \times 0.15–0.20 mm, tan, longitudinally alveolate-reticulate, with two appendages 0.2–0.5 mm long. $2n = c. 80$, *vide* R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 221 (2000). Fig. 124.

Scattered from S Canada to the N USA. Recorded from Utah but material not seen. 70: NWT. 71: ABT, BRC, MAN, SAS. 72: LAB, NBR, NSC, ONT, QUE. 73: COL, IDA, MNT, WYO. 74: ILL, IOW, MIN, SDA, WIS. 75: MAI, MIC, NWY, VER. Permanently moist, usually exposed areas including wet meadows, raised sites or margins of bogs, or depressions along sandy lakeshores. Map 422.

71. SASKATCHEWAN: 31 Jul 1858, *E.Bourgeau* (K). 72. QUEBEC: Ungava, E coast of James Bay, *A.Dutilly & E.Lepage 14837* (TRT); Rougemont, 13 Jul 1953, *L.Cinq-Mars* (NSW). 73. COLORADO: Boulder Co., Lake Eldora, *A.A.Heller 357* (COLO); Grand Co., Grand Lake, 1868, *G.Vasey 576* (GH, NY). IDAHO: Kootenai Co., Fernan Lake, *H.J.Rust 468* (NY). 74. ILLINOIS, Ringwood, *G.Vasey s.n.* (syn: MO). 75. MICHIGAN: E of Driggs, *F.J.Hermann 8293* (MICH, NY, WIS); Detroit, 26 Jun 1867, *J.M.Bigelow s.n.* (MICH, MO, RM, WIS).

218. *Juncus greenei* Oakes & Tuck., *in* E.Tuckerman, *Amer. J. Sci. Arts* 45: 37 (1843)

T: USA, Massachusetts [Essex Co.], Ipswich, *W.Oakes s.n.*; lecto: NY, *vide* R.E.Brooks, *Taxon* 35: 591 (1986); iso: GH, K, NY, W.

Illustrations: H.A.Gleason, *New Britton & Brown Illustr. Fl. NE. U.S.* 1: 391 (1958); S.E.Clemants, *Junc. New York State* 24 (1990); R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 220 (2000).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 221 (2000).

Perennials, to 70 cm tall, caespitose; rhizomes short, densely branched. Cataphylls 1–2, often reddish. Leaves basal, dark green, (1–) 2–3 per stem, subterete, slightly canaliculate, 5–30 cm long, 0.4–0.8 mm wide; auricles (0.2–) 0.4–0.6 (–0.8) mm long, whitish-scarious or rarely



Figure 124. *Juncus vaseyi*. A, habit; B, flower with capsule; C, seed. *Juncus dudleyi*. D, habit; E, flower with capsule; F, auricles. *Juncus occidentalis*. G, flower with capsule; H, inflorescence; I, distal part of leaf sheath with auricles. Drawn by J.R.Janish. Reproduced with permission from C.L.Hitchcock, A.Cronquist, M.Ownbey & J.W.Thompson, *Vasc. Pl. Pacif. Northw.* 1: 208, 212 (1969). © University of Washington Press.

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±subcoriaceous, often with pinkish tinge. Lower bract leaf-like, 3–22 cm long, usually much longer than the inflorescence; second bract often equalling inflorescence or longer, filiform. Inflorescence anthelate, densely branched, 1–8 cm long, 5–50-flowered; peduncles of individual flowers usually 0.3–1.4 mm long. Bracteoles membranous, acute, 1.1–1.6 mm long. Tepals subequal, lanceolate, acute; outer tepals 2.5–4.2 mm long; inner tepals 2.1–3.5 (–4.0) mm long, dark green, later with central band castaneous-brown. Stamens 6; anthers 0.5–0.8 mm long; filaments 0.5–0.8 mm long; style c. 0.2 mm long; stigmas 1.5–2.5 mm long. Capsules trilocular, ellipsoid-trigonous, (2.5–) 2.9–3.5 (–4) × 1.5–1.8 mm, with upper part gradually narrowing into an obtuse to truncate apex, castaneous-brown or dark brown, infrequently lighter, exceeding perianth. Seeds 0.48–0.65 (–0.70) × 0.20–0.25 mm, alveolate-reticulate; appendages absent. $2n = 80$, *vide* N.A.Harriman & D.Redmond, *Rhodora* 78: 730 (1976).

Confined to the Great Lakes Region, SE Canada and the New England area of the USA. 72: NBR, NSC, ONT, PEI, QUE. 74: ILL, IOW, MIN, WIS. 75: CNT, INI, MAI, MAS, MIC, NWH, NWJ, NWY, OHI, PEN, RHO, VER. Usually dry, well-drained, sandy soil in pine lands, near lake shores, or among sand dunes and often associated with disturbance. Map 423.

72. ONTARIO: Haldimand-Norfolk Co., Highway 24, 1 km W of Regional Rd. 10, *M.J.Oldham & D.A.Sutherland* 6665 (DAO, PRA). 75. MASSACHUSETTS: Suffolk Co., Chelsea Beach, 14 Jul 1866, *H.Mann* [*G.Engelmann, Herb. Junc. Bor. Amer. Norm.J* 18 (GH, NY, PR, VT)]; Oak Island, 6 Jul 1902, *F.F.Forbes* (PR); Hingham Bridge, 13 Jul 1902, *F.F.Forbes* (PR); Nahaut, *B.D.Greene* (isotyp. K). MICHIGAN: Detroit, 6 Jul 1867, *J.M.Bigelow* [*G.Engelmann, Herb. Junc. Bor. Amer. Norm.J* 19 (GH, PR, VT)].

219. *Juncus brachyphyllus* Wiegand, *Bull. Torrey Bot. Club* 27: 519 (1900)

T: USA, Arkansas [probably Nebraska], Upper Platte, *F.V.Hayden* 23; holo: GH29619.

Juncus kansanus F.J.Herm., *Pap. Michigan Acad. Sci.* 20 (1934): 41 (1935). T: USA, Kansas, Cloud Co., Concordia, 17 Jun 1897, *A.S.Hitchcock s.n.*; holo: KSC, photo KANU; iso: MICH.

Illustration: C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 190 (1969).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 221 (2000).

Perennials, to 80 cm tall, caespitose; rhizome densely branching. Cataphylls 1–2; leaves basal or sub-basal, 2–5 per stem, ±flat (becoming involute under xeric conditions) 9–25 cm long, 0.8–1.5 (–2.4) mm wide; auricles 0.4–1.1 (–2) mm, scarios, whitish or tinged purple. Lower bract (1–) 4–15 cm long, usually longer than the inflorescence. Inflorescence cymose, ±dense, 1.5–8 cm long, (10–) 40–150-flowered. Bracteoles broadly ovate, membranous, sometimes tan, acute, 1.2–2.6 mm long. Tepals subequal, ±lanceolate, acute, with the apices appressed to capsule in fruit; central band green to tannish; margins paler, 3.5–5.7 mm long; inner tepals often slightly shorter. Stamens 6, not exerted; anthers 0.5–1 mm long; filaments 0.6–1.1 mm long; style c. 0.2 mm long; stigmas 1.2–2.2 mm long. Capsules trilocular, trigonous-ellipsoid to narrowly so, 2.6–4.7 mm long, subabruptly narrowing into ±obtuse narrow apex, dark tan to reddish brown. Seeds ±ellipsoid, (0.32–) 0.45–0.52 (–0.65) × 0.12–0.26 mm, alveolate-reticulate; appendages absent. $2n = c. 80$, *vide* R.E.Brooks, in R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 221 (2000). Fig. 125.

Widely distributed in USA from Texas, Missouri and Nebraska to Oregon and Washington. 73: IDA, MNT, ORE, WAS. 74: KAN, MSO, NEB, OKL. 76: CAL. 77: TEX. 78: ARK. Exposed moist or wet soils associated with depressions in temporal wetlands, along stream banks or lake shores especially in sandy soils. Map 424.

73. IDAHO: Latah Co., Moscow, *W.H.Baker* 14288 (W). 74. KANSAS: Cloud Co., Aurora, *S.V.Fraser* [*Pl. Exs. Gray.*] 641 (IND, KANU, MO, PR); Douglas Co., S of Lawrence, *R.L.McGregor* 4901 (KANU). OKLAHOMA: Osage Co., N of Pawhuska, *Stephens & R.E.Brooks* 34960 (KANU). 78. ARKANSAS: Franklin Co., NW of Paris, *H.H.Iltis & F.Iltis* 5398B (SMU).

220. *Juncus confusus* Coville, *Proc. Biol. Soc. Wash.* 10: 127 (1896)

T: USA, Colorado, North Park, 6 Sept 1890, *C.S.Crandall*; holo: US.

Juncus exilis Osterh., *Bull. Torrey Bot. Club* (1930) 57: 559 (1931). T: USA, Colorado, Routt Co., Steamboat Springs, *G.E.Osterhout* 4965; holo: *n.v.*

Illustrations: C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 192 (1969); P.M.Catling & K.W.Spicer, *Can. J. Bot.* 65: 755, fig. 7 (1987); R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 222 (2000).

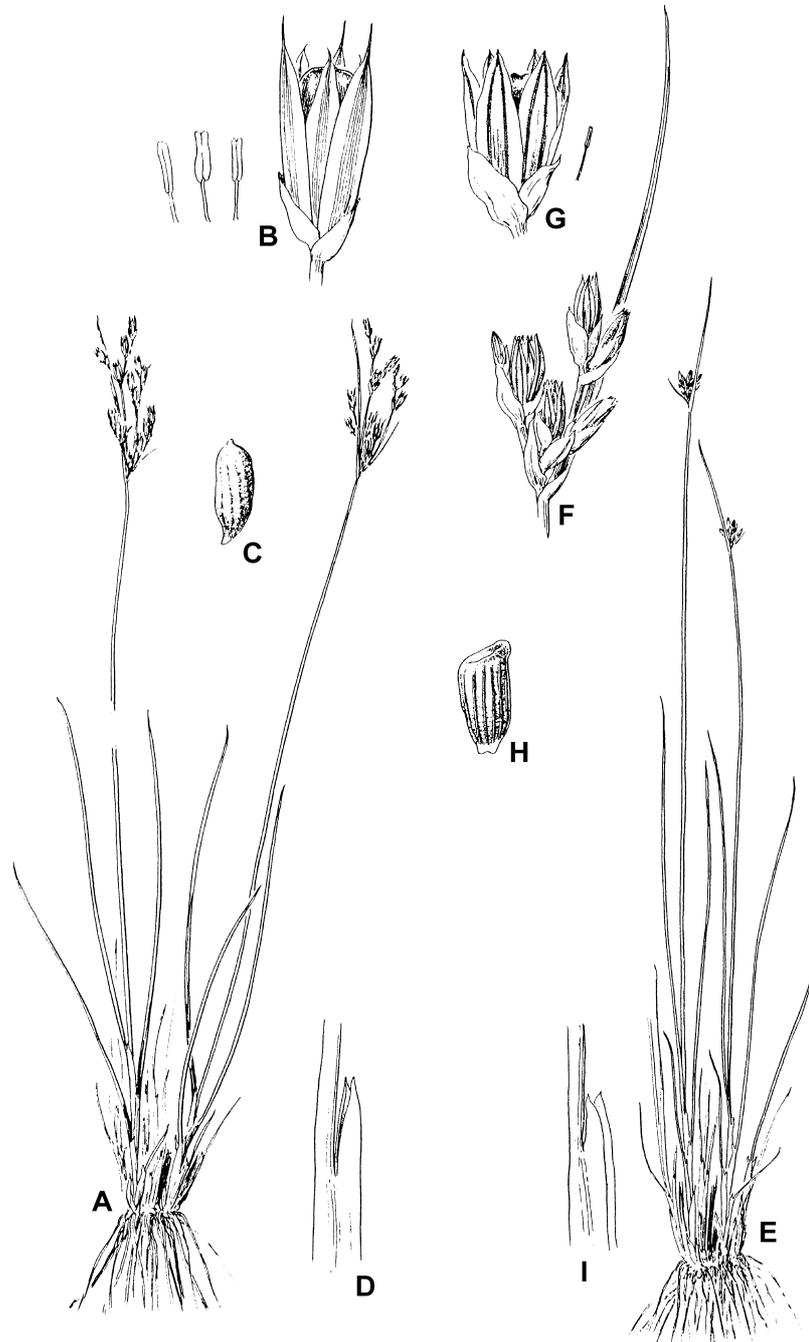


Figure 125. *Juncus brachyphyllus*. **A**, habit; **B**, flower with capsule and stamens; **C**, seed; **D**, auricles. *Juncus confusus*. **E**, habit; **F**, inflorescence; **G**, flower with capsule; **H**, seed; **I**, auricles. Drawn by J.R.Janish. Reproduced with permission from C.L.Hitchcock, A.Cronquist, M.Ownbey & J.W.Thompson, *Vasc. Pl. Pacif. Northw.* 1: 190, 192 (1969). © University of Washington Press.

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Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 221 (2000).

Perennials, (20–) 30–50 cm tall, caespitose; rhizomes densely branched, ±short, ascending; stem usually 0.5–0.8 mm in diam. Cataphylls 1–3, stramineous-brown; leaves basal, 2–4 per stem, ±flat, 3–15 cm long, 0.5–1.1 mm wide; auricles usually rounded, 0.3–0.7 mm long, scarious to membranous. Lower bract leaf-like, ±filiform, erect, c. 1.5–6 cm long, longer than inflorescence. Inflorescence of subdense cymes, 1–2.5 cm long, 3–25-flowered. Bracteoles to 1.5 mm long, ovate-lanceolate, acute, yellowish-membranous. Tepals subequal, 3.5–4.3 mm long, lanceolate to lanceolate-ovate, acute; central band prominent, greenish to pale castaneous, bordered darker brown; margins broad, membranous. Stamens 6, not exerted; anthers 0.3–0.5 mm long; filaments 0.6–0.9 mm long; style 0.1 (–0.2) mm long; stigmas c. 1.0 mm long. Capsules trilocular, ±oblong-ovoid, 2.5–3.5 mm long; apex obtuse to ±retuse, ±equalling perianth, tan or darker. Seeds ovoid-ellipsoid, 0.4–0.5 × c. 0.3 mm, alveolate-reticulate, apiculate; apices with minute appendage to 0.1 mm long or apparently without appendages. $2n = 80$, *fide* R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 221 (2000). Fig. 125.

Distributed in S and SW Canada and along the mountain ranges from Washington to California and Nevada. Reported to occur in New Mexico but material not seen. 71: ABT, BRC, SAS. 73: COL, IDA, MNT, ORE, WAS, WYO. 74: SDA. 76: ARI, CAL, NEV, UTA. Moist, open grasslands and meadows, often at higher altitudes. Map 425.

73. COLORADO: Larimer Co., Moraine Park, *W.A.Weber & T.Grove 14041* (W). WYOMING: Washakie Co., Big Horn Mtns, c. 50 km SE of Tensleep, Cherry Creek, *B.E.Nelson 4451* (PRA); Sheridan Co., Big Horn Mtns, c. 37 km NW of Burgess Junction, 5 Aug 1979, *B.E.Nelson 4615* (PRA). 76. ARIZONA: Greenlee Co., Hannagan Meadows, *D.J.Pinkava & al. 13802* (W). CALIFORNIA: Trinity Co., Lake Martin, 24 Jul 1974, *W.J.Ferlatte 1574* (JEPS); Colusa Co., West Peak, *L.R.Heckard & J.Hickman 5452* (JEPS).

221. *Juncus georgianus* Coville, *Bull. Torrey Bot. Club* 22: 44 (1895)

T: Georgia, [De Kalb Co.] Stone Mountain, May 1869, *W.M.Canby s.n.*; holotype: GH29639; isotype: NY, KANU.

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 221 (2000).

Perennials, to 40 cm tall, short-lived, caespitose; rhizome densely branched, short. Cataphylls usually 1–2, pale greenish, later scarious-membranous. Leaves basal, 2–3, flat, 5–15 cm long, 0.4–0.7 mm wide; auricles 0.2–0.3 mm long, scarious to membranous. Lower bract leaf-like, 2–7 cm long, rarely exceeding inflorescence. Inflorescence loose, 3–11 cm long, of diffuse (3–) 8–30 (–45)-flowered sickle-shaped cymes; flowers borne singly, on pedicels (0.2–) 3–10 (–15) mm long. Bracteoles broadly ovate, membranous, 1.5–2.2 mm long. Tepals subequal, lanceolate, (3.3–) 3.6–5.1 (–5.7) mm long, acuminate; central band greenish to tan, paler towards membranous margins. Stamens 6, not exerted; anthers (0.8–) 1.2–1.5 (–1.7) mm long; filaments 0.2–0.4 mm long; style 0.6–0.8 mm long; stigmas 2.5–3.1 mm long. Capsule trilocular, ellipsoid to narrowly so, subacute, 2.7–4.0 × 1.2–1.7 mm, tan. Seeds 0.36–0.45 × 0.25–0.30 mm, dark tan, alveolate-reticulate; appendages absent. $2n = c. 80$, *fide* R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 222 (2000).

Endemic in SE USA, from North Carolina to Georgia and Alabama. 78: ALA, GEO, NCA, SCA. Exposed sites with thin, usually sandy soil over surfacing granite (flatrocks), sites temporarily moist from seepage or after rainfalls. Map 426.

78. ALABAMA: Randolph Co., Almond, *R.M.Harper 3692* (NY). GEORGIA: De Kalb Co., summit of Stone Mtn, 4 Jul 1893, *J.K.Small* (NSW, NY, PAC, S, W, WIS, WVA); Cobb Co., Small Knob, Kenesaw Mtn, *Perry & Myers 808* (NY); Oglethorpe Co., NE Echols Mills, *F.J.Hermann 10010* (NY); Clayton Co., *R.M.Harper 241* (W). SOUTH CAROLINA: Lancaster Co., Kershaw, Forty Acre Rock, *H.E.Ahles & Williamson 54088* (KANU, IND, PAC, WVA).

222. *Juncus secundus* Beauv. ex Poir., in J.B.A.P.M. de Lamarck, *Encycl.*, Suppl. 3: 160 (1813)

Juncus tenuis var. *secundus* (Poir.) Engelm., *Trans. Acad. Sci. St. Louis* 2: 450 (1866). T: [USA] Virginia, *A.M.F.J.Palisot de Beauvois*; holotype: P.

Illustration: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 121, fig. 66 (1906); S.E.Clemants, *Junc. New York State* 19 (1990).

Perennials, 15–70 cm tall, caespitose; rhizome short. Cataphylls absent or single; leaves basal, (1–) 2–3, 10–30 cm long, canaliculate to ±flat, 0.5–1.0 mm wide; auricles broadly obtuse, scarious, 0.2–0.4 mm long, rarely subcoriaceous. Lower bract leaf-like, 1–10 cm long, usually ±shorter than inflorescence. Inflorescence terminal, c. 1–5 cm long, 5–15 (–30)-flowered, of 1–4 primary branches with few-flowered unilateral cymes, with regularly distributed singly-borne flowers. Bracteoles broadly ovate, membranous, 1.2–1.7 mm long, obtuse to subacute. Tepals subequal, lanceolate, 3.3–4.4 mm long; central band green, later stramineous, paler towards distinct membranous margins, acuminate to acute. Stamens 6, not exerted; anthers 0.4–0.8 mm long; filaments 0.5–0.9 mm long; style 0.1–0.2 mm long; stigmas 1.5–2.5 mm long. Capsule trilocular, ellipsoid, 3.0–4.0 (–4.7) × c. 1.3–1.7 mm long, narrowing into ±narrow, obtuse apex, tan or light brown. Seeds ellipsoid to lunate, c. 0.3–0.4 mm long, to c. 0.2 mm wide, pale brown, longitudinally striate, indistinctly reticulate; appendages minute, to c. 0.1 mm long. $2n = c. 80$, *vide* R.E.Brooks, in R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 222 (2000).

Endemic to SE Canada, and the NE, NC and SE USA, from Quebec and Maine to Georgia and to Oklahoma in the east. 72: NSC, ONT. 74: ILL, MSO, OKL. 75: CNT, INI, MAI, MAS, NWH, NWJ, NWY, OHI, PEN, RHO, VER, WVA. 78: ARK, DEL, GEO, KTY, LOU, MRY, NCA, TEN, VRG. Exposed sites, usually with well-drained sandy soil, often associated with shallow bedrock. Map 427.

75. INDIANA: Washington Co., E of Livonia, *F.J.Hermann 6705* (IND, MICH). MAINE: Sagadahoc Co., Woolwich, Nequasset Lake, *M.L.Fernald & B.Long 13179* (CU, GH, NY). 78. MARYLAND: Prince George Co., Beltsville, *A.Chase [A.Kneucker, Cyper. Junc. Exs.] 204* (PR, PRA, W). VIRGINIA: Greensville Co., N of Skipper's, *M.L.Fernald & B.Long 9888* (GH).

223. *Juncus dichotomus* Elliott, *Sketch Bot. S. Carol.* 1: 406 (1817)

Juncus tenuis var. *dichotomus* (Elliott) Alph.Wood, *Class-Book Bot.* 726 (1861). T: [USA, South Carolina or Georgia]. Car. & Georg., *S.Elliott s.n.*; lecto: CHARL., *designated here* by R.E.Brooks; photo KANU.

Juncus tenuis var. *unicornis* E.Mey., *Linnaea* 3: 371 (1828). T: Brazil, *A.Chamisso*; syn: LE; Mexico, *T.Haenke*; syn: PR.

Juncus cognatus Kunth, *Enum. Pl.* 3: 349 (1841). T: Uruguay, Montevideo, 1821–1822, *F.Sellow s.n.*; syn: B [destroyed], MO; Mexico, *T.Haenke*; syn: PR, *n.v.*; Mexico, *C.J.W.Schiede s.n.*; syn: MO.

Juncus dichotomus var. *platyphyllus* Wiegand, *Bull. Torrey Bot. Club* 30: 448 (1903); *Juncus platyphyllus* (Wiegand) Fernald, *Rhodora* 47: 124 (1945); *Juncus tenuis* var. *platyphyllus* (Wiegand) Cory, *Rhodora* 38: 405 (1936). T: USA, Virginia, Nansmond Co., Suffolk, 27 May 1893, *N.L.Britton & Small s.n.*; holo: NY247617.

Juncus albicans Fernald, *Proc. Amer. Acad. Arts* 45(17): 415 (1910). T: Mexico, Chihuahua, 1300 m, May 1908, *E.Palmer 161*; holo: GH29693; iso: F, NY.

Illustrations: M.Barros, *Darwiniana* 10: 373, fig. 30 (1953); R.K.Godfrey & J.W.Wooten, *Aquat. Wetl. Pl. S.E. U.S.* 552, fig. 320 (1979).

Map: H.Balslev, *Fl. Neotrop. Monogr.* 68: 80, fig. 40 (1996), as *Juncus tenuis* var. *dichotomus*; R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 222 (2000).

Perennials, c. 25–60 (–100) cm tall, caespitose; rhizome densely branched to short creeping-ascending. Cataphylls 1–3; leaves (1–) 2–3, basal to sub-basal, 10–25 (–40) cm long, c. 0.5–1.2 mm wide, nearly terete, canaliculate or ±flat; auricles scarious to subcoriaceous, whitish to yellowish, sometimes suffused purplish, 0.2–0.5 mm long. Lower bract leaf-like, 2.5–19 cm long, usually exceeding inflorescence. Inflorescence subdense, less often ±loose, (1.0–) 2.5–10 (–13) cm long, (5–) 10–85 (–100)-flowered, of c. 1–3 primary branches bearing unilateral cymes with approximated solitary flowers. Bracteoles broadly ovate, membranous, 1.4–2.2 mm long; apex subobtuse to acute. Tepals subequal (outer ones often slightly longer), lanceolate, acute, (3.0–) 3.3–4.5 (–5.5) mm long; central band green, later stramineous-brown to brown; margins indistinct, membranous. Stamens 6, not exerted; anthers 0.4–0.8 (–1.0) mm long; filaments 0.6–1.2 mm long; style c. 0.2 mm long; stigmas c. 1.0–2.0 mm long. Capsule unilocular, ellipsoid to widely so, slightly narrowing to a ±obtuse apex, (2.5–) 2.8–3.5 (–4.5) mm long, tan to brown, ±thick-walled, shorter than or ±equalling perianth. Seeds ellipsoid to lunate, 0.3–0.4 mm long, to 0.2 mm wide, brownish,

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reticulate; appendages indistinct. $2n = 80$, *vide* N.A.Harriman & D.Redmond, *Rhodora* 78: 728 (1976). Fig. 122 [introduced], 126 [indigenous].

Widely distributed in the E and SE USA, and scattered from Mexico to Argentina and Chile. It is difficult to distinguish the native occurrence from established introductions within the species' range; the occurrence in South America probably is secondary, although of old origin. Introduced to New Zealand (reported but no material seen) and Australia. 50: nsw. 51: nzn, nzs. 73: COL. 75: CNT, MAI, MAS, NWJ, NWY, OHI, PEN, RHO, VER, WVA. 77: TEX. 78: ALA, ARK, DEL, FLA, GEO, KTY, LOU, MRY, MSI, NCA, SCA, TEN, VRG, WDC. 79: MXC, MXE, MXG, MXS, MXT. 80: COS, ELS, GUA, HON. 81: JAM. 83: BOL. 84: BZL, BZS. 85: AGE, AGW, CLC, PAR, URU. Ditches, shores, clearings, and other typically open areas, usually in sandy, well-drained (but frequently wet) soil. Map 428.

75. NEW JERSEY: Camden Co., Camden, C.F.Parker [*G.Engelmann, Herb. Junc. Bor.-Amer. Norm.*] 24 (MICH, MO, PR). 78. FLORIDA: Lake Co., Eustis, G.V.Nash 353 (MICH, PR). SOUTH CAROLINA: Aiken Co., Aiken, 25 Jul 1866, H.W.Ravenel [*G.Engelmann, Herb. Junc. Bor.-Amer. Norm.*] 25 (MICH, MO, PR). 79. MEXICO SOUTHEAST: Chiapas, Paraje Matsab, A.S.Ton 946 (DS, LL, MICH, NY). MEXICO SOUTHWEST: Michoacán, Cerro San Miguel, 2200 m, F.G.Arséne 5306 (P). 85. ARGENTINA NORTHWEST: Jujuy, Capital, Sierra de Zapla, L.Novara 6763 (NY); Salta, Oran, Tarija R., W.J.Eyerdam & A.A.Beetle 22801 (K).

224. *Juncus tenuis* Willd., *Sp. Pl.* 2: 214 (1799)

T: America boreali, [collector unknown]; lecto: B-W6888/1, *vide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 79 (1996); iso: B-W6888/2, 3, 4, HBG, NY247725.

Juncus gracilis Sm., *Comp. Fl. Brit.* 55 (1800) [& *Engl. Bot.* 31, tab. 2174, Jun 1810], *nom. illeg.*, *non* Roth (1788), *nec* R.Br. (Apr 1810); *Juncus macer* Gray, *Nat. Arrang. Brit. Pl.* 2: 164 (1821); *Juncus gesneri* Sm., *Engl. Fl.* 2: 167 (1824), *nom. illeg.*; *Juncus smithii* Kunth, *Enum. Pl.* 3: 349 (1841), *nom. illeg.* T: Angusshire, Scotland, 1795 or 1796, G.Don; syn: K, LINN-SMITH.

Juncus bicornis Michx., *Fl. Bor.-Amer.* 1: 191 (1803); *Juncus tenuis* var. *bicornis* (Michx.) E.Mey., *Linnaea* 3: 371 (1828); *Juncus tenuis* subsp. *bicornis* (Michx.) P.Fourn., *Quatre Fl. France* 147 (1935). T: icon in Morison, *Hist. Pl.* 3: 228, sect. 8, pl. 9, fig. 15; syn: [USA] Georgie, A.Michaux; syn: P.

Juncus tenuis var. *multicornis* E.Mey., *Linnaea* 3: 371 (1828). T: Mexico [otherwise not indicated].

Juncus chloroticus Schult. & Schult.f., *Syst. Veg.* 7: 240 (1829). T: America merid., F.W.H.A.Humboldt; holo: B-WILLD6845 [as *Juncus pallidus*; plant identity not absolutely sure].

Juncus lucidus Hochst., in M.Seubert, *Fl. Azor.* 24 (1844). T: ins. Fayal [Azores, Faial Is.]; icon in M.Seubert, *Fl. Azor.*, tab. 4, fig. 1 (1844); syn.

Juncus germanorum Steud., *Syn. Pl. Glumac.* 2: 305 (1855); *Juncus tenuis* var. *germanorum* (Steud.) Rouy, *Fl. France* 13: 247 (1912). T: not indicated.

Juncus involucratus Kirk, *Trans. & Proc. New Zealand Inst.* 9: 550 (1877), *nom. illeg.* T: New Zealand, South Island, Amuri, T.Kirk s.n.; lecto: WELT44283, *vide* A.J.Healy & E.Edgar, *Fl. New Zealand* 3: 73 (1980); iso: CHR, K.

Juncus tristanianus Hemsl., *Rep. Voy. Challenger, Bot.* 1: 154 (1885). T: Tristan da Cunha, boggy pastures, 12 Nov 1852, J.MacGillivray s.n.; holo: K.

Juncus tenuis var. *laxiflorus* Fiek, *Jahres-Ber. Schles. Ges. Vaterl. Cultur* 67 (1889): 166 (1890). T: [Poland] Niesky, Trebus, Kahle; holo: n.v.

Juncus tenuis var. *williamsii* Fernald, *Rhodora* 3: 60 (1901); *Juncus bicornis* var. *williamsii* Vict., *Contr. Lab. Bot. Univ. Montréal* no. 14: 32 (1929); *Juncus macer* var. *williamsii* Fernald, *J. Bot.* 68: 367 (1930); *Juncus macer* f. *williamsii* (Fernald) F.J.Herm., *Rhodora* 40: 82 (1938); *Juncus tenuis* f. *williamsii* (Fernald) F.J.Herm., *Castanea* 10: 23 (1945). T: Maine, Van Buren, 19 Jul 1900, E.F.Williams s.n.; syn: GH29684, 32005, 32006.

Juncus tenuis var. *nakaii* Satake, *J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot.*, 4(2): 175 (1933). T: Honsyu, Toyonaka, prov. Settu, 10 Jul 1927, N.Ui 56; holo: TI.

Juncus subtenis Herter, *Candollea* 10: 87 (1943); *Revista Sudamer. Bot.* 7 (6–8): 200 (1943). T: Uruguay, C.Osten 4352; holo: G.

Illustrations: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 117, fig. 63 (1906); T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2(2): 125 (1931); Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 440, fig. 64 (1971); P.M.Catling & K.W.Spicer, *Can. J. Bot.* 65: 755, fig. 7 (1987); H.Balslev, *Fl. Neotrop. Monogr.* 68: 76, fig. 38, C (1996).

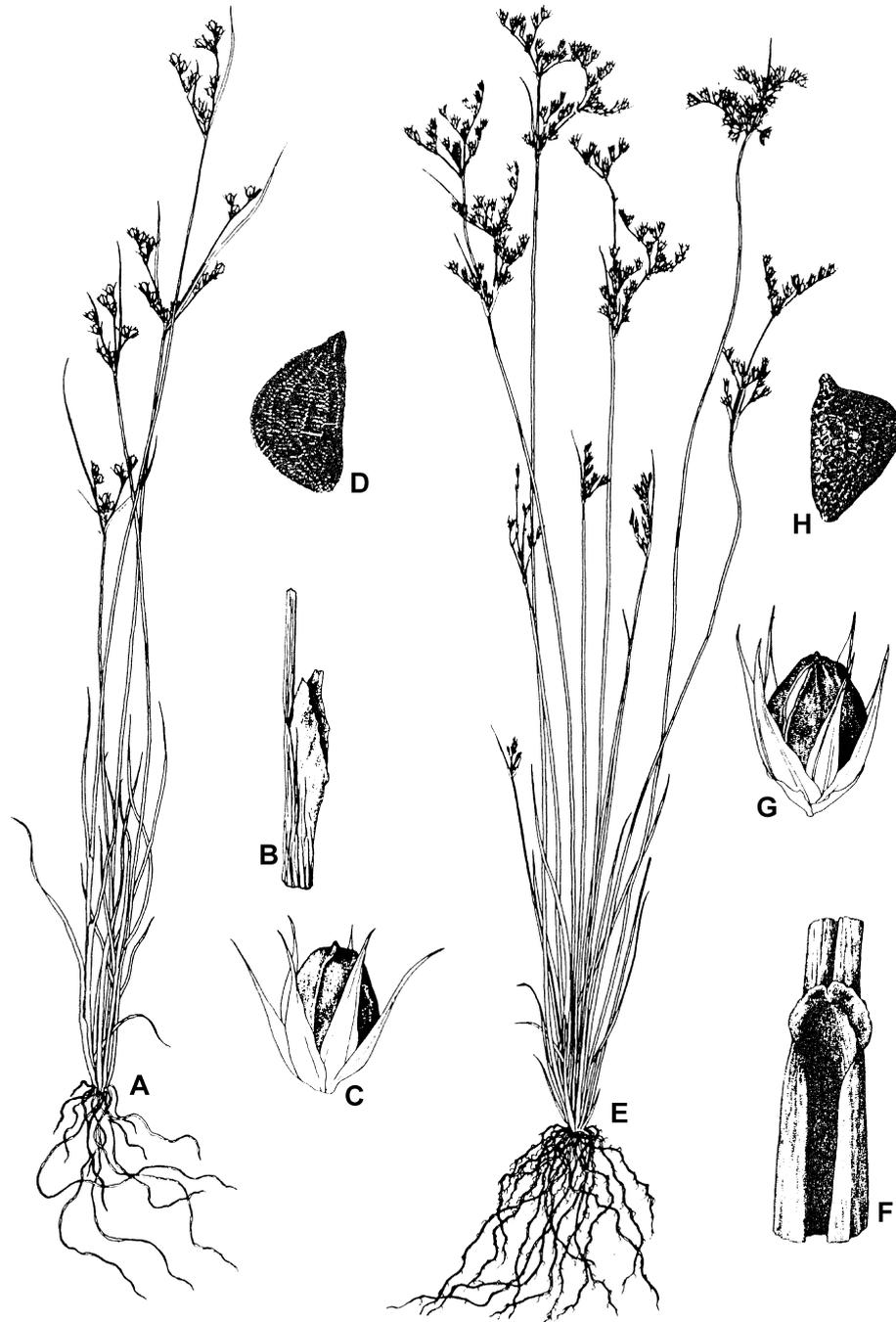


Figure 126. *Juncus tenuis*. A, habit; B, leaf sheath with auricles; C, perianth with capsule; D, seed. *Juncus dichotomus*. E, habit; F, leaf sheath with auricles; G, perianth with capsule; H, seed. Drawn by G.W.Reinert. Reproduced with permission from R.K.Godfrey & J.W.Wooten, *Aquat. Wetl. Pl. S.E. U.S.* 552, fig. 320 (1979). © The University of Georgia Press, Athens.

JUNCACEAE (*Juncus*)

Maps: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 82 (1965); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 91, map 182 (1986).

Perennials, (10–) 15–50 (–80) cm tall, caespitose; rhizome densely branched, ±short. Cataphylls usually 1–2; leaves basal (1–) 2–3, ±flat, 3–12 (–20) cm long, c. 0.5–1.0 mm wide; auricles acute, membranous, 2–5 mm long. Lower bracts 1–3, leaf-like, c. 2–10 cm long, usually longer than the inflorescence. Inflorescence usually lax, less often some flowers in denser clusters, c. 1–6 cm long, ±decomposited, of 1–5 primary branches, c. 5–40-flowered; flowers arranged in irregular groups. Bracteoles broadly ovate, membranous 1.2–1.7 mm long; apex subobtusate to acute. Tepals subequal (outer slightly longer), lanceolate, acuminate; central band green, paler and membranous towards margins, 3.3–4.4 mm long. Stamens 6, not exserted; anthers (0.2–) 0.4–0.7 mm long; filaments 0.5–1.1 mm long; style 0.1–0.2 mm long; stigmas c. 1.5 mm long. Capsule unilocular to pseudo-trilocular, subtrigonal, ellipsoid, subacute to ±obtusate, (3.3–) 3.8–4.7 mm long, tan or light brown, shorter than perianth. Seeds 0.3–0.5 × c. 0.2 mm, tan, faintly reticulate; appendages indistinct or minute, less than 0.1 mm long. 2n = 84, *fide* S.Snogerup, in Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 441 (1971); 2n = 40, *fide* N.A.Harriman & D.Redmond, *Rhodora* 78: 730 (1976); R.L.Taylor & G.A.Mulligan, *Fl. Queen Charlotte Is.* 2: 44 (1968); 2n = 80, *fide* R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 223 (2000). Fig. 126.

Native in E North America but introduced to many areas and established in numerous regions over the extratropical regions of both hemispheres. First find in Europe dates back to 1824. Spreading, and likely to be found in additional countries. 10: den, fin, grb, ire, nor, swe. 11: All. 12: fra, spa. 13: bul, gre, ita, rom, yuc. 14: All. 21: azo, mdr. 27: nat, tvl. 29: mau, mdg. 30: bry, irk. 31: kha, kur, prm. 33: ncs, tcs. 34: tur. 36: chc, chm, chn, chs. 38: jap, tai. 50: nsw, soa, tas, vic, wau. 51: nzn, nzs. 63: haw. 70: ask. 71: abt, brc, man, sas. 72: LAB, NBR, NFL, NSC, ONT, PEI, QUE. 73: COL, IDA, MNT, ORE, WAS, WYO. 74: ILL, IOW, KAN, MIN, MSO, NDA, NEB, OKL, SDA, WIS. 75: CNT, INI, MAI, MAS, MIC, NWH, NWJ, NWY, OHI, PEN, RHO, VER, WVA. 76: ARI, CAL, NEV, UTA. 77: NWM, TEX. 78: ALA, ARK, DEL, FLA, GEO, KTY, LOU, MRY, MSI, NCA, SCA, TEN, VRG, WDC. 79: MXC, MXE, MXG, MXN, mxt. 80: cos, els, gua, hon. 81: jam, pue. 82: ven. 83: clm, ecu. 84: bzs. 85: age, agw, par, uru. 90: tdc. Exposed or shaded sites in soils ranging from sand to clay, under moist or drier conditions, often these sites naturally or otherwise disturbed (e.g., by game or human trails). Map 429.

10. GREAT BRITAIN: Surrey, Richmond Park, Adams Pond, 16 Sep 1922, *N.L.Britton* 2551 (K). 11. AUSTRIA: Kärnten, Wörthersee, Krumpendorf, 12 Jul 1939, *K.Rechinger* (K). 12. FRANCE: Saone-et-Loire, Mouthier-en-Bresse, *R.Bigéard & Gillot [C.Magnier, Fl. Select. Exs.]* 137 (P). 14. RUSSIA SOUTH: Krasnodar, Tuapse, 18 Jun 1991, *N.V.Kostileva* (MHA). 33. ARMENIA: between Saratovka and Novosel'tsevo, 7 Aug 1985, *Zhandzhyan* (K). 38. JAPAN: Hondo, Shinano, Kutsukake, *J.Ohwi* 975 (BM). 75. VERMONT: Essex Co., E of Island Pond, *R.E.Brooks* 18530 & *C.Kuhn* (KANU). 78. TENNESSEE: Sevier Co., Greenbrier, *R.F.Cain & Duncan* 388 (IND). 90. TRISTAN DA CUNHA: Third Gulch, 500–600 m, *Y.Mejland* 620 (LD).

Hybridization is very likely between the taxa closely related to *J. tenuis*, including *J. anhelatus*, *J. interior*, *J. secundus*, *J. dichotomus* and *J. tenuis* itself. Hybridity was indicated by means of isozyme analysis (R.E.Brooks, unpubl.); further study is needed.

225. *Juncus anhelatus* (Wiegand) R.E.Brooks & Whittm., *Novon* 9: 11 (1999)

Juncus tenuis var. *anhelatus* Wiegand, *Bull. Torrey Bot. Club* 27: 523 (1900); *Juncus macer* var. *anhelatus* (Wiegand) Fernald, *J. Bot.* 68: 367 (1930); *Juncus macer* f. *anhelatus* (Wiegand) F.J.Herm., *Rhodora* 40: 81 (1938). T: [USA] Maine, Hartford, *J.C.Parlin*; syn: *n.v.*; Maine, Orono, *M.L.Fernald*; syn: GH, *n.v.*; Massachusetts, Lexington, *C.H.Knowlton*; syn: *n.v.*; Virginia, Carroll Co., *Small*; syn: *n.v.*; South Carolina, *M.A.Curtis*; syn: *n.v.*; Texas, Houston, *E.Hall* 663; syn: *n.v.*; Missouri, Butler Co., *H.Eggert*; syn: *n.v.*

Juncus macer f. *discretiflorus* F.J.Herm., *Rhodora* 40: 82 (1938); *Juncus tenuis* f. *discretiflorus* (F.J.Herm.) Fernald, *Rhodora* 47: 123 (1945). T: USA, Indiana, Harrison Co., 2 miles N of Mauckport, *C.C.Deam* 56381; holotype: GH29658; isotype: IND.

Illustration: S.E.Clemants, *Junc. New York State* 20 (1990).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 223 (2000).

Perennials, to 30–90 cm tall, caespitose; rhizome densely branched, short. Cataphylls 1–2; leaves basal, 2–3 (–5) per stem, (10–) 20–30 cm long, flat, 0.5–2.3 mm wide; sheaths loose, usually green; auricles acutish, membranous, 2.0–3.5 mm long. Lower bract c. 6–20 cm long, leaf-like, usually exceeding the inflorescence. Inflorescence diffuse, lax, 5–20 cm long, c. 10–100-flowered, of 2–6 primary branches bearing several loose unilateral cymes; flowers borne singly, ±remote. Bracteoles broadly ovate, membranous, 1.2–1.6 mm long, ±acute. Tepals subequal (outer ones mostly ±longer), lanceolate, acuminate; central band green, later ±stramineous, 3.2–4.5 mm long; inner tepals 2.6–3.5 mm long; margins membranous. Stamens 6, not exerted; anthers 0.3–0.7 mm long; filaments 0.8–1.1 mm long; style c. 0.2 mm long; stigmas 1.5–2.0 mm long. Capsule unilocular, broadly ellipsoid to obovoid, ±obtuse, 2.0–3.2 mm long, castaneous-brown, shorter than perianth. Seeds ellipsoid, tan, c. 0.3–0.5 × 0.20–0.25 mm, alveolate-reticulate; appendages absent. $2n = 80$, *fide* R.E.Brooks, *Novon* 9: 11 (1999).

Common in the eastern United States, known from NE Mexico; reported from SE Canada. 72: NBR, ONT, QUE. 74: ILL, IOW, KAN, MIN, MSO, OKL, WIS. 75: CNT, INI, MAI, MIC, NWH, NWY, OHI, PEN, VER, WVA. 77: TEX. 78: ALA, ARK, GEO, KTY, LOU, MRY, MSI, NCA, SCA, TEN, VRG. 79: MXN. Reported to occur in New Zealand but material not seen. Exposed or partially shady sites in moist or seasonally wet, sandy or clayey soils. Map 430.

74. ILLINOIS: Clark Co., *R.E.Brooks 18547 & C.Kuhn* (KANU). KANSAS: Leavenworth Co., *R.E.Brooks 1473a & C.Kuhn* (KANU). 75. OHIO: Lucas Co., *R.L.Stuckey 10005* (OS). 78. TENNESSEE: Knox Co., *T.H.Kearney jr. s.n.* (OS).

226. *Juncus occidentalis* [Coville] Wiegand, *Bull. Torrey Bot. Club* 27: 523 (1900)

Juncus tenuis var. *congestus* Engelm., *Trans. Acad. Sci. St. Louis* 2: 450 (1866); *Juncus tenuis* var. *occidentalis* Coville, *Proc. Biol. Soc. Wash.* 10: 129 (1896), *nom. illeg.* T: California, San Francisco, *H.N.Bolander*; syn: *n.v.*; California, Monterey, *W.H.Brewer*; syn: *n.v.*; Colorado, *E.Hall*; syn: *n.v.*

Illustration: L.R.Abrams, *Ill. Fl. Pacific States* 1: 358, fig. 872 (1923) [not very representative].

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 223 (2000).

Perennials, usually 30–60 cm tall, densely caespitose; rhizome short, densely branched. Cataphylls 0–2, brownish, loose; leaves basal, (1–) 2–3 per stem, 5–15 cm long, ±flat, c. 0.5–1.3 mm wide; sheaths loose, with membranous margins; auricles acutish to subobtuse, membranous, 0.5–1.0 (–1.5) mm long. Lower bract leaf-like, c. 4–9 cm long, usually longer than the inflorescence. Inflorescence ±dense, c. 1–7 cm long, usually 5–50-flowered, of 1–5 primary branches bearing usually subcontracted cymes; flowers borne singly or in loose clusters. Bracteoles broadly ovate, subobtuse, scarious. Tepals subequal, lanceolate, acuminate, (3.5–) 4.0–4.5 (–5.0) mm; central band greenish-brownish becoming pale brown; margins scarious. Stamens 6, not exerted; anthers 0.2–0.5 mm long; filaments 0.5–1.0 mm long; style 0.1–0.2 mm long; stigmas c. 1.0–1.5 mm long. Capsules unilocular, broadly ellipsoid to ovoid, obtuse, later truncate to retuse, 3.5–4.5 mm long, shorter than perianth, light brown. Seeds 0.4–0.5 × 0.15–0.20 mm; appendages ±absent or minute. $2n = 80$, *fide* R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 223 (2000). Fig. 124.

Endemic in the western USA, from Washington to California and Nevada. 71: BRC. 73: IDA, ORE, WAS. 76: ARI, CAL, NEV. Reported to occur in Montana, Wyoming and Utah in USA, and in Chile but material not seen. Moist, usually exposed sites in clay or sandy soil around springs, along rivers and streams, and around lakes. Map 431.

71. BRITISH COLUMBIA: Vancouver Is., Oak Bay, 31 May 1887, *J.Macoun s.n.* (UC). 73. IDAHO: Owyhee Co., Silver City, Sawpit Ck, *W.H.Baker 8245* (US). WASHINGTON: Jefferson Co., Fort Townsend, *I.C.Otis 2351* (PR, UC); Falcon Valley, *W.N.Suksdorf 2191* (UC). 76. CALIFORNIA: San Mateo Co., Searsville Lake, *A.Hornby 118* (W); San Luis Obispo Co., Cambria, 25 May 1947, *R.F.Hoover 7215* (UC); Santa Clara Co., between Mt Hamilton and Mt Santa Isabella, *C.W.Sharsmith & H.K.Sharsmith 3372* (UC).

227. *Juncus interior* Wiegand, *Bull. Torrey Bot. Club* 27: 516 (1900)

T: USA, Illinois, Richview, *G.Vasey s.n.*; holo: GH29651.

Juncus arizonicus Wiegand, *Bull. Torrey Bot. Club* 27: 517 (1900); *Juncus interior* var. *arizonicus* (Wiegand) F.J.Herm., *J. Wash. Acad. Sci.* 30: 217 (1940). T: USA, New Mexico, Copper Mines, *G.Thurber 238*; holo: GH29604.

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Figure 127. *Juncus trifidus*. **A**, habit; **B**, inflorescence; **C**, flower; **D**, tepal with stamen; **E**, capsule; **F**, seed; **G**, **H**, upper part of leaf sheath with auricles; **I**, stem T.S. (**A**–**E**, **G**–**I**, A.Rehmann, KRA; **F**, J.Mądalski, KRA). Scale bars: **A** = 3 cm; **B**, **C**–**F**, **H** = 2 mm; **G** = 3 mm; **I** = 0.5 mm. Drawn by T.Szynal. Reproduced with permission from T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2/2: 126 (1931).

Juncus arizonicus var. *curtiflorus* Wiegand, *Bull. Torrey Bot. Club* 27: 518 (1900). T: USA, Arizona, Flagstaff, *T.M.MacDougall 305*; holo: GH29605.

Juncus neomexicanus Wiegand, *Bull. Torrey Bot. Club* 30: 447 (1903); *Juncus interior* var. *neomexicanus* (Wiegand) F.J.Herm., *J. Wash. Acad. Sci.* 30: 217 (1940). T: USA, Arizona, Huachuca, 1890, *E.Palmer 461b*; holo: US; iso: NY29661.

Juncus monostichus Bartlett, *Rhodora* 7: 50 (1905). T: USA, Indiana, S of Anderson; *C.P.Smith s.n.*; holo: GH, photo W.

Juncus interior var. *uniflorus* Farw., *Rep. Michigan Acad. Sci.* 20: 169 (1918). T: Michigan, Dearborn, 14 Jul 1917, *C.Billington & O.A.Farwell 4533-1/2*; holo: MICH, *n.v.* [fide P.M.Catling & K.W.Spicer 1987: 754].

Juncus interior var. *billingtonii* Farw., *Rep. Michigan Acad. Sci.* 20: 169 (1918). T: Michigan, Dearborn, 14 Jul 1917, *C.Billington & O.A.Farwell 4533-1/3*; holo: MICH, *n.v.*

Illustration: P.M.Catling & K.W.Spicer, *Can. J. Bot.* 65: 755, fig. 7 (1987).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 224 (2000).

Perennials, c. 20–60 cm tall, densely caespitose; rhizome short, densely branched. Cataphylls 1–3; leaves basal, 1–2 (–3) per stem, 5–15 cm long, flat with margins turned up, 0.5–1.1 mm wide; sheaths pale green to reddish; auricles whitish or purplish tinged, scarious, 0.2–0.4 (–0.6) mm long. Lower bract 1–10 cm long, usually shorter than inflorescence. Inflorescence c. 1.5–7 cm long, (5–) 10–30 (–50)-flowered, of anthelate appearance, or unilateral cymes distinct; flowers borne singly; pedicels 0.3–1.0 mm long. Bracteoles broadly ovate, membranous, 1.2–1.7 mm long, subacute or subobtuse. Tepals subequal (outer ones often slightly longer), 3.0–3.8 (–4.4) mm long, lanceolate, acute to acuminate; central band ±green becoming stramineous-brown, narrow; margins distinct, membranous. Stamens 6, not exerted; anthers 0.4–0.6 mm long; filaments 0.5–0.9 mm long; style 0.1–0.2 mm long; stigmas c. 1.5–2.0 mm long. Capsule unilocular, broadly ellipsoid to subglobose, obtuse to truncate, (3.3–) 3.8–4.7 mm long, subequalling or ±exceeding perianth, tan or darker. Seeds ellipsoid to lunate, c. 0.4–0.6 × c. 0.15–0.25 mm; appendages indistinct. $2n = 80$, fide N.A.Harriman & D.Redmond, *Rhodora* 78: 730 (1976).

Widely distributed in W and C USA, and S Canada. Probably also in N Mexico, and reported to occur in Alberta, but material not seen. 71: MAN, SAS. 72: ONT. 73: COL, MNT, WYO. 74: ILL, IOW, KAN, MIN, MSO, NDA, NEB, OKL, SDA. 75: INI, OHI. 76: ARI, UTA. 77: NWM, TEX. 78: ARK, KTY, TEN. Dry, often upland sites in prairies, exposed disturbed sites, and ditches in sandy or clay soils. A secondary occurrence was reported from Japan [Y.Satake, *J. Jap. Bot.* 12(2): 91 (1936)] but material not seen. Map 432.

73. COLORADO: Boulder Co., NE of Boulder, *C.Weber 4220* (KANU). WYOMING: Crook Co., NW of Belle Fourche, 8 Jul 1973, *Stephens 66674* (KANU). 77. TEXAS: Clay Co., E of Henrietta, *Stephens 20592* (KANU).

228. *Juncus dudleyi* Wiegand, *Bull. Torrey Bot. Club* 27: 524 (1900)

Juncus tenuis var. *dudleyi* (Wiegand) F.J.Herm., *J. Arnold. Arbor.* 25: 56 (1944); *Juncus tenuis* subsp. *dudleyi* (Wiegand) P.Fourn., *Quatre Fl. France* 147 (1935). T: USA, New York, Truxton, *K.M.Wiegand s.n.*; holo: CU.

Juncus platycaulos Humb., *Bonpl. & Kunth, Nov. Gen. Sp.* 1: 236 [Quarto], 1: 190 [Folio] (1816) [the identity with *J. dudleyi* requires further study]; *Juncus tenuis* var. *platycaulos* (Humb., *Bonpl. & Kunth*) Buchenau, *Bot. Jahrb. Syst.* 12: 194 (1890). T: Colombia, Mt. Quindio between Ibagué and La Palmilla, *F.W.H.A.Humboldt & A.J.A.Bonpland s.n.*; lecto: P, fide H.Balslev, *Fl. Neotrop. Monogr.* 82 (1996); iso: MO.

Juncus andreaeanus Weath., *Contr. Gray Herb.* 81: 84 (1928). T: Colombia, Cundinamarca, Facatativá, 2680 m. 16 Jun 1875, *Andre 624*; holo: GH29698. iso: K, NY247744, P, S etc.

Juncus tenuis var. *uniflorus* Farw., *Amer. Midl. Naturalist* 9: 265 (1925). T: Michigan, *R.McVaugh, R.F.Cain & D.J.Hagenah 7242*, lecto: MICH, designated here by R.E.Brooks [not a combination of the name *Juncus interior* var. *uniflorus* Farw.; see also P.M.Catling & K.W.Spicer, *Can. J. Bot.* 65: 754 (1987)].

[*Juncus coarctatus* Willd. ex Spreng., *Syst. Veg.* 2: 109 (1825), *nom. inval.* Authent. material: Venezuela, ripa Orinoci, *F.W.H.A.Humboldt & A.J.A.Bonpland s.n.* (B-W6845).]

Illustrations: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 118, fig. 64 (1906); C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 208 (1969); P.M.Catling & K.W.Spicer, *Can. J. Bot.* 65: 755, fig. 7 (1987); P.M.Catling & K.W.Spicer, *Can. J. Bot.* 66: 1580, fig. 5 (1988); S.E.Clemants, *Junc. New York State* 22 (1990); R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 222 (2000).

JUNCACEAE (*Juncus*)

Map: H.Balslev, *Fl. Neotrop. Monogr.* 68: 81, fig. 41 (1996), as *Juncus tenuis* var. *platycaulos*; R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 224 (2000).

Perennials, 20–100 cm tall, caespitose; rhizomes densely branched, \pm horizontal, short. Cataphylls 1–3; leaves basal, 2–3 per stem, 5–30 cm long, green to yellowish green, \pm flat, 0.5–1.0 mm wide; sheaths loose; auricles yellowish, coriaceous, broadly obtuse, short, c. 0.2–0.4 mm long. Lower bract leaf-like, c. 3–15 cm long, usually exceeding inflorescence. Inflorescence \pm compact and few-flowered to \pm lax, up to 80-flowered, c. 1.5–5 (–9) cm long; primary branches 1–5, arrangement \pm anthelate. Bracteoles ovate, membranous, 1.3–2.0 mm long. Tepals subequal (outer ones slightly longer), c. 4–5 mm long, lanceolate, acuminate; central band greenish, bordered stramineous-brown; margins broad, membranous. Stamens 6, not exserted; anthers 0.6–1.0 mm long; filaments 0.8–1.2 mm long; style c. 0.2 mm long; stigmas 1.6–2.1 mm long. Capsule unilocular, \pm ellipsoid, 2.9–3.6 mm long, narrowing into an obtuse to truncate and mucronate apex, tan, shorter than perianth. Seeds 0.4–0.65 \times c. 0.20–0.25 mm, alveolate-reticulate; appendages indistinct. $2n = 80$, *fide* N.A.Harriman & D.Redmond, *Rhodora* 78: 729 (1976); $2n = c. 84$, *fide* R.E.Brooks, in R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 224 (2000). Fig. 124.

Widely distributed in North America and Mexico; probably introduced in tropical and temperate South America, further introductions known in Great Britain, Austria and Slovakia; probably overlooked elsewhere. 10: gbr. 11: aus, cze. 70: ask, nwt, yuk. 71: ABT, BRC, MAN, SAS. 72: NBR, NFL, NSC, LAB, ONT, PEI, QUE. 73: COL, IDA, MNT, ORE, WAS, WYO. 74: ILL, IOW, KAN, MIN, MSO, NDA, NEB, OKL, SDA, WIS. 75: CNT, INI, MAI, MAS, MIC, NWH, NWJ, NWY, OHI, PEN, RHO, VER, WVA. 76: ARI, CAL, NEV, UTA. 77: NWM, TEX. 78: ARK, DEL, KTY, LOU, MRY, MSI, TEN, VRG, WDC. 79: MXC, MXE, MXG, MXS, mxt. 80: els, gua. 82: ven. 83: clm, ecu, per. Exposed or shady sites on sandy to clay soils, usually in moist areas such as along stream banks, ditches, and around springs. Map 433.

11. AUSTRIA: Vorarlberg, Rheintal, Meiningen, 15 Jul 1988, *E.Waldburger* (W). 72. NEW BRUNSWICK: Charlotte Co., Grand Harbor, *C.A.Weatherby & U.F.Weatherby* 5732 (PR). ONTARIO: Rainy R. Co., 2 km W of Seine R. on Highway 11, *M.J.Oldham* 20212 (DAO, PRA); Halton Co., Oakville Railway Yard, *M.J.Oldham & P.M.Catling* 13529 (DAO, MICH, PRA); Prince Edward Co., Sandbanks Provincial Park, *M.J.Oldham* 17555 (DAO, MICH, PRA). 74. ILLINOIS: Wady Petra, 17 Jun 1906, *A.Chase* [*A.Kneucker, Cyper. Junc. Exs.*] 256 (PR, PRA, W). NORTH DAKOTA: Rolette Co., Turtle Mtns, St. John, 7 Jul 1910, *J.Lunell s.n.* (IND). 78. LOUISIANA: Calcasieu Parish, Sulphur, *Thomas* 81589 (OSH).

The identity of the South American plants often recognized as *J. tenuis* var. *platycaulos* requires further study.

229. *Juncus revolutus* R.Br., *Prodr.* 1: 259 (1810)

Juncus brownii F.Muell., *Linnaea* 26: 215 (1853), *nom. illeg.* [& *First Gen. Rep. Veg. Victoria* 19 (1853), *nom. inval.*]. T: 'D' [=Tasmania] Port Dalrymple; *R.Brown*; syn: BM, K.

Illustrations: F.Mueller, *Key Syst. Vict. Pl.* 2: fig. 123 (1885); F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 114 (1906); K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 275 (1993).

Perennials, 5–15 (–30) cm tall, loosely caespitose; rhizome long, creeping; stolons short, ascending, or absent; stem 0.5–0.8 mm in diam. Cataphylls 1–2, loose, greyish-stramineous; blade reduced. Leaves basal, 3–5 per stem, shorter than or equalling stem, \pm flat, c. 0.4–1.2 mm wide; sheaths loose, with broad margins; auricles broadly obtuse, 0.3–0.5 (–0.7) mm long; leaf apex acute. Lower bract single, c. 0.7–4.5 (–6) cm long, leaf-like, subequalling inflorescence. Inflorescence loose, 1–7 cm long, with 1–2 erect seldom recurved branches, 1–15-flowered; flowers borne singly or in loose few-flowered clusters. Bracteoles ovate, obtuse, c. 2 mm long, membranous, mostly with castaneous tinge. Tepals \pm equal, subcoriaceous, sometimes outer ones \pm longer, ovate-lanceolate to lanceolate, subobtuse to obtuse, (4.0–) 5.0–5.5 mm long; central band pale green becoming stramineous-brown, bordered castaneous; margins narrow, membranous. Stamens 6; anthers c. 1.3–1.5 mm long; filaments linear, c. 0.5 mm long; style c. 0.5–0.6 mm long; stigmas c. 1.0–2.0 mm long. Capsule triseptate, ellipsoid to oblong with apex obtuse to retuse, to c. 5.5 mm long, slightly exceeding perianth, pale castaneous. Seeds \pm narrowly ovoid, c. 0.5–0.6 \times 0.30–0.35 mm,

brown, longitudinally c. 14–17-striate, transversally reticulate; appendage one, 0.10–0.15 mm long. Fig. 122.

Endemic in SE Australia and Tasmania. 50: NSW, VIC, TAS. Subsaline habitats, on alluvial flats, shores etc. Map 434.

50. NEW SOUTH WALES: 34 km along road from Rylstone to Glen Davis, *V.Klaphake 1058* (K, NSW); Paradise Creek crossing, Elsmore Rd, off Tingha Road, 12 Nov 1984, *White s.n.* (BRI, NE, NSW400327); c. 9.5 miles [15 km] from Merriwa on Wollar road, *K.L.Wilson 712 & L.A.S.Johnson* (NSW). TASMANIA: Marion Bay, *J.H.Hemsley 6674* (K); Bagot Point (channel to Moulting Lagoon) East Coast, *P.Adam UNSW21689* (NSW, UNSW); Port Dalrymple, Jan 1804, *R.Brown 5781* (BM, NSW); *s. loc.*, *L.Rodway s.n.* (NSW49908). VICTORIA: S of Lake Corringale, W of Snowy River mouth, *A.C.Beauglehole 35331* (MEL, NSW); Port Fairy, *A.C.Beauglehole 49627* (MEL, NSW); 19 km NE of Camperdown P.O., *A.C.Beauglehole 63157* (MEL, NSW).

230. *Juncus homalocalis* F.Muell. ex Benth., *Fl. Austral.* 7: 128 (1878)

T: Blue Mountains, C.Moore 98; syn: K; Parramatta, *W.Woolls s.n.*; syn: K, MEL; New England, *C.Stuart s.n.*; syn: K; New England, Timbarra, *C.Stuart 20*; syn: MEL; Glenelg River, *Robertson 43/566*; syn: K; Black Forest, *F.Mueller*; syn: K, MEL; Wimmera, *J.Dallachy s.n.*; syn: MEL.

[*Juncus plebeius* auct. non R.Br. (1810): F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 116 (1906)]

Illustrations: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 116 (1906), as *J. plebeius*; J.M.Black, *Fl. S. Austral.*, 3rd edn, 1: 326, fig. 293 (1978); K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 275 (1993).

Perennials, (5–) 10–18 (–35) cm tall, densely caespitose; rhizome short; stolons absent; stem 0.5–1.2 mm in diam. Cataphylls 3–4. Leaves basal, 3–5 per stem, canaliculate to filiform, 0.3–0.9 mm wide; apex acute; sheaths tight, greenish-membranous; auricles obtuse, scarious, c. 0.5 mm long. Lower bract single, leaf-like, usually 3–10 (–15) cm long, usually equalling or longer than inflorescence. Inflorescence terminal, loose, to 10 cm long, umbelloid to anthelate, with 1–2 erect or arcuate primary branches; secondary peduncles short; flowers divaricate, in 2–4 (–8) loose, (1–) 3–6-flowered clusters. Bracteoles ovate, obtuse, to c. 2.0 mm long, scarious or pinkish. Flowers usually cleistogamous. Tepals ±tightly adpressed to pistils, unequal, with outer ones distinctly longer, linear-lanceolate, long acuminate, greenish becoming stramineous-brown; margins membranous, broad; outer tepals c. 5.0–6.5 (–7.5) mm long; inner tepals to c. 5.5 mm long. Stamens 3 (–4 or 5); anthers 1.0–1.3 mm long; filaments 0.8–1.0 mm long; style to 0.5 mm long; stigmas 1.5–2.0 mm long. Capsule ±triseptate, narrowly trigonous-ovoid to ellipsoid, acuminate to acute, c. 4.5–5.5 mm long, shorter than or equalling perianth, golden brown. Seeds ovoid, apiculate, c. 0.5–0.6 × 0.35 mm, deep brown, longitudinally c. 12–14-striate, distinctly transversally reticulate; appendages absent. Fig. 122.

Endemic in Australia; introduced in New Zealand and Isla de Pascua. 50: NSW, QLD, SOA, VIC. 51: nzn. 61: eas. Open woodlands, grasslands, temporarily wet soils. Map 435.

50. NEW SOUTH WALES: Long Swamp on Coxs River, Ben Bullen State Forest, *R.G.Coveny 15046 & P.D.Hind* (CHR, NSW, NY); Henty, Cemetery Reserve, *M.D.Tindale* (BM, NSW); Captains Flat, Sheepstation Creek, *M.D.Tindale 6009* (K, NSW); A.C.T., Canberra, 28 Dec 1949, *E.Gaubia* (W). QUEENSLAND: Wallangarra, *M.S.Clemens 44404* (K); 25 km NW of Amiens on back road through Herries Range to Warwick, *K.L.Wilson 4239a* (NSW, BRI, CHR). VICTORIA: Dimboola, 14 Dec 1902, *F.M.Reader* (L); between Frankston & Seaford, *R.Melville 2028* (NSW, K); c. 2 km from Maryborough on Ballarat road, below town reservoir, *L.A.S.Johnson 7653* (NSW, MEL). 61. EASTER IS.: Isla de Pascua, Rano Kao, c. 300 m, *C.Skottsberg & I. Skottsberg 680* (LD, UPS).

231. *Juncus squarrosus* L., *Sp. Pl.* 327 (1753)

T: In Europae borealis caespitosis; several syntypes, including *Burser I: 61*; syn: UPS; *C.Linnaeus*; syn: LINN449.14 [recommmendable as the lectotype]; *van Royen*; syn: L904,145-63.

Juncus sprengelii Willd., *Fl. Berol. Prodr.*, no 394 (1787). T: [Germany, Berlin] In der Spandauerheide in pratis versus Falkenhagen; icon in C.L.Willdenow, *Fl. Berol. Prodr.*, tab. vi, fig. 8 (1787); lecto: *designated here* [authentic material of unclear date was distributed by Kunth, e.g. UPS].

Juncus squarrosus var. *glomeratus* Hartm., *Handb. Skand. Fl.* 140 (1820). T: Jämtl. Fjäll.; Jämtland, *C.J.Hartman*; syn: UPS.

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Juncus squarrosus var. *longibracteatus* Zapal., *Consp. Fl. Galic.* 1: 130 (1906). T: [Poland/Ukraine] Kobierzyn, *A.Rehmann*; syn: *n.v.*; Chyżne na Orawie, *H.Zapalowicz*; syn: *n.v.*

Juncus ellmanii C.E.Hubb., Sandwith & Turrill, *Kew Bull.* 1928: 153 (1928); *Juncus squarrosus* subsp. *ellmanii* (C.E.Hubb., Sandwith & Turrill) Maire & Weiller, in R.Maire, *Fl. Afr. Nord* 4: 268 (1957). T: Spain, Escorial, Cerro de los Avantos, 1350 m, *E.Ellman & C.E.Hubbard 1023*; holotype: K.

Illustrations: T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2(2): 124 (1931); H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 3: 505 (1967); Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 436, fig. 60 (1971).

Maps: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 7(1): map 80 (1958); H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 82 (1965); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 89, map 178 (1986).

Perennials, 10–50 cm tall, caespitose; rhizome suberect, branched, short; stolons absent. Stems rigid. Cataphylls usually several; leaves basal (rarely one small leaf cauline), ±greyish-green, arcuate-spreading, subcoriaceous, canaliculate, 7–30 cm long, 1–2 mm wide, with distinct sclerenchyma on margins; sheaths dilated, tawny; auricles membranous to scarious, usually 0.2–0.4 mm long, obtuse. Lower bract c. 1–3 cm long, usually shorter than inflorescence. Inflorescence 3–10 cm long, 10–30 (–40)-flowered; flower pedicels c. 0.5–2 mm long. Bracteoles membranous, acute, 3.0–3.5 mm long. Tepals ±equal, lanceolate to narrowly ovate, c. 4.0–5.0 (–5.5) mm long, obtuse, pale brown; central band brown becoming dark brown; margins distinctly bordered stramineous-scarious. Stamens 6; anthers 1.5–2.0 mm long; filaments c. 0.5 mm long; style c. 0.2 mm long; stigmas to c. 2 mm long. Capsule trilocular, ovoid to broadly ellipsoid, obtuse, ±mucronate, c. 4–5 mm long, ±as long as perianth, tan to brown. Seeds obliquely ovoid, c. 0.6–0.8 mm long, c. 0.4 mm wide, conspicuously striate longitudinally, less distinctly alveolate; appendages absent. $2n = 42$, *vide* S.Snogerup, *Bot. Not.* 116: 148 (1963). Fig. 128.

W, C and NW Europe, Morocco, introduced in Finland, Svalbard, S Greenland, E USA, Tasmania and New Zealand. 10: DEN, fin, GRB, ICE, IRE, NOR, sva, SWE. 11: AUT, BGM, CZE, GER, NET, POL, SWI. 12: FRA, POR, SPA. 13: ITA. 14: BLR, BLT, RUN, UKR. 20: MOR. 50: tas. 51: nzn, nzs. 70: gnl. 74: wis. Oligotrophic grasslands, heaths, moorlands. Map 436.

10. GREAT BRITAIN: Wales, Aberystwyth, Devil's Bridge, *C.E.Hubbard 1779* (K). 12. FRANCE: Charente-Maritime, Fénéoux, *E.Contré [Soc. Fr. Éch. Pl. Vasc.] 3735* (P). SPAIN: Soria, Sierra de Urbión, Refugio de Cebrián, *N.Y.Sandwith 5295* (K). PORTUGAL: Serra do Caramulo, S. João do Monte, *A.Fernandes & J.Matos 5277* (UPS). 20. MOROCCO: Rif, Isagen Valley, 1500 m, 13 Jun 1929, *R.Maire* (P). 74. WISCONSIN: Ashland Co., Devil's Is., 5 Aug 1977, *W.E.Tans 1637* (WIS, photo GH, KANU, MICH, NY, OSH).

Plants from C Spain mostly deviate from the typical *Juncus squarrosus* in having narrower, more greyish leaves and longer stamens, and were described as *Juncus ellmanii*. They may deserve taxonomic recognition at the rank of variety or subspecies but further study is required.

232. *Juncus monanthos* Jacq., *Enum. Stirp. Vindob.* 61, 236 (1762)

Juncus hostii Tausch, *Flora* 17(2): 518 (1834), *nom. illeg.*; *Juncus trifidus* subsp. *hostii* Hartm., *Svensk Norsk Exc.-Fl.* 48 (1846); *Juncus hostii* var. *monanthos* (Jacq.) Tausch, *Flora* 17(2): 518 (1834), *nom. inval.*; *Juncus trifidus* var. *foliosus* Neilr., *Fl. Nied.-Oesterr.* 1: 149 (1859); *Juncus trifidus* subsp. *monanthos* (Jacq.) K.Richt., *Pl. Eur.* 1: 177 (1890), *nom. illeg.*; *Juncus trifidus* var. *monanthos* (Jacq.) Oeder, *Fl. Dan.* 29: no. 1691 (1821); Bluff & Fingerh., *Comp. Fl. German.* 440 (1825), *nom. illeg.* T: [Austria] in summis jugis Schneeberg, & in ejusdem praecipitio Sawgrube; syn: P; icon in N.J.Jacquin, *Enum. Stirp. Vindob.* tab. 4, fig. 1; syn.

Juncus schranckii K.Moll, in F.P.Schrank & K.E.Moll, *Naturhist. Briefe Oesterreich* 1: 84 (1785); 2: 208 (1785). T: [Krain] 'in vertice M. Storshitsh', *Juncus foliis planis culmo unifloro* Scop., *Fl. Carniol.* 225 (1760); syn: [Austria] Zell im Zillerthal, 13 Sep 1783, *K.E.Moll*; syn: *n.v.*

Illustrations: N.J.Jacquin, *Enum. Stirp. Vindob.*, tab. 4, fig. 1 (1762); H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 3: 506 (1967); S.Jávorka & V.Csapódy, *Iconogr. Fl. Europ. Centr.* 72, fig. 601 (1975); S.Pignatti, *Fl. Ital.* 3: 433 (1982).

Perennials, c. (15–) 18–30 (–40) cm tall, densely caespitose to mat-forming; rhizome short-noded, ±horizontal. Cataphylls 3–6, stramineous-brown; uppermost cataphylls with blade c. 6–10 cm long. Leaves 2–3 per stem, 1–2 arranged bract-like; lowermost leaf usually

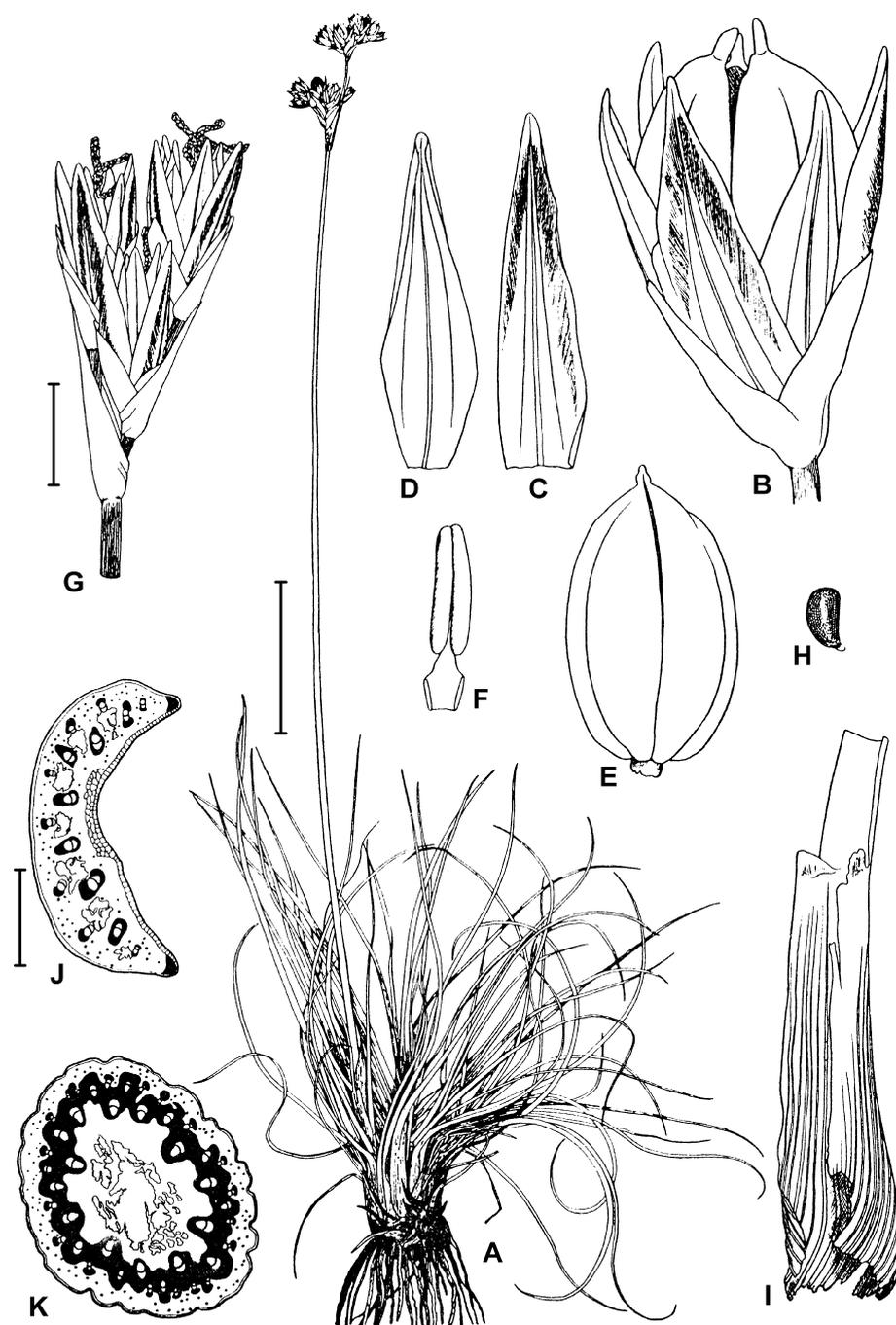


Figure 128. *Juncus squarrosus*. A, habit; B, perianth with capsule; C, outer tepal; D, inner tepal; E, capsule; F, stamen; G, a part of inflorescence; H, seed; I, distal part of leaf sheath; J, leaf blade T.S.; K, stem T.S. (A–K, A.Rehmann, KRA). Scale bars: A = 3 cm; B–F, H = 2 mm; G, I = 3 mm; J, K = 0.5 mm. Drawn by T.Szynal. Reproduced with permission from T.Szynal & J. Małowski, *Atlas Fl. Pol.* 2/2: 127 (1931).

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remote, c. 4–9 cm below inflorescence, usually 5–10 cm long, 0.3–0.8 mm in diam.; next upper leaf ±remote; uppermost leaf subtending inflorescence, ±canaliculate; margins ±without sclerenchyma bands, finely serrulate; dorsal epidermis sparsely papillose; auricles c. 3–4 mm long, lacerate-fimbriate. Inflorescence terminal, reduced to 1 (rarely 2–3) flowers, conspicuously overtopped by leaves. Bracteoles to c. 3 mm long, castaneous with membranous margins, ±lacerate to subentire. Tepals ovate-lanceolate, acuminate, ±equal or outer tepals slightly longer, (4.0–) 4.2–4.8 (–5.2) mm long, light to dark castaneous-brown; margins distinct, membranous-scarious. Stamens 6; anthers 1.4–1.6 mm long, mucronate; filaments c. 0.5–0.7 mm long; style 1.0–1.6 mm long, difficult to distinguish from young capsule mucro; stigmas c. 1.5–1.8 mm long. Capsule trilocular, ellipsoid-ovoid, c. 4.0–5.2 mm long including 1.0–1.3 (–1.5) mm mucro, light castaneous, shiny, ±exceeding perianth. Seeds obliquely ovoid, c. 1.0 × 0.5–0.6 mm, indistinctly reticulate, with two appendages c. 0.3 mm and c. 0.4–0.5 mm long.

Central Europe; confined to the Alps and extending to mountains of Croatia and Crna Gora, and to the N Apennines. 11: AUT, GER, SWI. 12: FRA. 13: ITA, YUG. Alpine and subalpine calcareous grasslands, limestone cliffs. Map 437.

11. AUSTRIA: Salzburg, Untersberg, Jul 1880, *P.Hora* (PR541359); Oberösterreich, Traunstein, 1690 m, 29 Jul 1894, *K.Ronniger* (W); Osttirol, Karnische Alpen, Kartisch, Erschbaumertal, 1800 m, 11 Sep 1979, *A.Polatschek* (W). GERMANY: Berchtesgadener Alpen, *M.F.S.Uechtritz* (PR). SWITZERLAND: St. Gallen, Alt-St.-Johann, 27 Jul 1872, *L.Favrat* (K). 13. ITALY: Lombardia, Alpi de Lecco, Mt Resegone, 17 Aug 1859, *L.Leresche* (K); Brenta, Val Gelada, 23 Sep 1983, *W.Burri & F.Krendl* (W); Dolomiti, Val Gardena, Selva, 1750 m, *R.Engel [Soc. Fr. Éch. Pl. Vasc.] 3327* (P). CROATIA: Velebit, Raduč, Malovan, 1500 m, 28 Jul 1908, *A.Degen* (K).

233. *Juncus trifidus* L., *Sp. Pl.* 326 (1753)

Juncus trifidus var. *pleianthos* Bluff & Fingerh., *Comp. Fl. German.* 1: 440 (1825), *nom. inval.*; *Juncus alpestris* Bubani, *Fl. Pyren.* 4: 181 (1901), *nom. illeg.* T: 'In Alpiibus Lapponicis, Helveticis, Pyrenaeis'; [Sweden, Lappland], *C.Linnaeus 119*; lecto: Institut de France, LAPP, *designated here*.

Juncus trifidus var. *sessiliflorus* Tausch, *Flora* 17(2): 517 (1834). T: Bohemia, *I.F.Tausch*; syn: PRC; Salzburg, *Kratzmann*; syn: PRC; Tyrol und Steyermark [the Austrian Alps, without further details], *F.W.Sieber*; syn: PRC.

Juncus trifidus var. *fastigiatus* Tausch, *Flora* 17(2): 517 (1834). T: [Austria] Steiermark, *Fenzl*; holo: *n.v.*

Juncus trifidus var. *uniflorus* Tausch, *Flora* 17(2): 517 (1834), *an nom. validum?* T: not indicated [according to Tausch, characters found in both var. *sessiliflorus* and var. *fastigiatus*].

Juncus trifidus var. *vaginatus* Neilr., *Fl. Nied.-Oesterr.* 1: 149 (1859). T: [the Austrian Alps] not designated.

Juncus trifidus b. [unranked] *curvatus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2 (2): 427 (1904). T: not designated.

Juncus trifidus var. *medius* Rouy, *Fl. France* 13: 233 (1912). T: not designated.

Juncus trifidus var. *triflorus* Krylov, *Fl. Alt.* 6: 1405 (1912). T: [the Altai, otherwise not indicated, probably meant as a type variety]

Juncus trifidus subsp. *carolinianus* Hämet-Ahti, *Veröff. Geobot. Inst. Rübel Zürich* 69: 7 (1980). T: USA, North Carolina, Buncombe Co, Craggy Gardens, 1897, *Biltmore Herbarium 5546*; holo: NCU; iso: GH, NY, S.

Illustrations: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 110, fig. 60 (1906); T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2(2): 126 (1931); Ö.Nilsson & S.Snogerup, *Bot. Not.* 125: 3, fig. 65 (1972); S.E.Clemants, *Junc. New York State* 15 (1990).

Maps: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 7(1): map 28 (1958); H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 82 (1965); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 90, map 179 (1986).

Perennials, 5–42 cm tall, densely caespitose to mat-forming; rhizome short-noded, ±horizontal, with sheath-like scales. Cataphylls 4–6, the uppermost with blade to c. 1 cm, rarely longer. Leaves (2–) 3 (–4) per stem, arranged bract-like, distal, rarely 1–2 leaves in proximal position; lower leaf inserted c. 1–3 cm below inflorescence, usually 4–12 cm long, 0.3–1.0 mm wide; other leaves ±tightly subtending inflorescence, ±flat to slightly canaliculate; margins ±without sclerenchyma bands, finely serrulate; dorsal epidermis sparsely papillose; sheaths to c. 4 cm long; auricles to 4 mm long, lacerate. Inflorescence terminal, reduced to 1–3 (–4) subsessile congested flowers conspicuously overtopped by

leaves. Bracteoles distally ±lacerate, to c. 2.5 mm long. Tepals ±equal or outer ones longer, lanceolate to ovate, acuminate, (2.0–) 2.8–3.5 (–4.2) mm long, light to dark brown; margins scarious. Stamens 6; anthers 1.2–1.5 mm long, ±mucronate; filaments c. 0.5–0.7 mm long; style 1.0–1.5 mm long; stigmas 2–3 mm long. Capsule trilocular, trigonous-ovoid, 2.2–3.7 mm long including a mucro 0.7–1.0 mm long, dark brown, ±exceeding perianth. Seeds indistinctly reticulate, 0.8–1.0 mm long, or 1.2–1.6 mm long including appendages, c. 0.5 mm wide; appendages c. 0.2 and c. 0.3 mm long. $2n = 30$, *vide* Á.Löve & D.Löve, *Univ. Colorado Stud., ser. biol.* 24: 25 (1966); S.Snogerup, in Ö.Nilsson & S.Snogerup, *Bot. Not.* 125: 1 (1972). Fig. 127.

Widely distributed in Europe, mainly in the north and in the mountains, western part of Siberia, Greenland and mountains of eastern North America. 10: FIN, FOR, GRB, ICE, NOR, SWE. 11: AUT, CZE, GER, POL, SWI. 12: FRA, SPA. 13: ALB, BUL, GRC, ITA, ROM, YUC. 14: RUE, RUN, UKR. 30: ALT, KRA, WSB. 70: GNL. 72: LAB, NBR, NFL, NSC, QUE. 75: CNT, MAI, NWH, NWY, WVA. 78: NCA, VRG. Crevices of granitic or schistose cliffs, alpine and subarctic tundra communities, marginally also in other habitats (rubble slopes etc.). Map 438.

11. AUSTRIA: Hohe Tauern, Mallnitz, 2100 m, 15 Jul 1912, *L.F.Čelakovský* (PR); Gross Glockner, Pasterze, *D.H.Hoppe* [*Herb. Viv. Pl. Gramin.*] 12 (BRNM, K). 12. SPAIN: Huesca, Benasque, *J.E.Zetterstedt* 1259 (S). 13. BULGARIA: Pirin, Banderica Valley, 2400 m, Jul 1936, *I.Klásterský & M.Deyl* (PR). 14. NORTH EUROPEAN RUSSIA: Komi Republic, Kozhim R. basin, Khambalyu, 8 Jul 1981, *A.Semenova* (PRA). UKRAINE: the East Carpathians, Mt Bliznica, 12 Jul 1934, *A.Hilitzer* (PR). 30. WEST SIBERIA: Tyumen', Yamal, Mantyto Lake, *O.V.Rebristaya* [*Gerb. Fl. SSSR*] 6313 (BL, LE, MW). 70. GREENLAND: West Greenland, Angmaksalik, 23 Jul 1946, *J.Lagerkrantz* (LD); Nigerdleq, *Joergensen & S.Larsson* [*Pl. Vasc. Groenl. Exs.*] 370 (C, PR).

In most of its range, the species exhibits little variation. In some regions, there are forms having features similar to those of *Juncus monanthos*, e.g., lower mean number of flowers in the inflorescence, more remote lower leaf, longer tepals and, rarely, longer upper cataphyll blade. Such plants, always closer to the typical *Juncus trifidus* in the whole character set, are almost exclusively found in the southern American part of the species' range (the Appalachians) where they were recognized as a separate subspecies, subsp. *carolinianus*. Similar plants (but even closer to the typical *Juncus trifidus*) are also found in S Norway and in the Balkan Peninsula. Their nature requires further study. The alleged intermediates grow on acid substrate while *J. monanthos* is confined to calcareous substrates.

234. *Juncus compressus* Jacq., *Enum. Stirp. Vindob.* 60, 235 (1762)

Juncus gramineus Dumort., *Fl. Belg.* 142 (1827), *nom. illeg.*; *Juncus gramineus* var. *compressus* (Jacq.) Dumort., *Fl. Belg.* 142 (1827), *nom. inval.*; *Juncus bulbosus* var. *compressus* (Jacq.) Regel, *Trudu Imp. S.-Peterburgsk. Bot. Sada* 7 (1): 553 (1880). T: 'vulgatissimus est per totam Austriam'; syn: L. [The name *J. gramineus* was published with a reference to *J. bulbosus* L., here treated as a reference to a common misapplication of the latter name, dating back to the second edition of C.Linnaeus, *Sp. Pl.*]

Juncus compressus var. *dianthelus* C.Koch, *Linnaea* 21: 629 (1848). T: [Hungary] Aus der grossen ungarischen Ebene; syn: *n.v.*

Juncus metzleri F.W.Schultz, *Pollichia* 13: 34 (1855); *Juncus compressus* var. *nudiculmis* F.W.Schultz, *Pollichia* 20–21: 250 (1863); *Juncus compressus* A.II. [unranked] *metzleri* (F.W.Schultz) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 431 (1904); *Juncus compressus* var. *metzleri* (F.W.Schultz) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 539 (1966), *nom. illeg.* T: [Germany] Speyer, *J.A.Metzler*; syn: *n.v.*

Juncus compressus var. *euxinus* Velen., *Fl. Bulg.*, Suppl. 1: 281 (1898); *Juncus compressus* f. *euxinus* (Velen.) Hayek, *Prodr. Fl. Balcan.* 3: 135 (1933). T: [Bulgaria] ad Burgas, *L.Jablonowski*; holo: PRC, *n.v.*

Juncus compressus 2. [unranked] *condensatus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 430 (1904). T: not designated.

Juncus compressus 3. [unranked] *elongatus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 431 (1904). T: not designated.

Juncus compressus 4. [unranked] *laxus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 431 (1904); *Juncus compressus* f. *laxus* (Asch. & Graebn.) Borza, *Consp. Fl. Rom.* 1: 40 (1947). T: not designated.

Juncus compressus 4.b. [unranked] *viridis* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 431 (1904). T: not designated.

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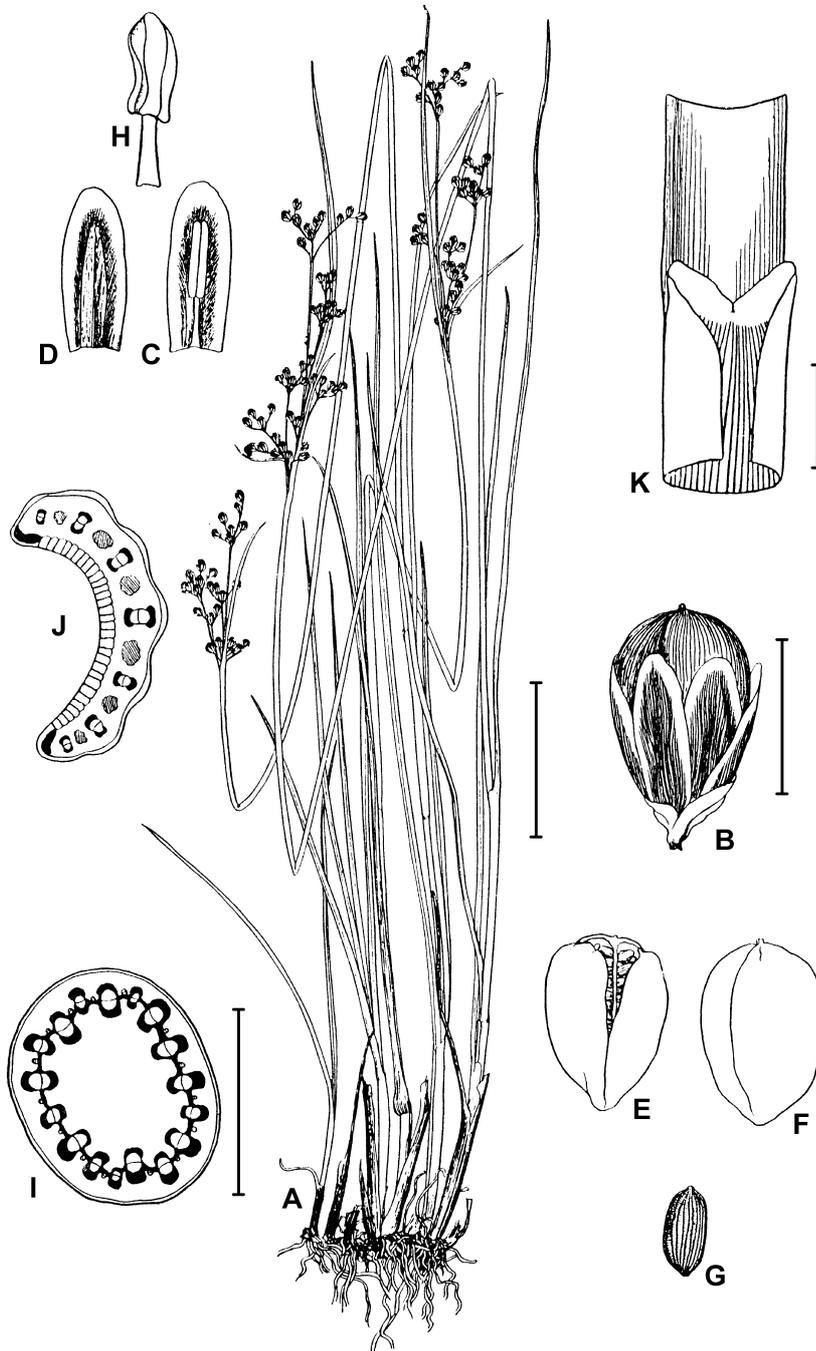


Figure 129. *Juncus compressus*. **A**, habit; **B**, perianth with capsule; **C**, outer tepal; **D**, inner tepal; **E**, ripe capsule; **F**, capsule; **G**, seed; **H**, stamen; **I**, stem T.S.; **J**, leaf blade T.S.; **K**, distal part of leaf sheath (A–K, B. Błocki, KRA). Scale bars: **A** = 3 cm; **B**, **C**–**F**, **H** = 2 mm; **G**, **I**, **J** = 1 mm; **K** = 2 mm. Drawn by T. Szynal. Reproduced with permission from T. Szynal & J. Małowski, *Atlas Fl. Pol.* 2/2: 127 (1931).

Juncus compressus 4.c. [unranked] *viridiflorus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 431 (1904). T: not designated.

Juncus compressus f. *longirepens* Zapal., *Consp. Fl. Galic.* 1: 130 (1906). T: [Poland/Ukraine] Puławy, Berdau; holo: *n.v.*

Juncus compressus f. *tenuifolius* Zapal., *Consp. Fl. Galic.* 1: 131 (1906). T: [Poland/Ukraine; numerous syntypes cited]

Juncus compressus var. *pseudogerardii* Jaffri, in S.I.Ali & M.Qaiser (eds), *Fl. Pakist.* 138:14 (1981). T: Kashmir, Jhelum valley, Manasbal lake, 5200 ft., 18 Jul 1940, R.R.Stewart 19423; holo: RAW.

Illustrations: T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2(2): 127 (1931); Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 437, fig. 61 (1971); P.M.Catling & K.W.Spicer, *Can. J. Bot.* 65: 755, fig. 7 (1987).

Maps: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 81 (1965); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 90, map 180 (1986).

Perennials, c. 10–40 cm tall, loosely caespitose; rhizome creeping; stems usually slightly compressed. Cataphylls 0–3; blades ±completely suppressed; sub-basal leaves 1–4; cauline leaves 1–2, 5–25 cm long, 0.8–2.0 mm wide, ±flat, sometimes ±canaliculate, ±dark bluish green; auricles broadly obtuse, very short. Lower bract leaf-like, to c. 10 cm long, usually conspicuously longer than inflorescence; middle bracts to c. 3.5 mm long, scarious. Inflorescence lax or slightly contracted, 1.5–8 cm long, composite or decomposite, ±anthelate, c. 10–60-flowered; flowers borne singly. Bracteoles scarious-membranous, broadly ovate, subobtuse to obtuse, c. 1.0–1.3 mm long. Tepals ±equal, ovate, obtuse. Outer tepals slightly cucullate distally, 2.1–2.8 mm long; central band green, later stramineous-brown, bordered castaneous-brown. Inner tepals distally with broad membranous margins. Stamens 6; anthers c. 0.6–1.0 mm long, up to twice as long as 0.4–0.6 mm filaments; style 0.2–0.4 mm long; stigmas 1.0–1.5 mm long. Capsule trilocular to partially triseptate, subglobose to broadly ovoid, obtuse to ±truncate, shortly (0.1–0.3 mm) mucronate, 2.5–3.5 mm long, conspicuously (up to 2×) exceeding perianth, light brown to deep castaneous-brown, shiny. Seeds ±ovoid, apiculate, 0.35–0.50 × c. 0.3 mm, pale brown, longitudinally c. 11–13-striate, distinctly transversely reticulate; appendages absent. 2n = 44, *fide* S.Snogerup, *Bot. Not.* 116: 149 (1963); S.Snogerup, in Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 439 (1971); N.A.Harriman & D.Redmond, *Rhodora* 78: 728 (1976). Fig. 129.

Widely distributed over the whole of Europe and extratropical Asia, naturalized in North America. 10: DEN, FIN, GRB, IRE, NOR, SWE. 11: All. 12: COR, FRA, POR, SAR, SPA. 13: ALB, BUL, GRC, ITA, ROM, SIC, TUE, YUC. 14: All. 30: ALT, BRY, CTA, IRK, KRA, TVA, WSB, YAK. 31: AMU, PRM. 32: All. 33: NCS, TCS. 34: AFG, CYP, EAI, IRN, TUR. 36: CHN, CHQ, CHX. 37: MON. 38: JAP, KOR. 40: PAK, WHM. 71: man. 72: nfl, nsc, ont, que. 73: col, mnt, wyo. 74: min, nda, neb, wis. 75: mai, mic, nwy. 76: uta. 78: mry. Damp meadows, ditches, lake shores, disturbed wet ground, from subsaline to mineral ±poor soils. Map 439.

10. GREAT BRITAIN: Bedfordshire, Tempsford, Taylor 757 (K). 11. AUSTRIA: Steiermark, Pfarrdorf, H.Reiter [A.Hayek, *Fl. Stir. Exs.*] 258 (WU). THE NETHERLANDS: Doornspijk, Jul 1947, J.L. van Soest (K); POLAND: Poznań, Rogalinek, F.Krawiec [Pl. Polon. Exs.] 490 (W). 13. GREECE: NW Macedonia, Hagia Trias, A.H.G.Alston & N.Y.Sandwith 1135 (K). 14. CENTRAL EUROPEAN RUSSIA: Tambov, Vyazovo, Shiraevskiy [Herb. Fl. Ross.] 1687 (WU). 30. BURYATIYA: Ulan-Ude, 20 Sep 1969, V.Vašák (PR315427). 34. TURKEY: Kütahya, R. Porsuk, 800–900 m, W.R.Dudley 36080 (K). 36. XINJIANG: along R. Tekes, c. 1300–1600 m, 13 Aug 1877, A.Regel (BM).

235. *Juncus gracillimus* (Buchenau) V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 627, 528 (1935)

Juncus compressus var. *gracillimus* Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 112 (1906) [or Buchenau ex Matsum, *Ind. Pl. Japon.* 2: 183 (1905), *n.v.*]. T: China [Shaanxi], Süd-Shensi, G.Giraldi; syn: *n.v.*; Japan, U.Faurie; syn: *n.v.*; Japan, J.Matsumura; syn: *n.v.*; Korea, U.Faurie; syn: *n.v.*

Illustrations: V.I.Krechetovich & N.F.Goncharov, in V.L.Komarov, *Fl. SSSR* 3: 504, tab. 28 (1935); Y.Satake, *J. Jap. Bot.* 9(6): 375, fig. 15 (1933); Y.Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 50, fig. 14 (1938); V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 61, tab. 3 (1985).

Maps: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 81 (1965); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 90, map 180 (1986); V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 63, fig. 15 (1985) [the Russian Far East]; N.K.Kovtonyuk, in L.I.Malyshv & G.A.Peshkova, *Fl. Sibiri 4 (Araceae – Orchidaceae)*: 157, map 20 (1987) [Siberia].

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Perennials, c. (30–) 50–60 (–70) cm tall, loosely caespitose; slender rhizome creeping; stolons absent, stems ±terete to slightly compressed. Cataphylls 0–2, pale brown; blades filiform, to 3 mm long. Sub-basal leaves 1–2; cauline leaves pale green, usually 1–3, to c. 30 cm long, often exceeding inflorescence, to 1.2 mm wide, ±flat to canaliculate; apex acute; auricles broad, to 0.3 mm long, scarious. Lower bract leaf-like, ±filiform, to c. 20 cm long, usually much exceeding inflorescence. Inflorescence lax, usually (3–) 7–10 (–15) cm long, ±decomposited, anthelate, c. 15–80-flowered; flowers borne singly. Bracteoles ±membranous, ovate-lanceolate, acute, to c. 1.3 mm long. Tepals ±equal, ±ovate; outer tepals subobtuse to obtuse, slightly cucullate distally; inner tepals obtuse, c. 2.2–2.7 mm long; central band greenish, later pale brownish, bordered ±castaneous; margins distally broad, membranous. Stamens 6; anthers 0.6–0.8 mm long; filaments 0.5–0.7 mm long; style to c. 0.2 mm long; stigmas c. 1 mm long. Capsule ±trilocular, oblong-ovoid, subtrigonal, acute to ±acuminate, with a mucro to 0.2 mm long, c. 2.5–3.0 mm long, much exceeding perianth, castaneous-brown, shiny. Seeds ±ovoid, apiculate, c. 0.45–0.50 × c. 0.3 mm, pale brown, longitudinally striate, transversely reticulate; appendages absent.

Japan, Korea, the Russian Far East and NE China. 30: BRY, CTA, TVA. 31: AMU, KHA, KUR, PRM, SAK. 36: CHI, CHM, CHN. 37: MON. 38: JAP, KOR. Subsaline damp meadows, coastal sands, road ditches, usually at low altitudes. Map 440.

31. KHABAROVSK: Amur Bay, Okeanskaya Station, Muravyov-Amurskiy Peninsula, *W.A. Transchel* 696 (LE; mistakenly designated as type by V.I. Kreczeticz). PRIMORYE: Vladivostok, *N. Probatova* (VLAD). SAKHALIN: S Sakhalin, Makarov, Pugachevo, 80 m, 31 Aug 1968, *V. Vašák* (PR307311–307319). 38. JAPAN: Tokyo, Jul 1899, *T. Makino* (LE). KOREA: Ouen-san, *U. Faurie* 889 (P).

236. *Juncus salsuginosus* Turcz. ex E.Mey., in C.F. Ledebour, *Fl. Ross.* 4: 230 (1853)

Juncus bulbosus var. *salsuginosus* (E.Mey.) Regel, *Bull. Soc. Imp. Naturalistes Moscou* 41 (2): 272 (1868); *Juncus gerardii* var. *salsuginosus* (E.Mey.) Buchenau, *Bot. Jahrb. Syst.* 12: 189 (1890); *Juncus gerardii* subsp. *salsuginosus* (Turcz. ex E.Mey.) Printz, *Veg. Siber.-Mong. Front.* 177 (1921). T: [Russia, Transbaikalia] prope Kiachtam, *P.K.N.S. Turczaninow*; syn: LE; Transbaikalia, ad fl. Temnik, *P.K.N.S. Turczaninow*; syn: LE.

Juncus salsuginosus subsp. *tuvanicus* Kovt., *Nov. Syst. Pl. Vasc.* 24: 49 (vii 1987) & *Fl. Sibiri* 4: 33 (ix 1987); *Juncus salsuginosus* var. *tuvanicus* (Kovt.) Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 114 (1990). T: Russia, Tuva Republic, distr. Ovjurskii, Sagly, in valle fl. Mugur, 27 Jul 1976, *E.E. Korotkova & Rubtsova* 1852; holo: LE; iso: NS.

Illustrations: V.I. Kreczeticz & N.F. Goncharov, in V.L. Komarov, *Fl. SSSR* 3: 504, tab. 28 (1935); N.K. Kovtonyuk, in L.I. Malyshev & G.A. Peshkova, *Fl. Sibiri (Araceae – Orchidaceae)*, 34, tab. 6, fig. 1 (1987).

Map: N.K. Kovtonyuk, in L.I. Malyshev & G.A. Peshkova, *Fl. Sibiri 4 (Araceae – Orchidaceae)*: 160 map 26 (1987) [Siberia].

Perennials, (10–) 15–25 (–30) cm tall, loosely caespitose; rhizome creeping, ±long-noded, with brownish scales. Cataphylls absent or 1–2, greenish-brownish, to 3 cm long. Leaves basal and sub-basal, 1–3, ±canaliculate to flat, c. 4–15 cm long, 0.6–1.1 mm wide; sheaths greenish, with membranous margins; auricles subacute, scarious, to c. 0.5 mm long. Lower bract reduced, pale brownish, or leaf-like, to c. 2.5 cm long, ±equalling or exceeding inflorescence. Inflorescence depauperate, (1–) 3–7 (–12)-flowered, subcongested or with 1–2 branches to 1.5–2.0 cm long; flowers borne singly or in 2–5-flowered groups. Bracteoles broadly ovate, brownish-membranous, c. 1.5–2.0 mm long, subobtuse. Tepals ±unequal; outer tepals slightly longer, ±lanceolate, ±cucullate at apex, subacute, (3.2–) 3.5–4.0 (–4.5) mm long; inner tepals broadly lanceolate, with broad membranous margins, obtuse; central band pale brownish, on a dark castaneous to dark brown background. Stamens 6; anthers 1.2–1.7 mm long; filaments 0.3–0.4 mm long; style 1.0–1.3 mm long; stigmas c. 1.5–2.0 mm long, reddish, exerted. Capsule ±trilocular, usually triseptate in the middle part, oblong-ovoid, 3.5–4.5 mm long, subobtuse, mucronate, castaneous, ±equalling or slightly exceeding perianth. Seeds ovoid, c. 0.6–0.7 × 0.3–0.35 mm, pale brown, longitudinally striate, densely transversely reticulate; appendage 1, minute, to 0.1 mm.

From Middle Asia and NW China to S and E Siberia and Mongolia. 30: ALT, BRY, CTA, IRK, TVA. 32: KAZ, KGZ, TZK. 36: CHX. 37: MON. Subsaline and saline grasslands and banks of streams. Map 441.

30. ALTAI: Chuyskaya step[pe], bank of Chuya R., 23 Jun 1907, *V.I. Vereshchagin 248* (NS); Kosh-Agach, Sailyugem Range, 21 Aug 1985, *N.K. Kovtonyuk 1624* (PRA); Kosh-Agach, Kizilmani, c. 1000 m, 21 Jul 1972, *V. Vašák* (PR). BURYATIYA: Novo-Selenginskiy Distr., Ubukumckiy, 24 Jun 1901, *V.I. Lipskiy* (NS). RUSSIA, TUVA REPUBLIC: Telli, *S. Tikhmikhina & T. Polyakova 28* (NS). **37.** MONGOLIA: Khubsubul, Delger-Muren R. valley, *I.A. Gubanov 5435* (MW).

Small-flowered plants from Tuva have been recognized as a distinct subspecies. Further study is needed.

237. *Juncus soranthus* Schrenk, *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg* 2: 193 (1843)

Juncus bulbosus var. *soranthus* (Schrenk) Regel, *Bull. Soc. Imp. Naturalistes Moscou* 41 (2): 272 (1868); *Juncus gerardii* subsp. *soranthus* (Schrenk) K. Richt., *Pl. Eur.* 1: 177 (1890); *Juncus gerardii* var. *soranthus* (Schrenk) Trautv., *Bull. Soc. Imp. Naturalistes Moscou* 40 (2): 110 (1867). T: Soongaria, ad fl. Ters Akhan, Jun 1842, *A.G. Schrenk*; lecto: MANCH, fide S. Snogerup, in K.H. Rechinger, *Fl. Iranica* 75: 14 (1971); iso: LE.

Juncus compressus var. *coarctatus* E. Mey. ex Buchenau, *Bot. Jahrb. Syst.* 12: 186 (1890). T: [Russia] Sarepta, *A. Becker*; syn: LE, PR.

Illustration: V.I. Krechetovich & N.F. Goncharov, in V.L. Komarov, *Fl. SSSR* 3: 504, tab. 28 (1935).

Map: N.K. Kovtonyuk, in L.I. Malyshev & G.A. Peshkova, *Fl. Sibiri 4 (Araceae – Orchidaceae)*: 161, map 28 (1987) [Siberia].

Perennials (15–) 20–35 (–50) cm, loosely caespitose; rhizome horizontal, short-noded; stem often stout. Cataphylls 2–4; cauline leaves absent, or single, short; basal and sub-basal leaves 2–4, c. 5–25 cm long, often reaching inflorescence, 1–2 mm wide, ±flat; auricles broadly obtuse, 0.3–0.7 mm long, scarious. Lower bract leaf-like, ±equalling inflorescence or longer. Inflorescence 3–13 cm long, (15–) 30–60 (–100)-flowered, composite or decomposite, flowers mostly in 2–5-flowered heads. Bracteoles broadly ovate, scarious, 1.0–1.5 mm long, subobtuse. Tepals ±equal, ±oblong-ovate, 2.8–3.5 mm long, obtuse; central band broad, greenish or pale brown, bordered deep castaneous to blackish brown; margins membranous; outer tepals ±cucullate at apex. Stamens 6; anthers 1.5–2.2 mm long; filaments 0.3–0.5 mm long; style c. 0.7–0.9 mm long (including young mucro); stigmas c. 1.0–1.5 mm long. Capsule ±trilocular, broadly ellipsoid-subtrigonal, brown, 3.0–3.5 mm long, ±equalling perianth, obtuse, mucronate; mucro c. 0.2–0.4 mm long. Seeds obliquely ovoid, apiculate, c. 0.5–0.6 × c. 0.3 mm, brown, faintly c. 16-striate, minutely reticulate; appendages absent.

From SE Russia to Kazakhstan and Uzbekistan and SW Siberia, the Altai, NW China and adjacent Mongolia. 14: RUS. 30: ALT, TUV, WSB. 32: KAZ, UZB. 34: AFG. 36: CHX. 37: MON. Saline, sandy habitats, usually in temporarily wet depressions, subsaline shores. Map 442.

14. SOUTH EUROPEAN RUSSIA: Sarepta, *A. Becker* (PR). **30.** RUSSIA, TUVA REPUBLIC: the West Sayan, Saygara, *M. Lomonosova, V. Pohitsina & D. Shaulo 2604* (NS). WEST SIBERIA: Khakassia, Shirinskiy Distr., Lake Itkul, 15 Aug 1948, *A.K. Skvortsov* (NS). **32.** KAZAKHSTAN: Karaganda, 50 km S of Mointi, *N.B. Pavlov 385* (AA). **36.** XINJIANG: Dzhungaria, 9 Jul 1957, *A.A. Yunatov, Li-Shi-in & Yuan I-fen 636* (LE).

238. *Juncus orchonicus* Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 90(5): 110 (1985)

T: Mongolia, ditio Selenginskij, Schamar, in valle fl. Orchon, 15 Jul 1979, *Z.G. Buevich 66/5432*; holo: MW; iso: MW, LE.

Illustration: V.S. Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 90(5): 111 (1985).

Perennials, c. (30–) 40–50 (–60) cm tall, loosely caespitose; rhizome creeping, dark brown, c. 1.0–1.3 mm in diam.; internodes short; stem slightly compressed. Cataphylls 0–2; basal leaves 1–2; cauline leaves 2–3, ±flat to canaliculate, to c. 0.8–1.0 mm wide; sheaths with broad scarious margins; auricles scarious, broadly obtuse, to 0.4–0.5 mm long. Lower bract filiform, leaf-like, to c. 4 cm long, often ±equalling inflorescence. Inflorescence relatively dense, 2–5 cm long, decomposite, with c. 2–6 main branches, each with several dense unilateral cymes, c. 30–60-flowered; flowers borne ±singly. Bracteoles broadly ovate, ±membranous, 0.4–0.8 mm long. Tepals ±equal, ±ovate, obtuse-rounded, concave, c. 1.6–2.0 (–2.2) mm long; central band prominent, greenish to pale castaneous-brown, bordered castaneous; margins membranous to scarious, broad. Stamens 6; anthers 0.4–0.6 mm

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long; filaments 0.5–0.7 mm long; style c. 0.2 mm long; stigmas c. 1 mm long. Capsule ±trilocular, oblong-ovoid, obtuse or with a truncate top, c. 2.1–2.5 × 1.3–1.6 mm, pale brownish-greenish, later light castaneous-brown, shiny, exceeding perianth. Seeds ±ovoid, apiculate, c. 0.35–0.4 × c. 0.2–0.25 mm, c. 11–13-striate, densely transversally reticulate; appendages absent.

Probably widely distributed in Mongolia and N and NE China. 36: CHI, CHM, CHN. 37: MON. Temporarily wet subsaline meadows. Map 443.

36. CHINA NORTH-CENTRAL: Shanxi, Chieh-hsiuh, c. 800 m, *H. Smith 5763* (UPS). 37. MONGOLIA: Selenga Aimak, 12 km NW of Shamar Somon, 18 Aug 1979, *Z.G. Buevich 230/5433* (LE, MW).

In many respects similar to *Juncus compressus*, and may represent a southeastern, small-flowered race of that species. It requires further study.

239. *Juncus gerardii* Loisel., *J. Bot.* [*Desvaux*] 2: 284 (1809)

Juncus bulbosus var. *gerardii* (Loisel.) A.Gray, *Man.*, 2nd edn, 483 (1856); *Tenageia gerardii* (Loisel.) Fourr., *Ann. Soc. Linn. Lyon*, sér. 2, 17: 172 (1869); *Juncus compressus* subsp. *gerardii* (Loisel.) Hartm., *Svensk och Norsk Exc.-Fl.* 48 (1846). T: [France] Provence, *Gerard*; syn: AV, *n.v.*; Barrelier, *lc.* 747, f. 2; syn.

Juncus bulbosus var. *salinus* Schur, *Enum. Pl. Transsilv.* 687 (1866). T: [Romania, several syntypes cited] *n.v.*

Juncus gerardii var. *ubsunuricus* Novikov, *Novosti Sist. Vyssh. Rast.* 24: 64 (1987). T: Mongolia, oras lacus Ubsu-nur, Dabst, 25 km ad austro-orientem, ad deltum fluminis Torgalig, 27 Aug 1978, *I.A. Gubanov 4867*; holo: MW; iso: LE.

Maps: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 82 (1965) [Probably including also *J. persicus*]; E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 91, map 181 (1986) [Probably including also *J. persicus*].

Perennials, (5–) 15–45 (–80) cm tall, loosely caespitose; rhizome creeping; internodes of variable length. Cataphylls 0–3; basal and sub-basal leaves 1–4 (–5); cauline leaves 0–2, ±flat, somewhat thick, (0.5–) 0.8–2.0 (–2.5) mm wide; sheaths ±green; margins membranous; auricles scarious, obtuse, c. 0.4–0.7 mm long. Lower bract leaf-like, usually 2–10 cm long, shorter than inflorescence. Inflorescence composite to decomposite, with (1–) 2–4 (–6) main branches, c. (1–) 5–10 (–15) cm long, 5–120-flowered, of several loose unilateral cymes. Bracteoles ovate, obtuse, c. 1.0–1.5 mm long, usually membranous and suffused pale castaneous to dark brown. Tepals subequal, 2.5–3.8 mm long, obtuse; outer tepals rarely minutely mucronate; central band green to dark castaneous-brown, bordered dark castaneous-brown; margins broad, membranous or scarious or dark brownish. Stamens 6; anthers 1.1–2.2 mm long, 2–4 (–5) times as long as filaments; style c. (0.5–) 0.7–1.0 mm long; stigmas c. 1.5–2.0 mm long. Capsule ±trilocular, ovoid to broadly ellipsoid, c. 2.5–3.8 mm long, ±obtuse, castaneous to dark brown, rarely paler, subequalling to slightly exceeding perianth. Seeds ±ellipsoid, apiculate, c. 0.5–0.7 × 0.25–0.3 mm, brown, c. 11–16-striate, transversely reticulate.

Widely distributed in Europe, N Africa, N and C Asia and North America. Confined to sites with higher salinity. Closely related to *Juncus persicus s. lat.* and may be conspecific with it. Three subspecies are recognized, with intermediates known between the type subspecies and the other two.

- | | | |
|----|--|---------------------------------------|
| 1 | Plants with at least one well-developed cauline leaf | |
| 2 | Uppermost leaf blade at least 3 times as long as its sheath | 239a. subsp. gerardii |
| 2: | Uppermost leaf blade less than 3 times as long as its sheath | 239b. subsp. atrofuscus |
| 1: | Most stems without cauline leaves | 239c. subsp. montanus |

239a. *Juncus gerardii* Loisel. subsp. *gerardii*

Juncus consanguineus Ziz, in W.D.J.Koch & J.B.Ziz, *Cat. Pl.* 8 (1814). T: [Germany] Palatinatus, *J.B.Ziz*; syn: *n.v.*

Juncus coenosus Bicheno, *Trans. Linn. Soc. London* 12: 309 (1817); *Juncus gramineus* var. *coenosus* (Bicheno) Dumort., *Fl. Belg.* 142 (1827), *nom. inval.* T: [Britain] in salsis copiose; syn: *n.v.*

Juncus bulbosus var. *lychnocarpus* Wallr., *Sched. Crit.* 1: 146 (1822). T: not designated.

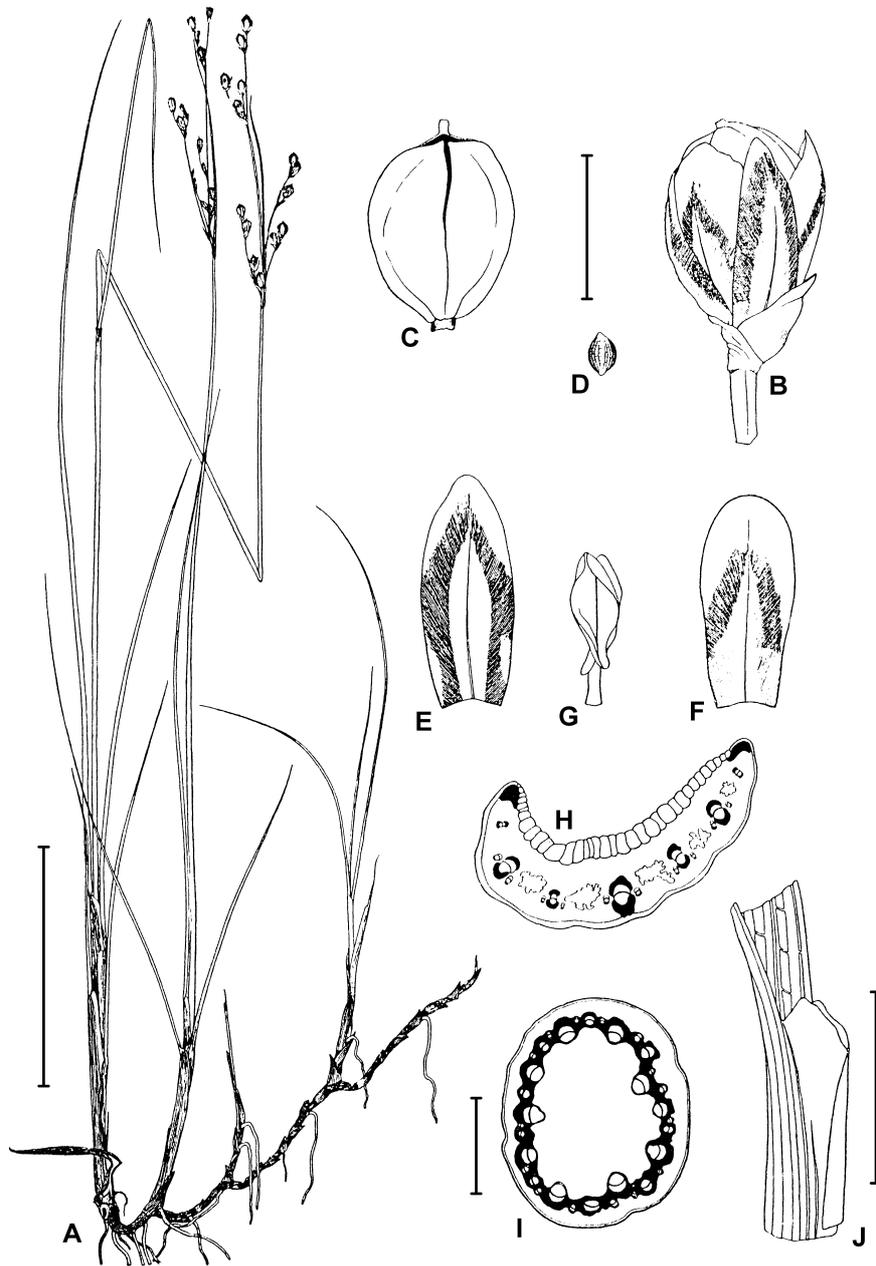


Figure 130. *Juncus gerardii* subsp. *gerardii*. **A**, habit; **B**, perianth with capsule; **C**, capsule; **D**, seed; **E**, outer tepal; **F**, inner tepal; **G**, stamen; **H**, leaf blade T.S.; **I**, stem T.S.; **J**, distal part of sheath with auricles (**A–I**, F.F.Schulz, KRA). Scale bars: **A** = 5 cm; **B**, **C–G** = 2 mm; **H**, **I** = 0.5 mm; **J** = 5 mm. Drawn by T.Szynal. Reproduced with permission from T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2/2: 128 (1931).

JUNCACEAE (*Juncus*)

- Juncus bulbosus* var. *phaeocarpus* Wallr., *Sched. Crit.* 1: 146 (1822). T: not designated.
- Juncus attenuatus* Viv., *Fl. Cors. Prodr.* 5 (1824). T: Île de Cavalli, *D.Viviani*; syn: G, *n.v.*, K.
- Juncus nitidiflorus* Dufour, *Ann. Sci. Nat. Bot.* 5: 86 (1825). T: [France] Bretagne, *J.B.G.M.Bory de Saint-Vincent*; syn: P; Corse, *J.F.Soleirol*; syn: *n.v.*; [Germany] Landshut, *J.A.Schultes*; syn: *n.v.*
- Juncus floridanus* Rafin., *Autik. Bot.* 194 (1840). T: [USA] South Florida, *C.S.Rafinesque*; holo: [seen by G.Engelmann in herb. Durand, now not extant].
- Juncus compressus* var. *ellipsoideus* Neill., *Fl. Nieder-Oesterr.* 149 (1859). T: [Austria] Neusiedler-See, *F.M.J.Welwitsch*; syn: *n.v.*; Langenlois, *Kalbruner*; syn: *n.v.*; syntype of *J. gerardii*.
- Juncus elatior* Lange, *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 1860: 67 (1860) [& in M. Willkomm & J. Lange, *Prodr. Fl. Hispan.* 1: 180 (1861)]; *Juncus compressus* subsp. *elatior* (Lange) Nyman, *Consp. Fl. Eur.* 749 (1882). T: *J. salinus* Lange exs.n. 145 vix Dr.[=M.C.Durieu]; syn: MA; *Expl. Alger.* 43, f. 2; syn: el Burgo Galleciae, *J.Lange*; syn: C. [see also M.C.Fernández-Carvajal, *Anales Jard. Bot. Madrid* 39: 104, fig. 32 (1982)].
- Juncus gerardii* var. *sparsiflorus* H.Mort. ex Lange, *Bot. Tidsskr.* 3: 79 (1869), *n.v.* T: *n.v.*
- Juncus lesbiacus* C.Candargy, *Bull. Soc. Bot. France* 44: 180 (1897). T: [Greece] Lesvos, Charamis, *C.-A.Candargy*; syn: *n.v.* [interpretation not safe].
- Juncus gerardii* l.b. [unranked] *pallidus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 432 (1904). T: not designated.
- Juncus gerardii* 2. [unranked] *maximus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 432 (1904). T: [Germany, Hessen] Nassau, *Soden*; syn: *n.v.*
- Juncus gerardii* b. [unranked] *chaucorum* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 432 (1904). T: [Germany] Norderney [Is.]; syn: *n.v.*; Sylt [Is.]; syn: *n.v.*
- Juncus gerardii* var. *pedicellatus* Fernald, *Rhodora* 22: 76 (1920). T: USA, Maine [Knox Co.], Matinicus, Sep 1908, *C.A.E.Long* 38; holo: NEBC.
- Juncus fucensis* H.St.John, *Rep. Prov. Mus. Nat. Hist.* 1927: 14 (1927) [Reprinted as: *Contrib. Washington St. College Bot. Dep.* 10: 1, 1928]. T: Washington, Jefferson Co., Port Discovery, 13 Sep 1921, *H.St.John* 5858; holo: WS, photo KANU, PRA.

Illustrations: C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 198 (1969); T.Szynal & J. Małdalski, *Atlas Fl. Pol.* 2(2): 128 (1931); Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 438, fig. 62 (1971); P.M.Catling & K.W.Spicer, *Can. J. Bot.* 65: 755, fig. 7 (1987).

Plants usually 10–50 (–80) cm tall. Cauline leaves 1–2, usually 5–25 (–40) cm long, (0.4–) 0.7–1.7 (–2.5) mm wide, usually 3–7× as long as their sheaths. Lower bracts usually 2–10 cm long. Inflorescence 2–10 (–15) cm long, c. 10–120-flowered. Tepals with central band ±green to castaneous, bordered dark castaneous-brown; margins broad, brownish-membranous. Anthers c. 1.2–1.7 mm long; filaments c. 0.4–0.5 mm long. Capsule c. 2.2–3.5 mm long. 2n = 84, *fide* S.Snogerup, *Bot. Not.* 116: 148 (1963). Fig. 130.

Widely distributed in Europe, North America, W and C Asia, where its E limit remains unclear, introduced in Australia (Victoria), New Zealand and Greenland. 10: DEN, FIN, GRB, IRE, NOR, SWE. 11: AUT, BGM, CZE, GER, HUN, NET, POL. 12: COR, FRA, POR, SAR, SPA. 13: ALB, BUL, GRC, ITA, ROM, SIC, TUE, YUC. 14: BLT, KRY, RUC, RUE, RUN, RUS, RUW, UKR. 20: ALG, MOR. 30: ALT, IRK, KRA, TVA, WSB. 32: KAZ, KGZ, TKM, TZK, UZB. 33: NCS, TCS. 34: ?AFG, EAI, ?IRN, TUR. 36: CHX. 37: MON. 50: vic. 51: nzn, nzs. 70: gnl. 71: BRC, MAN. 72: NBR, NFL, NSC, ONT, PEI, QUE. 73: COL, MNT, ORE, WAS. 74: ILL, KAN, MIN, MSO, NDA, WIS. 75: CNT, INI, MAI, MAS, MIC, NWH, NWJ, NWH, OHI, PEN, RHO, VER. 76: UTA. 78: DEL, KTY, MRY, VRG. Wet subsaline and saline habitats, brackish coastal marshes, mineral rich damp grasslands, sometimes open, anthropogenic habitats. Map 444.

10. FINLAND: Nauvo, Seili Is., Kirkkolahti, 19 Jul 1982, *T.Lempiäinen & Y.Mäkinen* (W). GREAT BRITAIN: England, Sussex, Seaford, *Hunt 2106* (LD); W Gloucester, Avon Gorge, *N.Y.Sandwith 5492* (K). 11. GERMANY: Dürkheim, c. 130 m, *A.Kneucker [Cyper. Junc. Exs.] 78* (PR, PRA). 13. GREECE: Lesvos, Kolpos Joras, *K.H.Rechinger & K.Rechinger 5660* (K). 14. RUSSIA SOUTH: Astrakhan, Ergeni, 23 May 1950, *A.B.Nikolaev* (MW). 34. TURKEY: Bursa, 4 km S of Uluabat, *F.Sorger 77–8–21* (W). 75. NORTHEASTERN USA: Connecticut, New Haven Co., Orange, 20 Jun 1899, *C.H.Bissell* (IND, NY, VT); Massachusetts, Cambridge, Charles R., *H.Mann [G.Engelmann, Herb. Junc. Bor. Amer. Norm.] 27* (AAU, MO, PR); Massachusetts, Boston, Back Bay, *F.F.Forbes 928* (PR); New York, Nassau Co., Long Beach, *F.W.Pennell 8315* (NY).

Plants from S Siberia and adjacent territories are in many respects intermediate between the type subspecies and subsp. *atrofuscus* [e.g., Krasnoyarsk Region, Angara R., Kezhma, 24 Jul 1981, N.K.Kovtonyuk 247 (NS, PRA)]. In subsaline habitats formerly used for forage (E USA, Germany).

239b. *Juncus gerardii* subsp. *atrofuscus* (Rupr.) Printz, *Veg. Sib.-Mong. Front.* 177 (1921)

Juncus atrofuscus Rupr., *Beitr. Pflanzenk. Russ. Reiches* 2: 59 (1845); *Juncus gerardii* var. *atrofuscus* (Rupr.) Trautv., *Bull. Soc. Imp. Naturalistes Moscou* 40 (2): 110 (1867); *Juncus bulbosus* var. *atrofuscus* (Rupr.) Regel, *Bull. Soc. Imp. Naturalistes Moscou* 41 (4): 172 (1868). T: [Russia, Archangelsk District] in sinu Indega, *F.J.Ruprecht*; syn: LE, *n.v.*; [Russia] ad prom. Mikulkin, *F.J.Ruprecht*; syn: LE, *n.v.*

Juncus bottnicus Wahlenb., *Fl. Lapp.* 32 (1812). T: [Norway] Norska Nordland vid Lyngenfjord, 7 Jul 1800, *G.Wahlenberg*; lecto: UPS, *fide* R.Moberg & Ö.Nilsson, *Nordic J. Bot.* 11: 293 (1991).

Illustrations: V.I.Krechetovich & N.F.Goncharov, in V.L.Komarov, *Fl. SSSR* 3: 504, tab. 28 (1935); L.Hämet-Ahti, *Ann. Bot. Fenn.* 3: 391, fig. 1, 292, fig. 2 (1966); Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 439, fig. 63 (1971).

Plants usually 30–50 cm tall. Cauline leaves 1–2, usually 3–15 cm long, c. 1.0–2.0 mm wide; uppermost leaves usually less than 3× as long as their sheaths. Lower bract usually to 5 cm long, shorter than inflorescence. Inflorescence to 7 cm long, 5–20-flowered, with some flowers in pairs. Tepals with central band brown to castaneous, bordered dark castaneous-brown; margins membranous-brown. Anthers c. 1.5–2.2 mm long; filaments 0.4–0.6 mm long. Capsule to 3.5 mm long.

Northernmost coasts of Scandinavia and European Russia; the reported occurrence in W Siberia and mountains of C Asia probably refers to plants seemingly intermediate between the type subspecies and subsp. *atrofuscus*. The eastern and southeastern limit imperfectly known: see the type subspecies for a note. 10: FIN, NOR. 14: RUN. Mostly coastal saline habitats, marshes. Map 445.

10. NORWAY: Troms, Vollan, 1955, *T.Ahti* (H); Nordkjosen, 1934, *Mejland* (O); Finnmark, Alta, 1884, *R.E.Fridtz* (O). **14.** NORTH EUROPEAN RUSSIA: Murmansk District, Petsamo [Pechenga], Pummanki, Haminanperä, 1919, *A.K.Cajander* (H); Arkhargelsk, Solovetsk Is., 1882, *C.A.Knabe* (H); Karelia, Poyakonda, 11 Aug 1971, *V.Vekhov 1* (MW).

239c. *Juncus gerardii* subsp. *montanus* Snogerup, *Bot. Not.* 131: 185 (1978).

T: Spain, Prov. Teruel, Sierra de Camarena, 1600 m, Jul 1892, *E.Reverchon 787*; holotype: LD; isotype: LD, W.

Juncus gerardii var. *crisoflei* Litard. & Maire, *Pl. Maroc. Nov.* 172 (1930). T: Morocco, Moyen Atlas, Enjil, 1600 m, 13 Aug 1924, *R.Maire*; syn: MPU *n.v.*, P

Illustration: S.Snogerup, *Bot. Not.* 131: 186, fig. 1 (1978).

Plants usually (5–) 15–30 cm tall. Sub-basal leaves 3–6, 5–10 cm long, 0.5–1.5 mm wide; cauline leaves not developed or rarely single, short. Lower bract to 5 cm long, shorter than inflorescence. Inflorescence usually 1–5 cm long, (1–) 5–20 (–30)-flowered, terminal unilateral cymes dense. Tepals usually deep castaneous-brown with central band greenish. Anthers c. 1.3–2.2 mm long; filaments 0.3–0.5 mm long. Capsule 3–4 mm long.

Known from Spain and N Morocco. 12: SPA. 20: MOR. Temporarily wet, mineral rich sites in the mountains. Map 446.

20. MOROCCO: Bekrit, Senoual Valley, 1950 m, 5 Aug 1924, *R.Maire* (P); Bekrit, Senoual Valley, 1800 m, 18 Jun 1924, *E.Jahandiez 649* (E, LD).

There is another relatively distinct form similar to *J. gerardii*. It is characterized by 3.5–4.5 mm long and ±acute outer tepals, presence of 1–2 cauline, relatively broad leaves, anthers 4–5 times as long as filaments, and capsule shorter than perianth. It was described as *Juncus fominii* Zoz (*Sbirn. Pric. Pamj. Akad. O. B. Fomina* 51, fig. 1, 2 (1938). Type: Ukraine, Dnepropetrovsk, Sywasch, insula Kujuk-Tuk, in Bolshoi Pod, 26 Jun 1935, *A.Krivosheia*; holotype: CWB, *n.v.*) and was accepted in several publications. It requires further attention and study, and may represent a taxon of at least subspecific rank.

JUNCACEAE (*Juncus*)

240. *Juncus heptopotamicus* V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 628 (1935)

Juncus epimetrocarpus V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 504 (1935) [in adnot., probably to be considered as an alternative name]. T: Soongoria, Dsharkent, Kara-Saz, 8 Jul 1910, *A.Michelson* 2123; syn: LE; Soongoria, Dsharkent, Arassan, 22 Jun 1910, *A.Michelson* 1428; syn: LE.

Juncus bulbosus var. *nigricans* Regel & Herder, *Bull. Soc. Imp. Naturalistes Moscou* 41 (2): 274 (1868). T: *n.v.*

Illustrations: V.I.Krechetovich & N.F.Goncharov, in V.L.Komarov, *Fl. SSSR* 3: 504, tab. 28 (1935), as *J. epimetrocarpus*; Wu Kuofang, *Fl. R. P. Sinicae* 13(3): 164, tab. 36 (1997).

Perennials, c. 10–30 (–40) cm tall, loosely caespitose, pale greyish-green; rhizome long, creeping; internodes of variable length, sometimes abbreviated; stem stiff, erect, terete. Cataphylls 0–2, brownish, usually 2–5 cm long; basal leaves 2–4 (–6), reaching $\frac{1}{3}$ – $\frac{2}{3}$ of stem, c. 1.0–1.3 (–2.0) mm wide, \pm flat to subcanaliculate; cauline leaves 0–1, inserted in lower half of stem; auricles obtuse, short c. 0.3–0.8 mm long, scarious to brownish-scarious. Lower bract leaf-like, c. 2–3 (–5) cm long, usually exceeding inflorescence. Inflorescence \pm decomposited, subcontracted, to c. 2–3 cm long, with 2–5 short main branches, c. 10–35-flowered; flowers in loose 2–5 (–7)-flowered clusters. Bracteoles ovate, obtuse, c. 1.5–1.8 mm long, castaneous. Tepals \pm equal, oblong-ovate, obtuse-rounded, c. 3.0–3.5 mm long; central band greenish, later stramineous-brown, bordered dark castaneous-brown; margins deep castaneous, with membranous margin almost absent. Stamens 6; anthers c. 1.3–1.6 mm long; filaments 0.4–0.5 mm long; style 0.8–1.0 mm long; stigmas to 2 mm long. Capsule trilobular, oblong-ovoid, gradually narrowing in a narrow truncate apex (acute in unripe capsules), c. 3.5–4.5 mm long, deep castaneous-brown, much exceeding perianth. Seeds ovoid-ellipsoid, c. 0.5 mm long, reticulate; appendages absent.

Distributed in Middle Asia and adjacent regions of China. 32: KAZ, KGZ, TZK, UZB. 34: AFG. 36: CHQ, CHX. Along streams, in moderately wet meadows and slopes, to 2500 m. Map 447.

32. KAZAKHSTAN: Dzhungarskiy Alatau, Matay Mtns, 17 Jun 1956, *V.Goloskokov* (AA); Kegensk, Saryzhaz, 13 Aug 1932, *S.J.Lipshitz* (MW); Taldy-Kurgansk, 6 Jun 1928, *S.J.Lipshitz* 166 (MW). KIRGIZSTAN: Issyk-kul Lake, Tamchi, 25 Aug 1966, *V.Pavlov* 196 (MW). TADZHIKISTAN: Pamiro-Alai, Turkenstanskiy Khrebet, Guralash reservoir, 9 Jul 1935, *B.Zakrgevskiy* (TAK). 36. XINJIANG: Wei du Kala, 10 Jun 1956, *Anonymous* 10432 (KUN).

241. *Juncus taonanensis* Satake & Kitag., *Bot. Mag. (Tokyo)* 48 (no. 573): 610 (1934)

T: China, Manshuria, Prov. Feng-T'ien, Tao-nan, 27 Jul 1931, *M.Kitagawa*; holo: TI.

Illustrations: Kitagawa, *Bot. Mag. (Tokyo)* 48 (no. 573): 610, fig. 17 (1934); Ma Yu-chuan, *Fl. Intramongol.* 8: 156, fig. 68 (1985); Wu Kuofang, *Fl. R. P. Sinicae* 13(3): 173, tab. 39 (1997).

Perennials, c. 5–21 cm tall, loosely caespitose; rhizome creeping; internodes short. Basal leaves 3–4; cauline leaves 1–2, sometimes exceeding stem, to c. 20 cm long, flat, c. 1 mm wide; sheaths with scarious margins; auricles scarious, broadly obtuse, to c. 1 mm long. Lower bract narrow, leaf-like, 2–7 cm long, \pm equalling inflorescence. Inflorescence loose, decomposited, (3–) 5–15 (–26)-flowered, with 1–3 main branches with loose unilateral cymes; flowers borne singly. Bracteoles scarious, c. 1.8–2.5 mm long, ovate, obtuse. Tepals \pm equal, oblong-lanceolate, c. 3.1–4.0 mm long; apex acute to obtusely acute; central band prominent, greenish to stramineous; margins broad, scarious. Stamens 3; anthers 0.5–0.8 mm long; filaments 1.2–1.5 mm long; style to c. 0.3 mm long; stigmas to 1 mm long, brownish red. Capsule oblong-ovoid, to c. 3 mm long, obtuse, shiny, brownish, shorter than perianth. Seeds \pm ellipsoid, c. 0.5 \times 0.2 mm, deep castaneous, reticulate; appendages absent.

Reported from Inner Mongolia, Manchuria and northcentral China, imperfectly known. 36: CHI, CHM, CHN. Along streams, shores of ponds, grassy marshes. Map 448.

No specimens, apart from the type, seen for this study.

242. *Juncus persicus* Boiss., *Diagn. Pl. Orient.*, ser. 1, 7: 101 (1846)

Juncus gerardii 2. [unranked] *persicus* (Boiss.) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 433 (1904); *Juncus gerardii* subsp. *persicus* (Boiss.) Snogerup, in K.H.Rechinger, *Fl. Iranica* 75: 14 (1971). T: [Iran] Kakun M Kuh-e Dinar, *C.G.T.Kotschy* 683; syn: CGE, E, BM, G, PR.

Perennials, loosely caespitose; rhizome creeping; internodes c. 1–3 cm. Cataphylls 2–3, well developed; intravaginal shoots sometimes developed; basal and sub-basal leaves 3–6; cauline leaves absent, or rarely a single short leaf developed; auricles short, scarios, obtuse to truncate. Lower bract leaf-like, usually shorter than inflorescence, with short acute to subobtuse auricles. Bracteoles ovate, obtuse, to c. 1.5 mm long, usually castaneous or with scarios upper part. Tepals subequal. Outer tepals often slightly longer, oblong-ovoid, subacute, with a distinct subterminal dorsal mucro c. 0.1–0.3 mm long, distinctly cucullate; central band usually greenish, bordered castaneous to very dark castaneous-brown; margins narrow to broad, membranous to membranous-brownish. Inner tepals ±ovate, broadly bordered membranous. Stamens 6; anthers c. 1.2–2.0 mm long; filaments c. 0.3–0.4 mm long, $\frac{1}{3}$ – $\frac{1}{6}$ length of anthers. Stigmas to c. 2 mm long. Capsule broadly ellipsoid-trigonous to ovoid-subtrigonous; apex obtuse to slightly retuse, castaneous-brown; mucro 0.2–0.5 mm long, ±equalling perianth. Seeds obliquely ovoid, longitudinally c. 16-striate, reticulate, brown; appendages absent.

A species widely distributed from European Turkey and the Near East to Afghanistan, Middle Asia, S Siberia and N China. It usually grows in subsaline grasslands, wet or temporarily wet meadows, and along streams. Two subspecies are recognized but their distribution is not known in detail.

Stem usually less than 20 cm long; inflorescence usually subcontracted, to 2 cm long; subterminal mucro c. 0.1 mm long; seeds 0.4–0.6 mm long

242a. subsp. **persicus**

Stem usually 20–50 cm long; inflorescence loose, c. 3–10 cm long; subterminal mucro c. 0.1–0.3 mm long; seed 0.6–0.75 mm long

242b. subsp. **libanoticus**

242a. *Juncus persicus* Boiss. subsp. *persicus*

Stem 3–15 (–25) cm long. Basal leaves 2–10 (–15) cm long, ±flat with raised margins, the narrowest leaves subterete, 0.4–1.2 mm wide, often reaching inflorescence. Auricles 0.3–0.4 mm long. Inflorescence subcontracted, usually 0.5–2 cm long, 3–16 (–30)-flowered; flowers borne singly and in 2–3-flowered clusters. Tepals c. 2.5–3.5 mm long; dorsal subterminal mucro c. 0.1 mm long. Style 0.4–0.8 mm long. Capsule 2.3–3.0 mm long. Seeds 0.4–0.6 mm long.

Distribution not completely known. Recorded with certainty from Iran, Iraq and Afghanistan. 34: AFG, IRN, IRQ. Subsalsine grasslands. Map 449.

34. IRAN: Kuh-e Dinar, *C.G.T.Kotschy 612* (PR, W); Khorasan, between Mashhad and Torbat-e Heydariyeh, *K.H.Rechinger 1549* (W). AFGHANISTAN: 35 km NW of Urgun, *K.H.Rechinger 35927* (W).

242b. *Juncus persicus* subsp. *libanoticus* (Thiébaud) Novikov & Snogerup, in S.Snogerup, P.F.Zika & J.Kirschner, *Preslia* 74: 252 (2002)

Juncus libanoticus Thiébaud, *Bull. Soc. Bot. France* 95: 20 (1948); *Juncus gerardii* subsp. *libanoticus* (Thiébaud) Snogerup, in K.H.Rechinger, *Fl. Iranica* 75: 13 (1971). T: [Lebanon] *Bekoa*; syn: *n.v.*; [Turkey] *marais d'Amik*; syn: *n.v.*; [Lebanon] *de Beskinta à Khan Sannin*; syn: *n.v.*

Juncus bulbosus var. *acutiflorus* Regel, *Bull. Soc. Imp. Naturalistes Moscou* 4: 272 (1868); *Juncus gerardii* var. *acutiflorus* (Regel [ex?]) Buchenau, *Bot. Jahrb. Syst.* 12: 189 (1890). T: Tianshan, *Semenow*; syn: LE; Gobi, *G.N.Potanin*; syn: LE.

Juncus vvedenskii V.I.Krecz., *Bull. Univ. As. Centr.* 21: 176 (1935); *Juncus persicus* subsp. *vvedenskii* (V.I.Krecz.) Novikov, *Nov. Syst. Pl. Vasc.* 15: 85 (1979); *Juncus gerardii* subsp. *vvedenskii* (V.I.Krecz.) Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 114 (1990). T: Uzbekistania, Bajssun, 17 May 1930, *S.Lepeschkin*; holotype: TAK.

Juncus subcompressus Zakirov & Novopokr., *Bot. Zhurn.* 36(1): 77 (1951); *Juncus compressus* var. *subcompressus* (Zakirov & Novopokr.) Novikov, *Nov. Sist. Vyssh. Rast.* 15: 84 (1979). T: Tadzhikistan, Verchniy Zeravshan, Makshevati-darya R., Sorokan-sai, 3200 m, 28 Jun 1940, *K.Z.Zakirov, M.G.Popov & P.Sergeeva*; holotype: LE.

Juncus manasiensis K.F.Wu, *Acta Phytotax. Sin.* 32: 445 (1994). T: China, Xinjiang, Manas, Bei-Shang Zhuang, 9 Jul 1957, *Ke-chien Kuan 1622*; holotype: XJBI.

Illustration: N.K.Kovtonyuk, in L.I.Malyshev & G.A.Peshkova, *Fl. Sibiri* (Araceae – Orchidaceae), 34, tab. 6, fig. 2 (1987); B.Tutel & I.Delice, *Biol. Dergisi* 28: 91, fig. 1 (1978).

JUNCACEAE (*Juncus*)

Stem (10–) 25–50 cm tall. Basal leaves 2–25 cm long, flat, 0.5–2.0 mm wide, reaching inflorescence or ±shorter. Auricles very short, c. 0.1 mm long. Inflorescence loose, c. 3–10 cm long, c. 10–70-flowered; flowers borne singly, rarely some in clusters. Tepals 2.5–4.5 mm long; dorsal subterminal mucro c. 0.3 mm long. Style 0.8–1.2 mm long. Capsule 2.5–4.0 mm long. Seeds c. 0.6–0.75 mm long.

Widely distributed from European Turkey, Crimea, Anatolia and the Near East to Middle Asia, S Siberia, Mongolia and China. 13: TUE. 14: KRY. 30: ALT, BRY, CTA, IRK, KRA, TVA, WSB. 32: KAZ, KIR, TAD, UZB. 33: TCS. 34: AFG, IRN, IRQ, LBS, TUR. 36: CHX. 37: MON. Damp meadows, subsaline grasslands. Map 450.

30. KRASNOYARSK: Khakassia, Taegnoe, *G.Pavlova & G.Bezlepikina 8873* (NS). WEST SIBERIA: Kemerovo, Kuzneckiy Raion, Krasnoe, *N.K.Kovtonyuk 56* (NS, PRA). 33. AZERBAJDZAN: Lenkoran, Sari Is., *Kiesevitzy* (PR). 34. AFGHANISTAN: *W.Griffith 381, 382* (BM); Kataghan, Sarab, *D.Podlech 11155* (M). IRAN: Kandavan, 2500 m, *P.Wendelbo 2178* (O); Khorasan, Hazar-Masjed Mtns, 1200–1600 m, *K.H.Rechinger 5160* (W). TURKEY: Kars, Aralik, 810 m, *P.H.Davis 43645* (E). 37. MONGOLIA: Ubsunur, Achei-nur Lake, *I.A.Gubanov 9047* (MW).

Some doubts remain about the position of *J. fominii*. The detailed protologue points to *J. persicus*, most probably to subsp. *libanoticus*. Only the leafy stem suggests it might be something else, perhaps a hybrid between *J. gerardii* and *J. persicus*. It also may represent a separate taxon but further study is needed.

243. *Juncus jaxarticus* V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 628 (1935)

Juncus compressus subsp. *jaxarticus* (V.I.Krecz. & Gontsch.) Jafri, in S.I.Ali & M.Qaiser (eds), *Fl. Pakist.* 138: 14 (1981). T: [Uzbekistan] Fergana, Marghelan, Chan-aryk, 14 May 1913, *N.A.Dessiatowa 544*; holo: LE.

Illustration: V.I.Krechetovich & N.F.Goncharov, in V.L.Komarov, *Fl. SSSR* 3: 504, tab. 28 (1935).

Perennials, c. 30–60 cm tall, loosely caespitose to caespitose, grey-green; rhizome horizontal; internodes often abbreviated and stems tufted; stems rigid. Cataphylls 1–2, often persistent or as filamentous remains; basal leaves 3–5, to 30 cm long, flat, usually 1.5–3 mm wide; cauline leaves 1–2, to c. 12 cm long; sheaths ±loose, greenish-stramineous; margins scarious; auricles scarious, short. Lower bract leaf-like, c. 3–6 cm long, equalling or exceeding inflorescence. Inflorescence loose, c. 3–4 cm long, with 2–5 main branches, c. 10–30-flowered, with terminal unilateral cymes abbreviated, forming loose 2–3-flowered clusters. Bracteoles scarious or pale stramineous, subacute, c. 1.5 mm long. Tepals subequal, lanceolate to broadly lanceolate, c. 3.5–4.0 mm long, acute; central band pale greyish green, later stramineous and sometimes distally bordered castaneous; margins broad, scarious. Stamens 6; anthers 1.3–1.7 mm long; filaments c. 0.4–0.5 mm long. Capsule oblong-ovoid, c. 3.5 mm long, ±obtuse, distinctly mucronate, castaneous, usually subequalling perianth. Seeds ±ovoid, c. 0.5 mm long, castaneous; appendages absent.

Endemic in Middle Asia. Also reported from Afghanistan and Pakistan but material not seen. 32: KAZ, KIR, TZK, UZB. 34: AFG. 40: PAK. Saline and subsaline grasslands, temporarily wet meadows. Map 451.

32. KAZAKHSTAN: Dzhabul Region, Shü R., Kara-tal, 17 Jun 1961, *A.A.Yunatov 9337* (LE); Syr-Darya Karatau, between Mt Aktau and the valley of Tamdy R., 7 Jul 1936, *Chilikina* (MW); Syr-Darya Karatau, Kur-Shaban, 2 Jul 1936, *Chilikina* (MW); Karsakpay, Sary-su R., 24 Jun 1929, *N.V.Pavlov 229* (LE); Chu-Iliyskie Mtns, Khantau, Sary-bulak, 17 Aug 1926, *V.P.Drobov & Gomolitskiy 1153* (LE); Kyzyl-Kum, Syr-Darya R., Baskara railway station, 28 Jun 1904, *V.I.Lipskiy* (LE). UZBEKISTAN/TADZHIKISTAN: Syr-Darya R., Fergana Valley, near Mel'nikovo, 22 May 1915, *V.P.Drobov 16* (LE).

Presumed Hybrids

Hybridization in the section is relatively rare, and remains unexplored. In the literature, hybrids between *Juncus tenuis* and other American members of the group (*J. secundus* and *J. dudleyi*, for instance) were occasionally mentioned but further study is needed to evaluate both the very existence of the hybrids and the frequency and character of the hybridization.

Juncus compressus Jacq. × *Juncus gerardii* Loisel.

Juncus ×*transiens* Druce ex Lousley, *Bot. Soc. Exch. Club Brit. Isl.* 10: 986 (1935), *nom. inval.*; *Juncus* ×*royeri* P.Fourn., *Fl. Compl. Pl. Fr.* 522 (1928), *nom. inval.*

Reported from Britain, France and Germany (Thüringen, Sachsen) but material not seen. The existence of the hybrid requires a study or an experimental proof; the material assigned to the hybrid in the herbarium collections belongs to either of the presumed parental taxa. For further information see H.C.Haussknecht, *Mitt. Geogr. Ges. Thuring.* 2: 217 (1884).

Juncus ×*oronensis* Fernald, *Rhodora* 6: 36 (1904) = *Juncus tenuis* Willd. × *Juncus vaseyi* Engelm.

T: USA, Maine, Orono, 21 Jul 1892, *M.L.Fernald 300*; holo: GH *n.v.*; iso: W.

Presumed to be a hybrid between *Juncus tenuis* and *Juncus vaseyi*, *fide* P.M.Catling & K.W.Spicer, *Canad. J. Bot.* 66: 1574–1582 (1987), although the occurrence of hybridization of *Juncus tenuis* requires an experimental study.

Juncus homalocaulis F.Muell. ex Benth. × *Juncus tenuis* Willd.

A rare hybrid known from New Zealand. NEW ZEALAND NORTH: Kaitaia, *H.Carse* (CHR 3255), *fide* E.Edgar, in A.J.Healy & E.Edgar, *Fl. New Zealand* 3: 91 (1980).

Juncus dudleyi Wiegand × *Juncus vaseyi* Engelm.

P.M.Catling & K.W.Spicer, *Can. J. Bot.* 66: 1580–1581 (1988), refer a specimen from Lesser Slave Lake, Alberta, *J.Macoun 27936* (DAO), to this hybrid combination. Further study is needed although the hybrid status of the plant is satisfactorily documented.

Doubtful Names*Juncus strictus* Lucé, *Topogr. Nachr. Oesel* 107 (1823), *n.v.*

T: *n.v.*

Juncus fuscatus Raf., *Autik. Bot.* 194 (1840).

T: [USA] Kentucky, Tennessee etc., *C.S.Rafinesque*; syn: [now not extant].

Juncus secundiflorus Raf., *Autik. Bot.* 194 (1840).

T: [USA] West Kentucky, Arkansas, *C.S.Rafinesque*; syn: [now not extant]

It belongs to the sect. *Steiroschloa*.

Juncus recurvatus Conrad ex Raf., *Autik. Bot.* 194 (1840).

T: [USA] New Jersey, *C.S.Rafinesque*; syn: [now not extant].

Juncus triphylus Raf., *Autik. Bot.* 195 (1840).

T: [USA] South New Jersey, *C.S.Rafinesque*; syn: [now not extant]

It belongs to the sect. *Steiroschloa*.

Juncus pauperculus Raf., *Autik. Bot.* 195 (1840).

T: [USA] Mts. Allegh. [?Alleghany, North Carolina], *C.S.Rafinesque*; syn: [now not extant].

It belongs to the sect. *Steiroschloa*.

Juncus virgatus Raf., *Autik. Bot.* 195 (1840).

T: [USA] Florida, *C.S.Rafinesque*; syn: [now not extant].

It belongs to the sect. *Steiroschloa*.

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Juncus convolutus Raf., *Autik. Bot.* 195 (1840).

T: [USA] Apalachian Mts., *C.S.Rafinesque*; syn: [now not extant; it belongs to the sect. *Steirochloa*].

Juncus trichodes Steud., *Syn. Pl. Glumac.* 2: 306 (1855).

T: [Russia, St. Petersburg] Regio Petropolitana, *Sanson*; holotype: H-STEVEN [ut *J. filiformis*], *n.v.*

Juncus vacillans Steud., *Syn. Pl. Glumac.* 2: 305 (1855).

T: Amer. septentr. [otherwise not indicated, not found in herb. Steudel in P].

Often referred to *J. tenuis* in the literature.

Juncus bulbosus var. *alpinus* Schur, *Enum. Pl. Transsilv.* 687 (1866)

Juncus compressus f. *alpinus* (Schur) S6o, *Acta Bot. Acad. Sci. Hung.* 16: 366 (1971). T: [Romania] Arp6s, *F.Schur*; holotype: *n.v.*

Juncus intermedius Tarasov, in A.A.Chiguryaeva & M.P.Gnutenko, *Pochvi i Rast. Yugo-Vostoka* 94 (1970), *nom. illeg., non Thuill.* (1800).

T: [Russia, Saratov region] Ozinci, Erschov, Piterca, Jul 1966, *A.O.Tarasov*; holotype: Saratov

Probably more than one gathering given as type, and the name therefore is not valid. If valid then it most probably belongs to *Juncus gerardii*.

Juncus intermedius subsp. *macrocarpus* Tarasov, in A.A.Chiguryaeva & M.P.Gnutenko, *Pochvi i Rast. Yugo-Vostoka* 96 (1970), *nom. inval.*

T: Not designated.

Juncus intermedius subsp. *microcarpus* Tarasov, in A.A.Chiguryaeva & M.P.Gnutenko, *Pochvi i Rast. Yugo-Vostoka* 96 (1970), *nom. inval.*

T: Not designated.

Juncus heptopotamicus var. *yiningensis* K.F.Wu, *Acta Phytotax. Sin.* 32: 447 (1994).

T: Xinjiang, Yining, 680 m, 21 May 1965, *Tai-yen Chou & Rong-lin Guo* 650375; holotype: SZ.

SECTION 9. JUNCOTYPUS

***Juncus* sect. *Juncotypus* Dumort., *Fl. Belg.* 142 (1827)**

Juncus [unranked] *Lateriflori* Peterm., *Deutschl. Fl.* 591 (1849) [lectotype: *fide* J.Kirschner & al., *Folia Geobot.* 34: 387 (1999)]; *Juncus* subg. *Juncotypus* (Dumort.) V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 546 (1935), *nom. superfl.* T: *Juncus conglomeratus* L.; lectotype: *fide* J.Kirschner & al., *Folia Geobot.* 34: 387 (1999) [H.Balslev, *Fl. Neotrop. Monogr.* 68: 88 (1996), proposed *J. inflexus* as a lectotype but the name was not included in the protologue and is not eligible].

Juncus [unranked] *Aphylli* Spenn., *Fl. Friburg.* 1: 179 (1825); *Juncus* sect. *Aphylli* (Spenn.) Cout., *Bol. Soc. Brot.* 8: 89 & 90 (1890); *Juncus* sect. *Lateriflori* [Fr. ex] T.Marsson, *Fl. Neu-Vorpommern* 451 (1869), *nom. illeg.* [lectotype: *fide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 88 (1996)]; *Juncus* sect. *Inflexi* K.F.Wu, *Acta Phytotax. Sin.* 32: 442 (1994). T: *Juncus inflexus* L.; lectotype: *fide* J.Kirschner & al., *Folia Geobot.* 34: 384 (1999).

Juncus sect. *Steirocaulos* Griseb., *Spic. Fl. Rumel.* 2: 405 (1846); *Juncus* [unranked] *Communes* Engelm., *Trans. Acad. Sci. St. Louis* 2: 433 (1866) [lectotype: *fide* J.Kirschner & al., *Folia Geobot.* 34: 385 (1999)]; *Juncus* sect. *Communes* (Engelm.) Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 55 (1938); *Juncus* sect. *Effusi* K.F.Wu, *Acta Phytotax. Sin.* 32: 443 (1994), *nom. illeg.* T: *Juncus effusus* L.; lectotype: *fide* J.Kirschner & al., *Folia Geobot.* 34: 389 (1999).

Juncus [unranked] *Arctici* Engelm., *Trans. Acad. Sci. St. Louis* 2: 434 (1866). T: *Juncus arcticus* Willd.

Juncus sect. *Genuini* Engelm., *Trans. Acad. Sci. St. Louis* 2: 433 (1866) [isonym: F.K.M.Vierhapper, in H.G.A.Engler & K.Prantl, *Nat. Pflanzenfam.*, 2nd edn, 15a: 215 (1930)]; *Juncus* subg. *Genuini* (Engelm.)

Buchenau, *Monogr. Juncac. Cap* 406 (1875); *Juncus* subsect. *Genuini* (Engelm.) Novikov, *Nov. Sist. Vyssh. Rast.* 19: 54 (1982). T: *Juncus glaucus* Ehrh. ex P.Gaertn., B.Mey. & Scherb.; lecto; *fide* S.Snogerup, in K.H.Rechinger, *Fl. Iranica* 75: 8 (1971).

Juncus [unranked] *Effusi* Rydb., *Fl. Rocky Mts.* 150 (1917). T: *Juncus filiformis* L.; lecto; *fide* J.Kirschner & al., *Folia Geobot.* 34: 386 (1999).

Juncus [unranked] *Subtriflori* Rydb., *Fl. Rocky Mts.* 150 (1917). T: *Juncus subtriflorus* (E.Mey.) Coville.

Juncus subsect. *Effusoidei* Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 62 (1938). T: *Juncus setchuensis* var. *effusoides* Buchenau.

Juncus subsect. *Beringenses* Novikov, *Nov. Sist. Vyssh. Rast.* 19: 56 (1982). T: *Juncus beringensis* Buchenau.

Juncus subsect. *Baltici* Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 115 (1990). T: *Juncus balticus* Willd.

Juncus subsect. *Drummondii* Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95: 116 (1990). T: *Juncus drummondii* E.Mey.

Perennials. Rhizome present, in caespitose forms often very short-noded. Stem with several basal cataphylls, i.e. leaves inserted at abbreviated basal nodes, mostly reduced to sheath with no or tiny blade; uppermost cataphylls rarely with well developed blade. Lower inflorescence bract erect, forming an apparent prolongation of the stem, inflorescence therefore pseudolateral. Stem and leaves of mature plants terete, consisting of a parenchymatous cylinder with a pith of specialized, usually conspicuously aerenchymatic tissue. Each flower with bract and one bracteole at base of pedicel, and two bracteoles at base of the flower.

A large section with world-wide distribution and 67 species. The species diversity is centred in Australia (more than a half of the section), Pacific North America and, to a lesser extent, in Europe and the Far East. Summer-flowering species.

- 1 Subepidermal sclerenchyma strands in stem absent; stem smooth or almost so when fresh, smooth or inconspicuously and irregularly striate when dry
- 2 Seeds with two distinct appendages (0.2–) 0.4–1.0 mm long; inflorescence 1–4 (–7)-flowered; plants densely caespitose; rhizome very short-noded
- 3 Capsule acute, subabruptly narrowing into acuminate mucro 0.3–0.8 mm long 251. *J. parryi*
- 3: Capsule obtuse, truncate or retuse; mucro short, to 0.1–0.2 mm long
- 4 Uppermost cataphyll with blade 5–15 cm long; seed appendages 0.2–0.4 mm long 253. *J. hallii*
- 4: Uppermost cataphyll with blade 0.2–0.8 cm long; seed appendages 0.5–1.0 mm long 252. *J. drummondii*
- 2: Seeds apiculate, without distinct appendages; inflorescence usually more than 5-flowered, if few-flowered then rhizomatous, with creeping rhizome and internodes of variable length
- 5 Anthers equalling filaments or up to 1.5 times longer
- 6 Outer tepals narrowly lanceolate with cuspidate and often slightly recurved apex; inner tepals narrowly lanceolate, acuminate; capsule 5.0–6.5 mm long 247. *J. haenkei*
- 6: Outer tepals lanceolate, acute, apex not recurved; inner tepals oblong, obtuse or mucronate; capsule 3.2–5.0 mm long 244. *J. arcticus*
- 5: Anthers c. 2–6 times as long as filaments
- 7 Tepals 3.2–5 mm long; stem straight or flexuose
- 8 Capsule 3.0–4.5 mm long, equalling or slightly exceeding perianth; capsule mucro 0.2–0.3 mm long; stem terete, not twisted nor flexuose, if so then 1–3 mm in diam. 245. *J. balticus*
- 8: Capsule 4.5–5.0 mm long, conspicuously exceeding perianth; capsule mucro 0.4–0.5 mm long; stem slightly compressed and twisted or usually flexuose, to c. 1 mm in diam. 249. *J. fauriei*
- 7: Tepals 5–8 mm long; stem usually tortuose to flexuose

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- 9 Flowers 3–9, solitary; inflorescence diffuse **250. J. nupela**
- 9: Flowers 10 to many, in dense clusters; inflorescence wholly congested or most of it congested, the rest in pedunculate heads
- 10 Inflorescence wholly contracted in a single head; flowers 10–20; seeds 0.7–1.1 × 0.4–0.5 mm **246. J. breweri**
- 10: Inflorescence of one sessile and usually 1–4 pedunculate heads; flowers usually 30–60; seeds 0.6–0.7 × 0.3–0.4 mm **248. J. lesueurii**
- 1: Subepidermal sclerenchyma strands in stem present; stem almost smooth (faintly striate), regularly striate to conspicuously ridged when fresh, visibly regularly striate to prominently regularly ridged when dry
- 11 Inflorescence borne on erect to erecto-patent peduncle (peduncle usually 2–4 cm long); consisting of a single dark to blackish head; tepals 4–8 mm long **254. J. jacquinii**
- 11: Inflorescence sessile, of many clusters or diffuse; if consisting of a single head then not dark or blackish; tepals usually shorter than 4 mm
- 12 Inflorescence 1–8 (–10)-flowered
- 13 Seeds with appendages 0.8–1.0 mm long; lower bract equalling to slightly exceeding inflorescence; stem 1.5–2.5 mm in diam.; lower bract sheath conspicuously constricted below inflorescence **273. J. beringensis**
- 13: Seeds without distinct appendages; lower bract much exceeding inflorescence; stem to 1.5 mm in diam.; lower bract sheath not constricted below inflorescence
- 14 Upper cataphyll with blade to c. 12 cm long; lower bract 3–10 cm long; anthers longer than filaments **272. J. brachyspathus**
- 14: Upper cataphyll with an awn-like blade to c. 0.5 cm long (rarely in a population some plants with leaf blades to 20 cm long) or blade absent; lower bract usually 10–30 cm long; anthers shorter than filaments
- 15 Tepals 3.3–4.7 mm long; capsule with mucro 0.2–0.3 mm long; cataphylls lax, distally stramineous to stramineous-brown; flowers 3–5, 1–2 of them on peduncles curved upwards before anthesis **274. J. curvatus**
- 15: Tepals 2.5–3.5 mm long; capsule not mucronate; cataphylls tight, pale stramineous; flowers 4–10, several on peduncles either straight or slightly curved before anthesis **271. J. filiformis**
- 12: Inflorescence more than 10-flowered, usually many-flowered
- 16 Inflorescence branches, distal part of stem and central band of tepals finely scabrid **303. J. radula**
- 16: Inflorescence branches, stem and tepals smooth
- 17 Flowers unisexual; plants dioecious
- 18 Stem striations 35–60; stem 65–125 cm long, 1.6–3.2 mm in diam.; stomata sunken below stem surface **302. J. psammophilus**
- 18: Stem striations 100–200; stem 120–400 cm long, 4–9 mm in diam.; stomata superficial **294. J. ingens**
- 17: Flowers hermaphrodite
- 19 Pith of rounded parenchymatous cells
- 20 Uppermost cataphyll with blade c. 10–30 cm long; inflorescence lax, flowers in loose unilateral cymes
- 21 Stamens 6; outer tepals to 3.5 mm long **277. J. kleinii**
- 21: Stamens 3; outer tepals 4–5 mm long **276. J. uruguensis**
- 20: Uppermost cataphyll with reduced blade to 1 cm long; inflorescence dense, of a single head or several dense pedunculate heads **275. J. ramboi**

- 19: Pith of astericiform aerenchymatous cells
- 22 Stamens 6, rarely fewer in some flowers in an inflorescence
- 23 Pith continuous (later, in old stems sometimes degenerating)
- 24 Capsule subglobose; tepals widely spreading around ripe capsule **255. J. patens**
- 24: Capsule ellipsoid to obovoid; tepals not spreading
- 25 Anthers shorter than filaments; capsule trilocular; stems almost smooth, indistinctly striate **256. J. gymnocarpus**
- 25: Anthers equalling or longer than filaments; capsule triseptate to unilocular; stems with prominent to medium-distinct or inconspicuous ridges
- 26 Inflorescence in dense glomerules, these usually in dense groups **309. J. vaginatus**
- 26: Inflorescence diffuse; flowers in loose to dense unilateral cymes, solitary
- 27 Stem 2.5–8 mm in diam.
- 28 Stem grey-green; ridges conspicuous [Pacific North America] **267. J. textilis**
- 28: Stem mid-green; ridges inconspicuous [Australia] **298. J. pallidus**
- 27: Stem 0.5–2.0 mm in diam.
- 29 Stem grey-green, dull; ridges conspicuous; outer tepals usually (2.4–) 2.8–3.0 mm long **287. J. dolichanthus**
- 29: Stem mid-green, glossy; ridges not distinct; outer tepals 2.0–3.0 mm long **293. J. pauciflorus**
- 23: Pith interrupted in most of stem
- 30 Pith usually reduced to septa-like plates, lacunae large
- 31 Capsule broadly ovoid to subglobose, 1.5–2.0 mm long **269. J. gubanovii**
- 31: Capsule ellipsoid to ovoid, at least 2.5 mm long
- 32 Stem ridges distinct, prominent, c. 10–22; style c. 0.5 mm long; cataphylls distally lax, dark red-brown and glossy at base **270. J. inflexus**
- 32: Stem ridges not prominent, c. 25–60; style 0.1–0.2 mm long; cataphylls distally tight, dark yellow-brown and dull at base **304. J. remotiflorus**
- 30: Pith finely interrupted, lacunae small
- 33 Inflorescence few-flowered; flowers in 1 (–2) subsessile and 1 (–2) shortly pedunculate dense clusters; stem ridges indistinct, 15–25 **286. J. distegus**
- 33: Inflorescence many-flowered, diffuse; flowers solitary or drepania irregularly subcontracted; stem ridges prominent, if indistinct then 20–52
- 34 Stem grey-green, ridges prominent, 10–20 (–40) **308. J. subsecundus**
- 34: Stem yellow-green, ridges not very distinct, 20–52 **297. J. ochrocoleus**
- 22: Stamens 3, rarely 4–6 in some flowers in an inflorescence
- 35 Pith continuous (in old stems sometimes degenerating)
- 36 Upper cataphylls to 2–3 cm long; style 0.3–0.4 mm long [Sikkim] **268. J. tobdeniorum**
- 36: Upper cataphylls longer, usually much longer than 3 cm; style 0.1–0.2 (–0.3) mm; [various origins, outside Sikkim]

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- 37 Capsule trilocular, rarely imperfectly so (septa not perfect in the most distal part of capsule) **264. J. decipiens**
- 37: Capsule unilocular or triseptate (septa almost not developed or usually not reaching halfway to the capsule centre)
- 38 Stem striations or ridges 10–30, distinct and prominent
- 39 Lower bract sheath dilated and bract therefore often reflexed after fruit ripening; capsule with a short distinct basally conical mucro **257. J. conglomeratus**
- 39: Lower bract sheath narrow and bract remains erect in fruit and later; capsule not or very shortly mucronate
- 40 Upper cataphyll tight; stem ridges 10–20 **258. J. pylaei**
- 40: Upper cataphyll lax; stem ridges 15–30
- 41 Stem light green; cataphylls often scabrid at base; capsule 2.0–2.5 mm long, shorter than or equalling perianth **262. J. hesperius**
- 41: Stem greyish green; cataphylls smooth at base; capsule 2.5–3.0 mm long, exceeding perianth **265. J. setchuensis**
- 38: Stem striations or ridges 30–80, indistinct, or distinct and prominent
- 42 Lower bract usually shorter than or equalling inflorescence **295. J. laeviusculus**
- 42: Lower bract exceeding or much exceeding inflorescence
- 43 Inflorescence reddish overall (capsules red-brown or dark red-brown; tepals red-brown along the midrib) **299. J. phaeanthus**
- 43: Inflorescence stramineous to golden brown (either capsules or tepals may occasionally be reddish brown or castaneous)
- 44 Stem striations distinct, prominent
- 45 Cataphylls coppery to dark golden brown adaxially, dark castaneous to black at base abaxially **278. J. alexandri**
- 45: Cataphylls silvery stramineous adaxially, yellow-brown to dark so at base abaxially **285. J. continuus**
- 44: Stem striation visible but indistinct, not prominent
- 46 Tepals dark brown to dark castaneous-brown along a narrow green midrib; cataphylls tight; stem usually to 1.8 mm in diam.
- 47 Cataphylls dark brown to dark castaneous-brown throughout; upper cataphyll margins overlapping to the very top **261. J. laccatus**
- 47: Cataphylls stramineous to pale green distally; not overlapping at least in upper 10% **263. J. aemulans**
- 46: Tepals stramineous, stramineous-brown or greenish; cataphylls lax or tight
- 48 Stem blue-green, subglaucous; stomata at least slightly sunken **289. J. firmus**
- 48: Stem mid-green, bright green or yellow-green; stomata superficial
- 49 Stem soft **259. J. effusus**
- 49: Stem hard
- 50 Inflorescence usually of densely clustered pedunculate dense heads **283. J. bassianus**

- 50: Inflorescence diffuse, with flowers solitary, variously densely clustered
- 51 Cataphylls tight; upper cataphyll margins overlapping to the very top; stem striations 30–40 **260. J. exiguus**
- 51: Cataphylls lax, not overlapping in upper $\frac{1}{3}$; stem ridges 35–80 **285. J. continuus**
- 35: Pith interrupted in most of the stem
- 52 Capsule trilocular
- 53 Pith strongly interrupted with conspicuous lacunae **266. J. durus**
- 53: Pith very finely interrupted with minute lacunae **292. J. edgariae**
- 52: Capsule unilocular or triseptate
- 54 Upper cataphylls to 2–3 cm long; stem 0.7–1.0 mm in diam. [Sikkim] **268. J. tobdeniorum**
- 54: Upper cataphylls longer than 4 cm; stem more than 1 mm in diam. [Australasia]
- 55 Stem greyish green to bluish green, sometimes glaucous
- 56 Stomata sunken (in sloping-sided pits) **305. J. sarophorus**
- 56: Stomata superficial
- 57 Stem ridges usually 10–20; cataphylls tight, dark yellow-brown abaxially at base
- 58 Inflorescence head-like or occasionally with 1–2 extra dense clusters; stem striations 0.1 mm wide or more **288. J. filicaulis**
- 58: Inflorescence with flowers spread out along branches or variously clustered; stem striations mostly less than 0.1 mm wide **308. J. subsecundus**
- 57: Stem ridges usually 25 or more; cataphylls lax or tight, blackish or red-brown or dark yellow-brown abaxially at base
- 59 Cataphylls tight, dark yellow-brown at base; stem very soft **304. J. remotiflorus**
- 59: Cataphylls lax, dark castaneous, dark red-brown or almost blackish at base; stem soft or hard
- 60 Inflorescence usually 1–5 cm long, of one or several discrete clusters **279. J. amabilis**
- 60: Inflorescence diffuse with solitary flowers; if flowers in dense clusters then inflorescence usually more than 10 cm long
- 61 Capsule 2.5–3.0 mm long **306. J. semisolidus**
- 61: Capsule usually 1.8–2.5 mm long
- 62 Stem soft
- 63 Cataphylls usually dull at base abaxially; stem ridges prominent **280. J. aridicola**
- 63: Cataphylls usually glossy at base abaxially; stem ridges indistinct **300. J. polyanthemus**
- 62: Stem hard
- 64 Inner tepals acute to subobtuse and mucronate; stem ridges 35–55, distinct **307. J. subglaucus**
- 64: Inner tepals obtuse to almost auriculate; stem ridges 40–100, indistinct **300. J. polyanthemus**

JUNCACEAE (*Juncus*)

- 55: Stem mid-green to yellow-green, not glaucous or only slightly so
- 65 Stomata sunken (in straight-sided pits)
- 66 Cataphylls dark yellow-brown distally, red-brown abaxially at base; tepals with narrow membranous margins; stem striations c. 5–7 mm per mm **282. *J. australis***
- 66: Cataphylls yellow distally, dark golden brown abaxially at base; tepals with broad membranous margins; stem striations 7–10 per mm **290. *J. flavidus***
- 65: Stomata superficial
- 67 Cataphylls tight
- 68 Inflorescence usually of two dense clusters, one sessile, the other pedunculate; stem ridges 15–25, prominent **286. *J. distegus***
- 68: Inflorescence lax, diffuse, flowers solitary or loosely aggregated; stem ridges 38–70, indistinct **296. *J. mollis***
- 67: Cataphylls lax
- 69 Stems soft
- 70 Stem usually 4–10 mm in diam.; stem striations 65–160, indistinct; tepals 2–3 mm long **301. *J. procerus***
- 70: Stem usually 0.5–3.5 mm in diam.; stem striations 20–65, prominent or indistinct; tepals 1.3–2.5 mm long
- 71 Flowers usually in 2–10 dense clusters; cataphylls adaxially dark golden brown **291. *J. gregiflorus***
- 71: Flowers usually solitary in diffuse inflorescence; cataphylls adaxially silvery to golden brown **310. *J. usitatus***
- 69: Stems hard
- 72 Inflorescence either wholly congested or in several dense clusters
- 73 Stem ridges prominent or distinct; lower bract much exceeding inflorescence or rarely equalling it
- 74 Inflorescence wholly congested or of few dense clusters, 1–3 cm long **281. *J. astreptus***
- 74: Inflorescence usually of 3–20 subglobose clusters, 2–6 cm long **292. *J. edgariae***
- 73: Stem striations or ridges indistinct; lower bract shorter than inflorescence or exceeding it by less than $\frac{1}{3}$ of its length **284. *J. brevibracteus***
- 72: Inflorescence usually diffuse, with solitary widely spaced or subdensely condensed flowers
- 75 Cataphylls abaxially pale yellow (stramineous) distally, pale golden brown at base **297. *J. ochrocoleus***
- 75: Cataphylls abaxially dark yellow-brown distally, red-brown, dark red-brown or black at base
- 76 Capsule 2.5–3.0 mm long, narrowly ellipsoid; inflorescence usually 10–25 cm long **306. *J. semisolidus***
- 76: Capsule 1.8–2.5 mm long, obovoid to ellipsoid; inflorescence usually 2.5–10 cm long
- 77 Stem ridges distinct; cataphylls glossy abaxially at base, silvery to pale golden brown adaxially **307. *J. subglaucus***
- 77: Stem ridges indistinct; cataphylls dull abaxially at base, golden brown to coppery adaxially **295. *J. laeviusculus***

**PREDOMINANTLY NORTH AMERICAN, EUROPEAN AND FAR
EASTERN SPECIES**

244. *Juncus arcticus* Willd., *Sp. Pl.* 4th edn, 2: 206 (1799)

T: [Norway] in alpinis Norvegiae, Lapponiae, *H.M.Vahl*; holo: B-W6865.

Juncus arcticus var. *tuvinicus* Polozhij, *Nov. Sist. Vyssh. Rast.* 11: 319 (1974). T: Russia, Tuva Republic, Erzin, Naryn, 20 Aug 1971, *G.Surov, A.Revushkin & A.Rannev*; holo: TK, *n.v.*

Juncus pauciflorus Moench ex Schleich., *Cat. Pl. Helv.* 57 (1800), *nom. inval.*

Maps: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 8(5): map 18 (1962); H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 83 (1965) [incomplete]; E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 99, map 198 (1986).

Perennial, 10–30 (–55) cm tall; rhizome creeping, sparsely branched with short or up to 1 cm long internodes. Stem leafless, terete, 1.5–2.5 mm thick, stiff, smooth, inconspicuously 30–40-striate when dry, lacking subepidermal sclerenchyma strands; epidermis cells uniform; vascular bundles \pm in three rows; pith initially of rounded imperfectly astericiform cells, later irregular, arachnoid. Cataphylls 3–4; upper cataphylls 3–6 (–9) cm, with no or very small blade, stramineous to light castaneous. Inflorescence pseudolateral, dense, (2–) 3–10-flowered, lower bract 3–5 cm long, much exceeding the inflorescence, $\frac{1}{10}$ – $\frac{1}{4}$ as long as stem. Bracteoles 2.5–3.5 mm long, \pm unequal, broadly ovate, obtuse to mucronate or acute, whitish membranous above, brown at base. Outer tepals (3.5–) 4.5–6 mm long, slightly longer than inner ones, lanceolate, acute to shortly apiculate; inner tepals oblong, obtuse to emarginate or obtuse with short mucro, all dark brown with greenish central band and broad scarious margin in upper part. Stamens 6; anthers 0.4–1.5 mm long, $\frac{1}{3}$ as long as or equalling filaments. Style to 0.5 mm long; stigmas 1 mm long. Capsule unilocular, triseptate, 3.2–5 mm long, \pm equalling or exceeding perianth, trigono-ovoid to trigono-ellipsoid, obtuse with 0.2–0.3 mm mucro, dark brown to castaneous. Seeds 0.6–1.1 \times 0.3–0.5 mm, more or less obliquely ovoid, inconspicuously reticulate, dark brown, appendages \pm absent.

Found in northern circumpolar arctic to subarctic areas and from upper forest regions to low alpine levels in some mountains. 10: FIN, ICE, NOR, SVA, SWE. 11: AUT, SWI. 12: FRA, SPA. 13: ITA. 14: RUN. 30: ALT, BRY, IRK, KRA, TVA, WSB, YAK. 31: KAM, KHA, KUR, MAG, SAK. 70: ASK, GNL, NWT, YUK. 71: MAN. 72: QUE. Open, usually permanently wet soil on lime-rich substrates. From near sea level in the arctic to 2600 m or more in the mountains.

- | | | |
|----|--|--------------------------------------|
| 1 | Capsule distinctly exceeding perianth | 244c. subsp. grubovii |
| 1: | Capsule equalling to slightly exceeding perianth | |
| 2 | Flowers usually 2–5; lower bract c. $\frac{1}{4}$ – $\frac{1}{8}$ of stem; plants usually to 30 (–40) cm | 244a. subsp. arcticus |
| 2: | Flowers 3–10; lower bract $\frac{1}{7}$ – $\frac{1}{10}$ of stem; plants usually 25–55 cm | 244b. subsp. alaskanus |

244a. *Juncus arcticus* Willd. subsp. *arcticus*

Juncus acuminatus Balb., in J.J.Roemer, *Arch. Bot.* (Leipzig) 3: 129 (1803), *nom. illeg., non Michx.* (1803). T: [without collector or locality], syn: B-W6865/2.

Juncus muelleri Trautv., *Trudu Imp. S.-Peterburgsk. Bot. Sada* 5: 119 (1877); *Juncus arcticus* var. *muelleri* (Trautv.) Kovt., *Izvest. SO AN URSS 6, ser. Biol.* 1: 43 (1985). T: [Russia, Siberia, Yakutia] Ad fl. Olenek infra fl. Dalgas, 11 Aug 1874, *A.Czekanowski & F.Müller*; holo: LE.

Juncus arcticus var. *depauperatus* Trautv., *Trudu Imp. S.-Peterburgsk. Bot. Sada* 5 (1): 118 (1877). T: [Russia, Siberia, Yakutia] fl. Chatanga, *A.Czekanowski & F.Müller*; syn: LE; Olenek, fl. Tomba, *A.Czekanowski & F.Müller*; syn: LE; fl. Tomba, *A.Czekanowski & F.Müller*; syn: LE; Lena, fl. Naschim, *A.Czekanowski & F.Müller*; syn: LE; Shigansk, *A.Czekanowski & F.Müller*; syn: LE; inter Gowor et Ogonjer, *A.Czekanowski & F.Müller*; syn: LE.

Illustration: H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 3: 501 (1967); Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 313, fig. 56 (1971).

JUNCACEAE (*Juncus*)

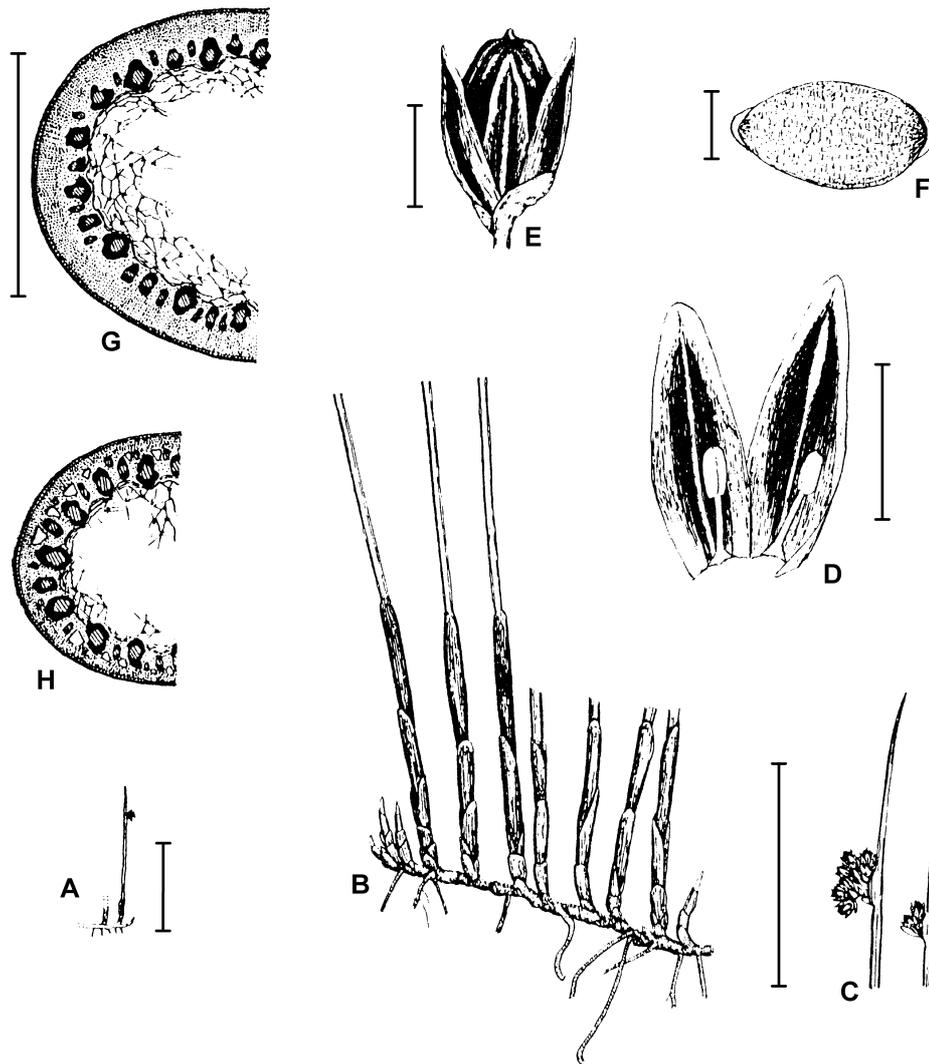


Figure 131. *Juncus arcticus* subsp. *arcticus*. **A**, habit; **B**, basal part of plant; **C**, inflorescences; **D**, tepals with stamens; **E**, perianth with capsule; **F**, seed; **G**, **H**, stem T.S. Scale bars: **A** = 20 cm; **B**, **C** = 4.5 cm; **D** = 17 mm; **E** = 2 mm; **F** = 0.5 mm; **G**, **H** = 0.9 mm. Drawn by Ö.Nilsson. Reproduced with permission from Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 313, fig. 56 (1972). © Lund Botanical Society.

Mostly 10–30 (rarely to 40) cm tall; rhizome creeping, with most rhizome internodes very short. Stem bluish green, rigid, c. 0.8–1.2 mm in diam., faintly irregularly striate. Cataphylls 3–4, stramineous to light stramineous-brown, sometimes pale castaneous at base; blade usually missing. Lower bract $\frac{1}{8}$ – $\frac{1}{4}$ as long as stem. Inflorescence usually mostly 2–4 (–6)-flowered, usually \pm contracted; flowers on short pedicels. Tepals 3–4.5 mm long, ovate to elliptical; outer tepals obtuse to mucronate (sometimes apiculate); inner tepals slightly shorter, 2.7–4 mm long, obtuse to emarginate, sometimes subacute. Anthers 0.4–0.7 mm long; filaments 0.6–1.1 mm long; style c. 0.5 mm long; stigmas c. 1 mm long. Capsule 3.5–4.5 (–5.0) mm long, trigonous-ovoid to trigonous-ellipsoid, equalling to slightly exceeding perianth, obtuse; mucro c. 0.2–0.3 mm long, dark castaneous-brown. Seeds c. 0.7–1.0 \times 0.3–0.4 mm, faintly reticulate and c. 25-striate; appendages \pm absent. $2n = c. 80$, *vide* Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 313 (1971). Fig. 131.

N Europe and N Asia, mountains of C Europe and C Asia, the Far East, Greenland; scattered in Canada. 10: FIN, ICE, NOR, SVA, SWE. 11: AUT, SWI. 12: FRA, SPA. 13: ITA. 14: RUN. 30: ALT, BRY, IRK, KRA, TVA, WSB, YAK. 31: KAM, MAG. 70: GNL, NUN. 71: MAN. 72: QUE. 76: ONT. Fens and open ground. Map 452.

10. NORWAY: Hedmark, Folldal, Grimsbu, Longstad, 655 m, 5 Aug 1969, *R.Elven* (O). SWEDEN: Lappland, Jukkasjärvi, Abisko, 1 Aug 1917, *E.Asplund* [*Pl. Suec. Exs.*] 462 (LD, S). 11. SWITZERLAND: Silvretta-Samnaungruppe, Fimbertal, Heidelberg Hütte, 2300 m, 4 Aug 1967, *F.Oberwinkler 11598a* (M). 12. FRANCE: Hautes Alpes, Lautaret, 2 Jul 1911, *H.Vieux* (W). SPAIN: Huesca: Benasque, Lago Padierna, 25 Jul 1955, *P.Montserrat* (JACA). 13. ITALY: S Tirol, Schlern near Bozen, 2400 m, 20 Aug 1903, *H.Handel-Mazzetti* (LD). 30. YAKUTIYA: Sibiria, Jakutsk, Balaganach, 71°35', 15 Jul 1898, *Nilsson* (LD). 70. GREENLAND: Nugssuaq-peninsula, south coast W of Atanikerdluk, 9 Jul 1932, *J.Grøntved 252* (C, LD). NUNAVUT: Southhampton Island, Coral Harbour, 64°08'N 83°17'W, *W.J.Cody 1768* (LD). 71. MANITOBA: Churchill, 17 Aug 1933, *G.Gardner 401* (LD). 72. QUEBEC: Smith Island, E coast of Hudson Bay, 60°47'N 78°36'W, 24 Aug 1928, *M.O.Malte* (LD).

A detailed examination of the type of *Juncus muelleri* shows that N.K.Kovtonyuk (in *Fl. Sibiri, Araceae – Orchidaceae*, p. 20 (1987)) was right in treating it as a depauperate form of *J. arcticus*. The type plant has thin stems and a two-flowered inflorescence but the relevant characters are unequivocal. Anthers in the type equal their filaments, which is contrary to the observations of V.S.Novikov [*Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 86(5): 104 (1981)].

244b. *Juncus arcticus* subsp. *alaskanus* Hultén, *Acta Univ. Lund.*, ser. nov., sect. 2, 39(2): 441 (1943)

Juncus arcticus var. *alaskanus* (Hultén) Novikov, *Nov. Sist. Vyssh. Rast.* 19: 55 (1982). T: Alaska, Wiseman, *E.Scamman 998*; holo: GH, *n.v.*

Illustrations: E.Hultén, *Fl. Alaska* 286 (1968); A.Ceska, in G.W.Douglas, D.Meidinger & J.Pojar, *Ill. Fl. Brit. Columb.* 6: 221 (2001).

Map: E.Hultén, *Fl. Alaska* 286 (1968); R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 216 (2000).

Mostly 25–55 cm tall; rhizome with many of the nodes c. 10 mm long; stems in loose rows. Stem wiry, thin, c. 0.8–1.4 mm in diam., faintly irregularly striate. Cataphylls abaxially stramineous-brown to grey-brown distally, \pm brown and slightly glossy at base, \pm lax, truncate and \pm auriculate at apex; blade filiform, short. Lower bract usually 4–6 cm long, $\frac{1}{7}$ – $\frac{1}{10}$ as long as stem. Inflorescence of 1–3 subsessile and 2–8 pedunculate flowers, usually with 1–3 main branches to c. 2 cm long (pedicels up to 15 mm). Tepals unequal. Outer tepals acute to acuminate, c. 3.5–5 mm long; central band pale brownish, bordered deep castaneous; margins membranous. Inner tepals broadly ovate, c. 2.5–3.3 mm long, obtuse or often mucronate, with broad scarious to membranous margins. Anthers 0.6–0.8 mm long; filaments 0.5–0.6 mm long; style 0.2–0.3 mm long; stigmas to c. 1 mm long. Capsule ellipsoid to narrowly oblong-ovoid, \pm obtuse, c. 3–3.5 mm long, \pm equalling perianth, dark castaneous-brown, with a short mucro c. 0.1 mm long. Seeds ellipsoid, c. 0.6–0.7 \times c. 0.3–0.4 mm; appendages absent. $2n = 80$, *vide* G.Knaben, *Nytt Mag. Bot.* 15: 244 (1968).

Alaska and neighbouring parts of subarctic Canada, just reaching British Columbia. 70: ASK, NUN, NWT, YUK. 71: BRC. Open wet places in Arctic and subalpine to alpine zones. Details of distribution imperfectly known; Hultén, *Fl. Alaska* 286 (1968) indicated a much larger distribution, and the taxon may still be overlooked in Chukotka. Map 453.

JUNCACEAE (*Juncus*)

70. ALASKA: Nome, 13 Aug 1938, *N.J. Andersson 4858* (LD); Takahula Lake, Brooks Range, 300 m, 67°20'N 153°41'W, 4 Aug 1979, *Jørgensen T178* (LD); Sandbars, Tanana R. near Robertson R., 7 Oct 1957, *L.A. Spetzman 495* (S, US).

244c. *Juncus arcticus* subsp. *grubovii* (Novikov) Novikov, Kirschner & Snogerup, in S. Snogerup, P.F. Zika & J. Kirschner, *Preslia* 74: 252 (2002)

Juncus grubovii Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 86(5): 103 (1981); *Juncus muelleri* subsp. *grubovii* (Novikov) Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 95(5): 116 (1990). T: Mongolia borealis, ditio Chubsugulskij, 120 km ad boreali-occidentem ab opp. Muren, in glareosis humidis ad ripam sinistram fl. Delger-Muren, 20 km supra ostium Beltes-Hola, 14 Aug 1980, *A.I. Gubanov 8660*; holotype: MW; isotype: LE.

Map: N.K. Kovtonyuk, in L.I. Malyshev & G.A. Peshkova, *Fl. Sibiri 4 (Araceae – Orchidaceae)*: 158, map 21 (1987) [Siberia].

Plants 25–32 cm tall; stem 1.2–2.5 mm in diam., ±smooth. Lower cataphylls grey-brown to dark brown, not shiny; upper cataphylls stramineous grey-brown; uppermost cataphyll grey-brownish to greenish-stramineous, ±loose, to c. 4–5 cm long. Lower bract 3–5 cm long, c. 1/4–1/6 of stem. Inflorescence 2–5-flowered, of 1–3 subsessile flowers and 1 (–2) branches to 1–1.5 cm long. Bracteoles to c. 2 mm long, ovoid, subobtuse, membranous. Tepals subequal. Outer tepal longer, ±acute, oblong-ovoid, 3.5–4.3 mm long. Inner tepals ±obtuse, to c. 3.5 mm long; central band greenish pale brown, bordered dark castaneous-brown; margins broad, membranous. Anthers c. 0.6–0.7 mm long; filaments 0.7–0.8 mm long; style c. 0.2 mm long; stigmas to 1.3 mm long. Capsule oblong to ellipsoid-ovoid, c. 3.8–5.2 mm long, with narrower upper part subabruptly narrowing into subacute apex, brown to deep castaneous-brown, conspicuously exceeding perianth. Seeds oblong-ovoid, c. 0.7 × 0.3–0.35 mm, apiculate, pale brown, finely striate and indistinctly transversely reticulate.

Siberia, Mongolia. 30: TVA, YAK. 37: MON. Shores of watercourses. Map 454.

30. YAKUTIYA: Uczurskiy Distr., banks of Uczur R., 56°40' N, 100°15' E, 20 Aug 1932, *Iljina* (MW). 37. MONGOLIA: W shore of Lake Kosogol, 6 Jul 1902, *V.L. Komarov* (LE).

245. *Juncus balticus* Willd., *Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk.* 3: 298 (1809)

Juncus balticus var. *europaeus* Engelm., *Trans. Acad. Sci. St. Louis* 2: 441 (1866), *nom. inval.*; *Juncus balticus* Rasse *europaeus* (Engelm.) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 438 (1904); *Juncus arcticus* subsp. *balticus* (Willd.) Hyl., *Bot. Not.* 106: 354 (1953); *Juncus helodes* Link., *Enum. Horti Berol. Alt.* 1: 305 (1821), *nom. illeg.*; *Juncus glaucus* var. *littoralis* Wahlenb., *Fl. Suec.* 209 (1824) [*Juncus balticus* cited among syntypes]. T: [Germany] an den sandigen Meeresufer bei Warnemünde, 1809, *G.G. Detharding*; holotype: B-WILLD; further authentic material: K.

Maps: E. Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 8(5): map 18 (1962); E. Hultén & M. Fries, *Atlas N. Eur. Vasc. Pl.* 1: 99, map 198 (1986).

Perennials, 25–100 (–250) cm tall; rhizome sparsely branching with mostly 5–10 mm long nodes. Stem leafless, 1–10 mm thick, bluish green, smooth or when dry inconspicuously 30–70-striate, lacking subepidermal sclerenchyma strands; epidermis cells uniform; bundles in three variously well defined rows, rarely interspaced with lacunar tubes; pith continuous, rarely finely interrupted (subsp. *andicola*), initially of astericiform cells, later irregular, arachnoid. Cataphylls 3–6; upper cataphylls 3–30 cm, stramineous to light brown, mostly with no or short awn-like blade but in some American races with one or rarely two well developed blades. Inflorescence pseudolateral, diffuse, (5–) 25–66 (–80)-flowered. Lower bract considerably exceeding inflorescence, 1/5–1/3 as long as stem; flowers bracteolate. Tepals 3.2–5 mm long, subequal, obtuse to apiculate, light to dark brown with broad scarious margin. Stamens 6; anthers 0.8–1.5 mm long, 1.5–2 (–6) times as long as filaments. Style 0.8–1 mm long; stigmas 1.5–2 mm long. Capsule 3–4.5 mm long, equalling or slightly exceeding perianth, trigono-ovoidal, with mucro 0.2–0.3 mm long, unilocular, triseptate, usually light brown, shining. Seeds 0.8–1 × 0.4 mm, ovoid, faintly striate-reticulate, with two inconspicuous appendages.

Even after the exclusion of a few related species often included in it, *J. balticus* is still extremely variable both as individuals and as populations and in regions. It requires further

investigation. A plant probably belonging here has been found in NW Anatolia on Ulu-dag; it is perhaps extinct and its taxonomic status is uncertain.

Seven geographically and morphologically defined subspecies are recognized to classify the complexity of *J. balticus*. However, the extensive variation in Pacific North America remains to be further studied, and the taxonomy of *J. balticus* in South America remains unexplored.

- 1 Stem usually 3–10 mm in diam.; pith often finely interrupted **245g.** subsp. **andicola**
- 1: Stem 1–3 (–4) mm in diam.; pith continuous
- 2 Uppermost cataphyll usually with a well developed blade; stem usually slightly compressed and twisted **245e.** subsp. **mexicanus**
- 2: Uppermost cataphyll without blade or with a minute, acicular blade
- 3 Inflorescence usually contracted, 6–10-flowered; longest peduncles to 1 cm **245c.** subsp. **cantabricus**
- 3: Inflorescence diffuse to subcontracted, usually more than 10-flowered; peduncles usually longer than 1 cm
- 4 Capsule rostrum 0.3–0.7 mm long; main inflorescence branches 0.3–0.5 mm thick
- 5 Some peduncles and inflorescence branches flexuous; bracteoles to c. 1.5 mm long [E and EC USA & E Canada] **245d.** subsp. **littoralis**
- 5: Peduncles and inflorescence branches straight; bracteoles usually 1.5–2.5 mm long [Alaska, W North America, Mexico & Guatemala] **245f.** subsp. **ater**
- 4: Capsule rostrum 0.2–0.3 mm long; main inflorescence branches 0.5–0.8 mm thick
- 6 Style 0.7–0.9 mm long; anthers 1.1–1.5 mm long; cataphylls abaxially deep yellow-brown to dark brown proximally **245a.** subsp. **balticus**
- 6: Style 1.0–1.2 mm long; anthers 1.4–2.0 mm long; cataphylls abaxially red-brown or dark castaneous proximally **245b.** subsp. **pyrenaeus**

245a. *Juncus balticus* Willd. subsp. balticus

Juncus balticus var. *tenuis* H.Linb., *Acta Soc. Fauna Fl. Fenn.* 22: 4 (1896). T: Russia [St Petersburg region], Isthmus karelicus, *H. Lindberg*; holotype: H.

Juncus balticus B. [unranked] *pseudoinundatus* Asch. & Graebn., *Fl. Nordostdeutsch. Flachl.* 173 (1898). T: [Germany], otherwise not designated.

Juncus balticus f. *laxior* Neuman, *Sveriges Fl.* 655 (1901). T: [Sweden], Skåne, Ystad, *L.M. Neuman*; holotype: *n.v.*

Juncus balticus f. *contractus* Neuman, *Sveriges Fl.* 655 (1901). T: [Sweden] otherwise not designated.

Juncus balticus monstrositas *spiralis* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 438 (1904). T: [Germany] Warnemünde, *H.G. Flörke*; synonym: *n.v.*; Warnemünde, *O. Seemen*; synonym: *n.v.*

Illustrations: T. Szynal & J. Mądalski, *Atlas Fl. Pol.* 2(2): 132 (1931); T.J. Reichgelt, *Fl. Neerl.* 1(6): 183, fig. 47 (1964); Ö. Nilsson & S. Snogerup, *Bot. Not.* 124: 314, fig. 57 (1971).

Map: E. Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 8(5): map 18 (1962); E. Hultén & M. Fries, *Atlas N. Eur. Vasc. Pl.* 1: 99, map 198 (1986).

Mostly 25–80 cm tall; rhizome ±long-noded, creeping, c. (3–) 4–6 mm in diam.; stems in loose to subdense rows. Cataphylls usually 3, c. 6–12 cm long, abaxially dull stramineous distally, yellowish pale brown, ±dull proximally (later becoming almost blackish), adaxially stramineous-silvery. Stem 1.5–3.0 mm in diam., terete, ±light green to mid-green, rigid; pith initially of rounded astericiform cells. Lower bract usually c. 7–17 cm long, $\frac{1}{5}$ – $\frac{1}{3}$ as long as the stem. Inflorescence diffuse, (5–) 25–60 (–c. 80)-flowered; main branches straight, c. 0.5–0.8 mm in diam. Bracteoles ovate, acute, to c. 1.5 mm long, stramineous to pale castaneous. Tepals subequal, lanceolate. Outer tepals ±acute, (3.2–) 3.7–4.0 (–4.7) mm long; central band greenish, distinct, bordered deep castaneous; margins narrow or absent. Inner tepals slightly shorter, acute to mucronate, with distinct membranous margins. Anthers c. 1.1–1.5 mm long, 1.5–2× as long as filaments; filaments c. 0.4–0.6 mm long; style 0.7–0.9 mm long; stigmas c. 1–2 mm long. Capsule oblong-ovoid, trigonous, acute with mucro 0.2–0.3 mm long, pale

JUNCACEAE (*Juncus*)

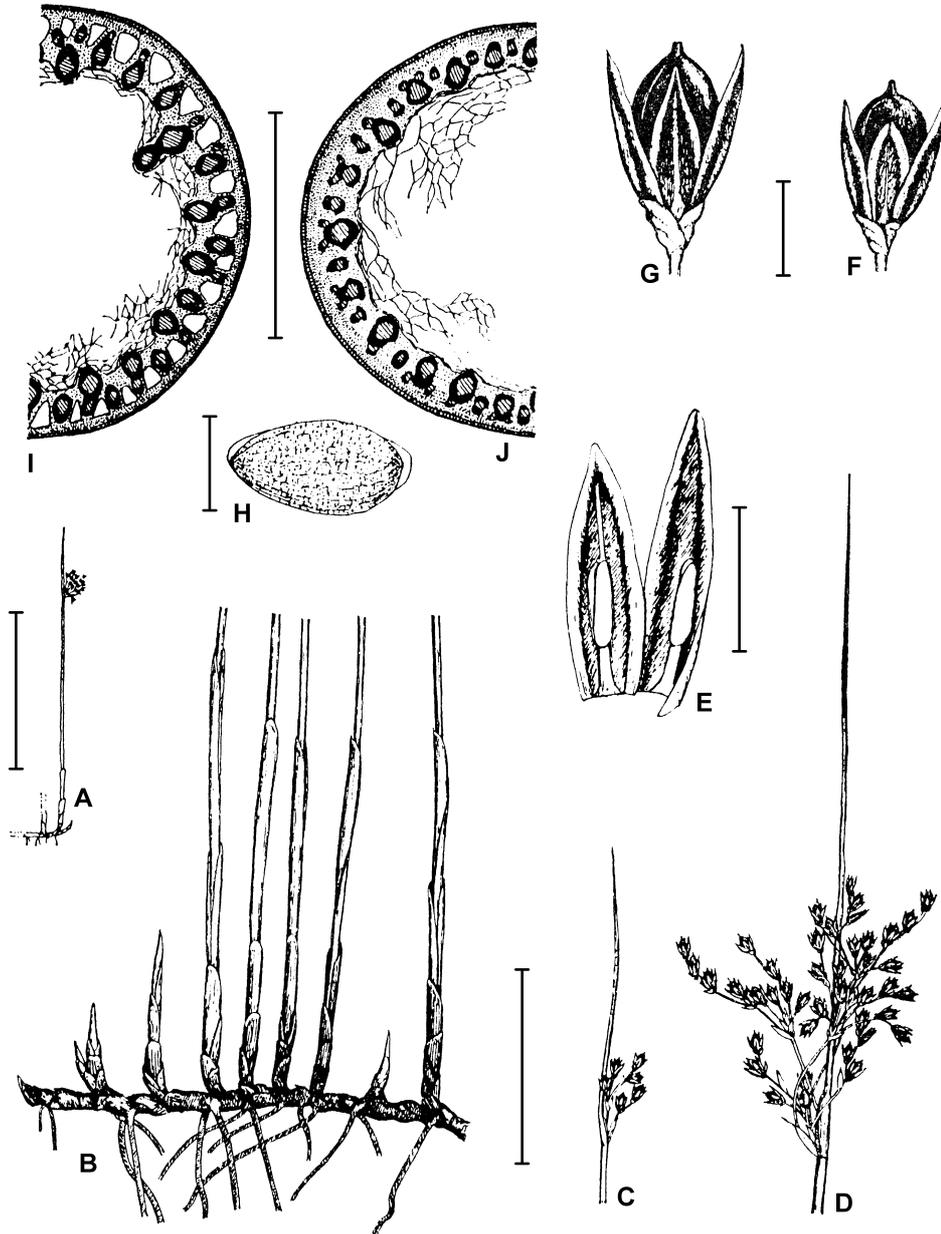


Figure 132. *Juncus balticus* subsp. *balticus*. **A**, habit; **B**, basal part of plant; **C**, **D**, inflorescence; **E**, tepals with stamens; **F**, **G**, perianth with capsule; **H**, seed; **I**, **J**, stem T.S. Scale bars: **A** = 40 cm; **B**, **C**, **D** = 4.5 cm; **E** = 17 mm; **F**, **G** = 2 mm; **H** = 1 mm; **I**, **J** = 0.9 mm. Drawn by Ö.Nilsson. Reproduced with permission from Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 314, fig. 57 (1972). © Lund Botanical Society.

brown to pale castaneous, c. 3.3–3.8 mm long, usually \pm exceeding perianth. Seeds ovoid, c. 0.7–1.0 \times 0.35–0.4 mm, pale brown, faintly reticulate. $2n = 80, 84$, *vide* Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 315 (1971) [uncertain counts]. Fig. 132.

Distributed in the Baltic area and N Russia, Iceland, Scandinavia and N Britain. 10: DEN, FIN, FOR, GRB, ICE, NOR, SWE. 11: GER, NET, POL. 14: BLT, RUN, RUW. Wet sandy sites mostly along sea coast. Map 455.

10. DENMARK: Jutland, Raabjerg Mile, 6 Aug 1968, *H.T.Holm & al.* [*Fl. Jutl. Exs.*] 476 (AAU, C, LD). FINLAND: Ostrobothnia, Pedersöre, Ådö Is., 17 Aug 1898, *I.Montell* [*Pl. Finl. Exs.*] 146a (H, LD). GREAT BRITAIN: W Sutherland, mouth of the Naver, 10 Jul 1885, *Fox 1431* (LD). ICELAND: Kjosarsysla, Mosfellssveit, Ulfarsa, 60 m, *Á.Löve & D.Löve A0112* (LD). NORWAY: Rogaland, SW of Stavanger, 21 Jul 1992, *S.Snogerup 9498* (LD). SWEDEN: Skåne, Åhus, Yngsjösjön, 16 Aug 1997, *H.Wittzell* (LD). 11. GERMANY: Warnemünde, 13 Jul 1883, *G.Griewank* (LD). THE NETHERLANDS: Terschelling Is., Boschplaat, 7 Aug 1954, *Kramer* (W). POLAND: Gdańsk, mouth of Wisla, 10 Jul & 1 Aug 1874, *C.G.Baenitz 24* (LD). 14. ESTONIA: Pärnaw, Waldhof, 11 Aug 1922, *C.E.Lundström 402* (W). RUSSIA NORTHWEST: Sestroretsk, 25 Jul 1899, *N.I.Puring* (LD).

245b. *Juncus balticus* subsp. *pyrenaicus* (Timb.-Lagr. & Jeanb.) Fourn., *Quatre Fl. France* 146 (1946)

Juncus pyrenaicus Timb.-Lagr. & Jeanb., *Bull. Soc. Sci. Phys. Nat. Toulouse* 6: 232 (1884); *Juncus arcticus* Willd. subsp. *pyrenaicus* (Timb.-Lagr. & Jeanb.) Rivas Goday & Borja, *Anales. Inst. Bot. Cavanilles* 19: 512 (1961). T: [Spain, the Pyrenees] Montlouis, Llagone, Conangle, la Quillane, *Real*; syn: *n.v.*

Map: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 83 (1965).

Plants (25–) 30–45 (–70) cm tall, forming dense to loose stands; rhizome creeping, 2–4 mm in diam., sparsely branched, with very short to 1.5 cm long nodes. Cataphylls usually 3–4, tight, 6–10 cm long, abaxially stramineous-brown or often reddish brown to castaneous distally, red-brown or dark castaneous proximally, glossy; blade minute or absent. Stem terete, 1–3 mm thick; pith of irregular cells with long processes, becoming arachnoid. Lower bract usually 9–16 cm long. Inflorescence mostly 1–3 cm long, lax or rarely \pm contracted, mostly (9–) 12–32-flowered. Bracteoles ovate, c. 1.5 mm long, scarious to castaneous. Outer tepals 4.0–5.4 mm long, apiculate to acute; central band greenish, bordered deep castaneous; margins of variable width, scarious. Inner tepals slightly shorter, usually 3.5–4.5 mm long, lanceolate, mucronate to acute, castaneous-brown with broad green midrib and membranous margin. Stamens 1.8–2.6 mm long; anthers 1.4–2.0 mm long, 2.5–4.5 \times as long as 0.4–0.6 mm filaments; style c. 1.0–1.2 mm long; stigmas to c. 2.0 mm long. Capsule 3–4 mm long, narrowly trigonous-ovoid, subacute with mucro 0.2–0.3 mm long, \pm equalling perianth, usually light to golden brown. Seeds \pm ovoid, c. 0.7–0.8 mm long, faintly reticulate.

S France and N Spain, the Pyrenees and Sierra de Gúdar. 12: FRA, SPA. Meadows on moderately rich to \pm calcareous soils. Map 456.

12. FRANCE: Pyrénées-Orientales, Formiguères, Galbe valley, 1600 m, *G.Bosc* [*Soc. Éch. Pl. Vasc. Eur. Bass. Médit.*] 10945 (AAU, LD, LG); Cerdagne, Montlouis, 1600 m, 26 Jul 1916, *E.M.Sennen* [*Pl. Esp.*] 2857 (LD, MA); Pyrénées-Orientales, Vallée d'Éyne, 2000 m, 6 Sep 1910, *J.A.Soulié* (MA 19014). SPAIN: Teruel, Sierra de Gúdar, Jul 1958, *J.Borja* (MAF65332); Sierra de Gudar, Valdelinares, Jul 1958, *J.Borja* (MAF65335); Sierra de Gúdar, Solavientos, Fte. Capellania, *P.Montserrat* (JACA); Aragón, Bains de Venasque, Val d'Alba, 2300 m, *H.Coste* (W).

Intermediates between subsp. *pyrenaicus* and subsp. *cantabricus* are known from the Spanish Pyrenees and Teruel.

245c. *Juncus balticus* subsp. *cantabricus* (T.E.Díaz, Fern.-Carv. & Fern.Prieto) Snogerup, *in* S.Snogerup, P.F.Žika & J.Kirschner, *Preslia* 74: 256 (2002)

Juncus cantabricus T.E.Díaz, Fern.-Carv. & Fern.Prieto, *Trab. Dep. Bot. Univ. Oviedo* 2: 13 (1977). T: Picos Albos (1800 m) Somiedo (Asturias), 5 Oct 1977, *C.Fernandez-Carvajal & Fernández Prieto*; holo: FCO6456.

Plants (15–) 20–40 cm tall, forming loose stands; rhizome creeping, 2.5–4.5 mm in diam., sparsely branched, with short or up to 1.5 cm long nodes. Cataphylls 4–5, stramineous to castaneous and glossy abaxially; upper cataphylls with short awn-like blade. Stem terete,

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1–2.5 mm thick; pith even in young stems arachnoid. Lower bract c. 4–10 cm long. Inflorescence usually contracted, mostly 6–10 (–19)-flowered; peduncles usually to 1 cm long. Bracteoles ovate, to 2 mm long, acute, castaneous at base. Tepals lanceolate; outer tepals slightly longer, 3–4 mm long, lanceolate, acute to acuminate; inner tepals subobtusate and mucronate to ±acute, 2.5–3.3 mm long, castaneous-brown with broad green central band and broad scarious to membranous margins. Anthers 0.7–1.3 mm long, 1.9–2.6× as long as 0.4–0.6 mm filaments; style 0.5–0.7 mm long; stigmas c. 1 mm long. Capsule c. 3 mm long.

Spain, Cordillera Cantabrica, Sierra de Gúdar. 12: SPA. Meadows on poor soil, 1500–1900 m. Map 457.

12. SPAIN: León, Pena Urbina La Pequena, Alto de Rosapero, 24 Jul 1975, *F.Prieto & Álvarez* (FCO); Teruel, La Vega de Alcalá de la Selva, 1550 m, 29 Jul 1955, *P.Montserrat* (JACA).

245d. *Juncus balticus* subsp. *littoralis* (Engelm.) Snogerup, in S.Snogerup, P.F.Zika & J.Kirschner, *Preslia* 74: 256 (2002)

Juncus balticus Willd. var. *littoralis* Engelm., *Trans. Acad. Sci. St. Louis* 2: 442 (1866); *Juncus balticus* Rasse *littoralis* (Engelm.) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 438 (1904); *Juncus littoralis* (Engelm.) Smyth & L.C.Smyth, *Trans. Kansas Acad. Sci.* 25: 106 (1912), *nom. illeg.*; *Juncus litorum* Rydb., *Brittonia* 1: 85 (1931); *Juncus arcticus* Willd. subsp. *littoralis* (Engelm.) Hultén, *Kongl. Svenska Vetenskaps-akad. Handl.* 8, 5: 24 (1962); *Juncus arcticus* var. *littoralis* (Engelm.) B.Boivin, *Phytologia* 42: 405 (1979). T: Ipswich, Mass., 1842, *W.Oakes s.n.*; lecto: MO, *fide* S.Snogerup, P.F.Zika & J.Kirschner, *Preslia* 74: 256 (2002).

Juncus setaceus Rostk., *Monogr. Gen. Junci* 13, tab. 1, fig. 2 (1801), *nom. rejic. propos.* T: [USA] Pennsylvania, *H.Mühlenberg*; holo: B-W6847 [The two plants on the type sheet correspond well to the illustration; *Juncus balticus* does not have subulate tepals as described in the protologue but the inrolled tepals of dry material make this impression. The plants undoubtedly belong to the E American form of *Juncus balticus*.]

Juncus balticus var. *laxus* Hook., *Fl. Bor.-Amer.* 2: 189 (1840). T: [Canada] Labrador, *Dr. Morrison*; syn: *n.v.*

Juncus balticus var. *stenocarpus* Fernald & Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 144 (1906). T: [Quebec, Bonaventure Co., mouth of the Bonaventure R.] Angeschwemmte Insel an der Mündung des Bonaventurafusses, Provinz Quebec, 4 Aug 1904, *J.F.Collins, M.L.Fernald & A.S.Pease s.n.*; holo: *n.v.*; iso: K, P.

Juncus balticus var. *melanogenus* Fernald & Wiegand, *Rhodora* 14: 35 (1912). T: Quebec, Saguenay Co., Bradore, 4 Aug 1910, *M.L.Fernald & K.M.Wiegand 2992*; holo: *n.v.*; iso: K.

Juncus balticus f. *dissitiflorus* Engelm. ex Fernald & Wiegand, *Rhodora* 25: 208 (1923). T: Ontario, shore of Lake Ontario, Sackett's Harbor, *A.Gray*; holo: GH.

Juncus balticus f. *opulentus* Lepage, *Naturaliste Canad.* 81 (12): 256 (1954). T: Ontario, Piskwamisk, 51°42' N, 10 Sep 1953, *E.Lepage & M.G.Duman 31895*; holo: DAO.

Juncus balticus f. *flavidior* Lepage, *Naturaliste Canad.* 81 (12): 257 (1954). T: Quebec, Fort George, 8 Sep 1950, *E.Lepage 13024*; holo: DAO.

Illustration: S.E.Clemants, *Junc. New York State* 10 (1990).

Map: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 8(5): map 18 (1962); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 99, map 198 (1986).

Plants usually 35–80 cm tall, usually forming dense stands, or in loose rows; rhizome 2–7 mm in diam.; sometimes with nodes up to 2 cm long. Cataphylls 3–4, usually to 5–10 (–15) cm long, abaxially dull to slightly glossy, yellowish-stramineous distally; middle part usually castaneous to yellowish brown, proximally yellow-brown to castaneous, ±glossy; adaxial side yellowish-silvery, glossy; upper cataphyll with awn-like blade to c. 1.5 mm long. Stem ±paler green, terete, c. 0.8–1.5 (–2.0) mm in diam.; pith initially of perfectly astericiform cells. Lower bract c. 3–17 cm long. Inflorescence usually diffuse, rarely condensed, 1–3 (–6) cm long, 5–20 (–25)-flowered; main branches often flexuose, usually 0.3–0.5 mm in diam. Bracteoles ovate, acute, to c. 1.5 mm, castaneous-brown at base, distally ±scarious to pale brownish. Tepals subequal, lanceolate. Outer tepals 3.3–4.4 mm long, with central band greenish to pale brown, bordered blackish to dark castaneous-brown; margins usually broad, membranous. Inner tepals subacute, 3.1–3.9 mm long. Anthers 1.3–1.6 (–2.0) mm long, 3–4× as long as 0.4–0.6 mm filaments; style 0.9–1.2 mm long; stigmas c. 1.5 mm long. Capsule narrowly oblong-ovoid, subtrigonous, 3.1–4.0 mm long, ±equalling perianth, castaneous-brown to dark castaneous-brown, shining, ±acute and mucronate; mucro 0.3–0.6 mm long.

Seeds 0.7–0.8 × 0.4–0.45 mm; outer seed coat ±loose, faintly reticulate. 2n = 80, *vide* N.A.Harriman & D.Redmond, *Rhodora* 78: 731 (1976).

E Canada and NE & NC USA, especially coastal areas and near the Great Lakes and other major watercourses. 71: MAN. 72: LAB, NBR, NFL, NSC, ONT, QUE. 74: ILL, MSO, SDA, WIS. 75: MAI, MAS, MIC, NWY, OHI, PEN. Sandy beaches and shores, wet open sites along streams, lowland form. Map 458.

71. MANITOBA: Fort Churchill, 2 Aug 1948, *J.M.Gillett* 2369 (DAO, LD). 72. LABRADOR: Goose Bay near Hamilton River, 53°17'N, 60°21'W, 3 Jul 1950, *J.M.Gillett* & *W.I.Findlay* 5173 (DAO, LD). NEW BRUNSWICK: Buctouche, *H.J.Scoggan* 12928 & *D.Erskine* (W). NOVA SCOTIA: Yarmouth, *C.D.Howe* & *W.F.Lang* 18 (LD, NY). ONTARIO: Thunder Bay, St. Ignace Is., Caribou Cove, *C.E.Garton* 6897 (DAO, W). QUEBEC: Bic, Le Bicquet, 24 Aug 1927, *J.Rousseau* 30025 (LD). 74. SOUTH DAKOTA: Deadwood, *A.S.Hitchcock* 27 (LD). 75. MAINE: Nells, 15 Jun 1881, *Blake* (LD). MICHIGAN: Lake and River, Detroit, 4 Jul & 3 Aug 1866, *J.M.Bigelow* [*G.Engelmann*, *Herb. Junc. Bor. Amer. Norm.*] 3 (AAU, LD, MO, PR, S, W). NEW YORK: Genesee Co., Bergen Swamp, Bergen, 18 Aug 1918, *K.M.Wiegand* 9565 (W). PENNSYLVANIA: Dillerville Swamp, W of Lancaster, 26 Jun 1890, *Small* (LD).

245e. *Juncus balticus* subsp. *mexicanus* (Willd. ex Roem. & Schult.) Snogerup, in S.Snogerup, P.F.Zika & J.Kirschner, *Preslia* 74: 257 (2002)

Juncus mexicanus Willd. ex Schult. & Schult.f., *Syst. Veg.* 7(1): 178 (1829); *Juncus balticus* var. *mexicanus* (Willd.) O.Kuntze, *Revis. Gen. Pl.* 3(2): 320 (1898); *Juncus arcticus* var. *mexicanus* (Willd.) Balslev, *Brittonia* 35: 308 (1983). T: Mexico, *F.W.H.A.Humboldt* & *A.J.A.Bonpland* s.n.; holo: B-W6843.

Juncus compressus Humb., *Bonpl. & Kunth, Nov. Gen.* 1: 235 (1816), *nom. illeg., non* Jacquin (1762); *Juncus complanatus* Schult. & Schult.f., *Syst. Veg.* 7(1): 185 (1829). T: Mexico, Chapultepec, San Augustin de las Cuevas and Real del Monte, *F.W.H.A.Humboldt* & *A.J.A.Bonpland* s.n.; holo: P.

Juncus orizabae Liebm., *Vidensk. Meddel. Dansk Naturhist. Foren. Kjobenhavn* 1850: 39 (1850). T: Mexico, Mt. Orizaba, 3650 m, Sep 1841, *F.M.Liebmann* s.n.; holo: C; iso: W, fragment.

Juncus balticus var. *crassiculmis* Buchenau, in A.Grisebach, *Pl. Lorentz.* 219 (1874); *Juncus crassiculmis* (Buchenau) Herter, *Revista Sudamer. Bot.* 6: 149 (1940). T: Argentina, Catamarca, Laguna Blanca, *P.G.Lorentz* 448; lecto: GOET, *vide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 96 (1996); iso: W.

Juncus balticus var. *durangensis* Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 146 (1906). T: Mexico, Durango, Apr–Nov 1896, *E.Palmer* 188; lecto: W, *vide* H.Balslev, *Fl. Neotrop. Monogr.* 68: 96 (1996); iso: G, K, US etc.

Juncus balticus var. *columnaris* Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 145 (1906). T: Chile, Atacama, 2400 m, 19 Jan 1904, *K.F.Reiche* s.n.; holo: W.

Illustrations: F.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 146, fig. 74 (1906); M.Barros, *Darwiniana* 10: 385, fig. 34 (1953).

Map: H.Balslev, *Fl. Neotrop. Monogr.* 68: 96, fig. 48 (1996) [Neotropical region].

Plants (10–) 20–70 cm tall, forming loose to dense stands; rhizome creeping, ±long-noded, 3–6 mm thick; stems often in dense groups from abbreviated rhizome branches. Cataphylls usually 2–3, very loose, broad, to 8 (rarely to 10) cm long, pale stramineous in distal $\frac{2}{3}$ – $\frac{3}{4}$, dull yellowish brown to mid-brown or rarely dull pale castaneous at base, pale stramineous adaxially; lower cataphylls with or without short awn-like blade; uppermost cataphylls usually with well developed blade. Basal leaves 1–2, well developed, terete but usually ±compressed and slightly twisted, 1–2 (–3) mm thick, smooth or irregularly slightly striate, green to greyish green; pith continuous, dense, of astericiform cells. Well developed leaves 5–30 cm long, terete; auricles short, rounded, somewhat cartilaginous. Lower bract often short, 1.5–5 cm long (rarely to 15–30 cm), shorter than to three× as long as inflorescence, with a conspicuously pointed tip. Inflorescence pseudolateral, 1–3 (–5–10) cm long, diffuse or with several loose clusters on short usually flexuose peduncles usually 0.2–0.4 mm thick; flowers usually 5–20. Bracteoles pale stramineous to scarious, sometimes pale castaneous-brown at base, ovate, acute, c. 1.5 mm long. Tepals 3.5–5 mm long, subequal, lanceolate; outer tepals acuminate, with central band greenish to stramineous, usually bordered pale brown to deep castaneous-brown, with broad, scarious margins; inner tepals acute to acuminate, sometimes subobtusate and mucronate. Anthers 1.4–1.6 mm long, much longer than c. 0.4 mm filaments. Capsule 3.5–5 mm long, ±equalling tepals, narrowly oblong-ovoid, subtrigonus, abruptly contracted to 0.3–0.5 mm mucro, castaneous-brown to brown. Seeds

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ellipsoid to narrowly ovoid, pale brown, 0.8–0.9 × 0.4–0.45 mm, oblong-ovoid; outer seed coat ±loose, finely reticulate.

From Washington through Oregon and California, E to New Mexico and W Texas, SE to S Mexico and Guatemala; disjunct occurrence in high mountains of Peru, Bolivia and Chile, and probably near sea level in Patagonia (Balslev 1996). Probably present in more Mexican provinces than reported. 73: COL, ORE, WAS. 76: ARI, CAL, NEV, UTA. 77: NWM, TEX. 79: MXC, MXE, MXG, MXN, MXS. 80: COS, GUA. 83: BOL, PER. 85: AGS, AGW, CLC, CLN, CLS. Open soil, wet meadows, often on sandy and more or less saline soils. From sea level in the north and south to 4000 m in the Andes. Map 459.

73. OREGON: Klamath Co., Wizard Is., Crater Lake, *W.M.Baker 6355* (OSC, UC, WS). 76. CALIFORNIA: San Luis Obispo Co., Cuyama, Caliente Creek, May–June 1896, *Eastwood* (CAS). 79. MEXICO CENTRAL: Mexico State, Toluca rd. km 22, 2900 m, *G.McPherson 1050* (CAS, DUKE, NY). MEXICO NORTHEAST: Coahuila, Saltillo, *E.Palmer 201* (S). MEXICO GULF: Veracruz, Llano Grande, above Aculzingo, 3150 m, *A.J.Sharp 44113* (NY). MEXICO NORTHWEST: Baja California, Santa Catarina Spring, *R.E.Broder 420* (DS). MEXICO SOUTHWEST: Oaxaca, Sierra, 2150 m, *H.G.Galeotti 5845*, p.p. (P). 80. GUATEMALA: Quezaltenango, Salcája, 2335 m, *L.B.Smith 956* (AAU, F). 83. BOLIVIA: La Paz: Murillo, Miraflores, 3600 m, *E.Asplund 522 p.p.* (NY). PERU: Cuzco, Claca, Hda. Paucartiva, 2950 m, *S.K.Keel 434B* (NY). 85. CHILE: Atacama, Copiapó, Sierra San Miguel, Los Marayes, 2000 m, *I.M.Johnston 4901* (F, S).

The Andean form, at least partly corresponding to var. *columnaris* Buchenau, forms dense and high tussocks mostly consisting of former years' growth.

245f. *Juncus balticus* subsp. *ater* (Rydb.) Snogerup, in S.Snogerup, P.F.Zika & J.Kirschner, *Preslia* 74: 258 (2002)

Juncus ater Rydb., *Fl. Rocky Mts.* 151, 1060 (1917); *Juncus arcticus* subsp. *ater* (Rydb.) Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. IV, 8(5): 24 (1962); *Juncus balticus* var. *montanus* Engelm., *Trans. Acad. Sci. St. Louis* 2: 442 (1866); *Juncus arcticus* var. *montanus* (Engelm.) Welsh, *Andersons's Fl. Alaska* 611 (1974). T: USA, Rocky Mountain Flora, lat. 39°–41°, 1862, *E.Hall & J.P.Harbour 567*; lecto: MO, fide H.Balslev, *Fl. Neotrop. Monogr.* 68: 97 (1996); iso: MO, PR.

Juncus balticus var. *vallicola* Rydb., *Bull. Torrey Bot. Club* 31: 399 (1904); *Juncus vallicola* (Rydb.) Rydb., *Fl. Rocky Mts.* 152, 1060 (1917). T: USA, Wyoming, Point of Rocks, 1901, *E.D.Merrill & E.V.Wilcox 664*; holo: NY.

Juncus balticus var. *condensatus* Suksd., *Werdenda* 12: 6 (1923). T: Falcon Valley, Klickitat Co., Washington, 1905 & 1908, *W.Suksdorf 5199*; holo: WS; iso: MO, WS, K.

Juncus balticus var. *eremicus* Jeps., *Man. Fl. Pl. Calif.* 198 (1923). T: [California] Owens Lake, 24 Jul 1912, *W.L.Jepson 5116*; holo: UC-JEPS.

Illustrations: H.L.Mason, *Fl. Marshes California* 352, fig. 171 (1957); E.Hultén, *Fl. Alaska* 286 (1968); C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 188 (1969).

Maps: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 8(5): map 18 (1962); E.Hultén, *Fl. Alaska* 286 (1968); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 99, map 198 (1986).

Plants (25–) 40–120 (–150) cm tall, forming ±dense stands; rhizome usually short-noded. Cataphylls 3–4, usually lax, less often ±tight, abaxially stramineous-brown distally, usually dull (rarely slightly glossy) castaneous at base; upper cataphylls c. 7–15 cm long, with short awn-like blade. Stem (0.7–) 1.5–4 mm thick, terete, pale to greyish green, not compressed nor twisted; pith continuous, of astericiform cells, later ±arachnoid. Inflorescence mostly diffuse, (5–) 10–30 (–45)-flowered; main branches straight, c. 0.3–0.4 mm in diam. Bracteoles ovate, 1.5–2.0 (–2.5) mm long, acute, castaneous at least at base. Tepals ±equal, ±narrowly lanceolate; outer tepals often slightly longer, 3.5–5 mm long, acuminate, castaneous with lighter midrib, often becoming stramineous, sometimes ±entirely deep castaneous; inner tepals subobtusate and mucronate or acute. Anthers 1.2–1.8 (–2.2) mm; 2.0–4× as long as 0.4–0.6 (–0.7) mm filaments; style (0.7–) 0.9–1.3 mm long; stigmas c. 2–3 mm long. Capsule oblong-ovoid, trigonous, c. 3.5–4.5 mm long, subequalling perianth, subabruptly narrowing into 0.4–0.7 mm mucro, dark castaneous-brown or brown. Seeds 0.7–0.8 × c. 0.4 mm, faintly reticulate.

From Alaska through western N America to S Mexico and Guatemala; distribution imperfectly known. 70: ASK, NWT, YUK. 71: ABT, BRC, SAS. 73: COL, IDA, MNT, ORE, WAS, WYO. 74: KAN, NDA, NEB, OKL, SDA. 76: ARI, CAL, NEV, UTA. 77: NWM,

TEX 79: MXC, MXN. 80: GUA. Margins of watercourses, especially in saline areas, marshes, along streams and pond or lake margins, mud flats, from near sea level to the mountains in the north and in W USA, southwards only in the mountains. Map 460.

70. ALASKA: Whittier, 19 Jul 1979, *Jørgensen*, W16 (LD). YUKON: Kluane Lake, mouth of Slim's R., *H.M.Raup & L.G.Raup* 12624 (A, S). 73. COLORADO: Mancos, 8 Jul 1898, *C.F.Baker, F.S.Earle & S.M.Tracy* 438 (W). OREGON: Harney Co., Edge of Malheur Lake, 3 Jul 1954, *Steward* 6785 (LD, ORE). WASHINGTON: N of Seattle, Jun 1931, *W.J.Eyerdam* (LD). WYOMING: Park Co., Beartooth Mtns, Sunlight Basin Rd above Clark's Fork R., *R.G.Stolze* 1050 (W). 76. CALIFORNIA: Douglas Co., near Egbert Spring, *J.H.Sandberg & J.B.Leiberg* 404 (UC, WS). 79. MEXICO CENTRAL: Distrito Federal, San Borjes, 2260 m, *F.G.Arsène* 10991 (US). 80. GUATEMALA: Huehuetenango, Sierra de los Cuchumatanes N of Tojiah, km 322 on Ruta Nac. 9N, 3200 m, *J.H.Beamon* 3924 (DUKE, TEX, UC, US).

An extremely variable, perhaps heterogeneous subspecies consisting of several local forms differing in stem diameter, length of lower bract, number of flowers in the inflorescence etc. It requires further investigation.

245g. *Juncus balticus* subsp. *andicola* (Hook.) Snogerup, in S.Snogerup, P.F.Zika & J.Kirschner, *Preslia* 74: 258 (2002)

Juncus andicola Hook., *Icon. Pl.*, ser. 2, 8: pl. 714 (1848); *Juncus arcticus* var. *andicola* (Hook.) Balslev, *Brittonia* 35: 308 (1983). T: Ecuador, Andes of Quito, *W.Jameson* 51; holo: K; iso: BM, G.

Juncus pictus F.Phil., *Linnaea* 33: 268 (1854); *Juncus balticus* var. *pictus* (F.Phil.) Grisebach, *Symb. Fl. Argent.* 316 (1879). T: Chile, Thermas de Chillan, Lake Ranko on Chiloe Island, 26 Feb 1862, *R.A.Philippi* s.n.; holo: SGO 37869; iso: K.

Juncus conceptionis Steud., *Syn. Pl. Glumac.* 2: 296 (1855). T: Chile, Concepción, *D.D'Urville* s.n.; holo: P.

Juncus deserticola F.Phil., *Reise Atacama* 52 (1860). T: Chile, Atacama, Zorras, 3200 m, Feb 1853, *R.A.Philippi* s.n.; lecto: SGO37866, fide H.Balslev, *Fl. Neotrop. Monogr.* 68: 98 (1996).

Scirpus peruvianus H.Pfeiff., *Mitt. Inst. Allg. Bot. Hamburg* 8: 40 (1929). T: Peru, Challascapa, 250 m, *Guenther & O.Buchtien* 1705; holo: HBG, probably destroyed; photo: NY.

Juncus andicola var. *schulz-korthii* J.F.Macbr., *Field. Mus. Nat. Hist., Ser. Bot.* 11: 44 (1931). T: Peru, Puno, Pucará, 3600 m, *A.Weberbauer* 1367; holo: B, destroyed; photo F, US.

Juncus antonianus Steud., in *W.Lechler, Berberid. Amer. Austral.* 56 (1857), *nom. inval.*; authentic material: Peru, San Antonio, Jun. 1954, *W.Lechler* 1808, G, GOET, K.

Illustrations: M.Barros, *Darwiniana* 10: 397, fig. 37 (1953). H.Balslev, *Fl. Neotrop. Monogr.* 68: 89, fig. 44, C (1996).

Map: H.Balslev, *Fl. Neotrop. Monogr.* 68: 95, fig. 47 (1996) [Neotropical region].

Plants (20–) 50–110 (–170) cm tall, usually robust, forming large and often dense stands; rhizome 2.5–10 mm in diam., with 1–4 cm long internodes. Cataphylls usually 3, large, (10–) 15–25 cm long, with awnlike blade; upper cataphylls distally stramineous, stramineous-brown in the middle, darker towards the base, ±dull, adaxial side silvery stramineous; lower cataphyll often blackish brown, glossy. Stem (1–) 3–10 mm thick, terete, not compressed or twisted; pith of astericiform cells, often interrupted. Lower bract usually 7–15 (–40) cm long. Inflorescence much branched, 2–15 cm, dense, with 20–several hundred flowers, usually partly congested (sometimes wholly), partly of ±dense heads on peduncles to 6 cm long and c. 0.5–0.7 mm in diam. Bracteoles ovate, 1.5–2.0 mm long, acute, reddish brown. Tepals subequal, 4.5–6 mm long, narrowly lanceolate; outer tepals acute-acuminate; inner tepals ±acute; central band pale brown to dark castaneous-brown; otherwise red-brown to dark castaneous-brown; margins narrow. Anthers 1.3–1.7 mm long; filaments 0.6–0.8 mm long; style 0.7–1.0 mm long; stigmas c. 1.0–2.0 mm long. Capsule ellipsoid-ovoid, trigonous, c. 3.8–5.5 mm long, shorter than or equalling perianth, acuminate, gradually narrowing into c. 0.5 mm rostrum. Seeds ellipsoid, pale brown, c. 0.6–0.8 × 0.3–0.4 mm, faintly reticulate; appendages absent. Fig. 145.

C and S America, some localities in C to SE Mexico and Guatemala, main distribution along the Andes through Colombia, Ecuador, Peru, Bolivia, Chile and Argentina. 79: MXC. 80: GUA. 83: BOL, ECU, PER. 85: AGW, ?AGS, CLC, CLN, CLS. Wet pastures in the mountains, margins of lakes and ponds, gravelly banks of streams, up to 4000 m in the Andes. Map 461.

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79. MEXICO: Mexico State, Mun. Amecameca, SE slope Ixtaccihuatl, La Joya, Canada de Alcalican, 3850 m, *R.Galvan 718* (ENCB). **80.** GUATEMALA: Huehuetenango: Soloma, 2200 m, *A.F.Skutch 1044* (F, GH, US). **83.** BOLIVIA: La Paz: Laguna Jacha Kkota 8 km S of La Paz, 3750 m, *H.Balslev 1141* (AAU, NY, QCA). COLOMBIA: Narino, Mt. Cumbal, Laguna Bolsa, 2740–2980 m, *J.Ewan 16134* (NY, US). ECUADOR: Carchi: 28 km W of El Angel, 3400m, *H.Balslev & F.Quintana 23904* (NY); Cotopaxi, 8 km S of Cotopaxi railroad station, 3450 m, *H.Balslev 1186* (AAU, NY, QCA); Pichincha, Pifo-Páramo de Guamani, *H.Balslev & F.Quintana 24182* (AAU, NY). PERU: Ancash, Recuay, Carpa-Pachacoto, 3450 m, *A.López-Miranda & al. 8330* (AAU, MO, NY); Cuzco, Hda Uro Calca, 2900 m, *Vargas 2446* (BM, F, MO). **85.** ARGENTINA: Jujuy, Yavi, *A.C.Dell'Arciprete 2256* (NY).

246. *Juncus breweri* Engelm., *Trans. Acad. Sci. St. Louis* 2: 440 (1866)

T: California, Monterey, 24 May 1861, *W.H.Brewer [Calif. State Surv.] 651*; holo: MO; iso: K, MO, UC.

Juncus lesueurii var. *tracyi* Jeps., *Fl. Calif.* 4: 249 (1922). T: [California] Ocean Beach at Humboldt Bay, 7 Aug 1901, *Tracy 1272*; lecto: UC, designated here by H.L.Lint.

Illustration: A.Ceska, in G.W.Douglas, D.Meidinger & J.Pojar, *Ill. Fl. Brit. Columb.* 6: 225 (2001).

Perennials, (20–) 30–80 (–140) cm tall; rhizome blackish, 2–9 mm thick, creeping (sometimes almost vertical in sand), with long internodes but stems often tufted on short rhizome branches. Cataphylls few; upper cataphylls (2–) 4–13 cm long, lax above, mostly castaneous-brown to dark castaneous-brown, ±glossy. Stem leafless, terete or slightly compressed, 1–2.5 (–3) mm thick, hard and wiry, mostly tortuous or arching, occasionally straight, smooth, faintly ridged when dry; subepidermal sclerenchyma strands absent; pith continuous. Lower bract (3–) 6–20 (–40) cm long, arching, $\frac{1}{10}$ –2 times as long as stem; middle bracts 2–7 mm long, with broad scarious margins. Inflorescence mostly compact, headlike, rarely up to 2.5 cm long; flowers mostly 10–20; longest peduncle usually to 3 mm. Bracteoles broadly ovate, c. 3.5 mm long, acute, pale castaneous, distally paler to scarious. Outer tepals lanceolate, 5–7 (–8) mm long, acute to acuminate, usually longer than inner ones, all castaneous-brown to purplish-brown with broad greenish centre and brownish or (in the inner) light membranous margins. Stamens 6; anthers 1.6–2.0 mm long; filaments c. 0.4 mm long; style c. 1.0–1.2 mm long; stigmas c. 2.0–2.5 mm long. Capsule trilocular, 3–5 mm long, shorter than the tepals, oblong-ovoid, acute, mucronate, castaneous at least above, shining. Seeds ovoid, 0.7–1.1 × 0.4–0.5 mm, apiculate, dark brown; outer seed coat mostly loose, faintly reticulate; appendages absent.

Coastal localities from Vancouver and Queen Charlotte Islands to near Santa Barbara, California. 71: BRC. 73: ORE, WAS. 76: CAL. Sand dunes, sand flats, and marshy dune slacks. Map 462.

71. BRITISH COLUMBIA: Cox Island, 21 Jun 1950, *R.M.Hardy* (V); Vancouver Island, Witty's Lagoon, 2 Aug 1950, *R.M.Hardy* (V); *A.Ceska 18947* (PRA); Vancouver Island, Keeha Beach, 23 Jun 1983, *R.T.Oglivie s.n.* (PRA). **73.** OREGON: Clatsop Co., 5 Sep 1935, *Brown & Powell* (OSC); Tillamook, 12 Jul 1882, *J.T.Howell* (CAS, OSC, PR, WTU). **76.** CALIFORNIA: San Francisco Co., Point Lobos, 7.V.1933, *M.S.Jussel* (CAS); Santa Barbara Co., near mouth of Santa Maria R., *E.R.Blakley 5162* (CAS); Humboldt Co., Little R., 4 Aug 1929, *A.A.Heller 14996* (PR).

247. *Juncus haenkei* E.Mey., *Syn. Junc.* 10 (1822)

Juncus compressus var. *haenkei* (E.Mey.) Laharpe, *Essai Monogr. Junc.* 26 (1825); *Juncus balticus* var. *haenkei* (E.Mey.) Buchenau, *Bot. Jahrb. Syst.* 12: 215 (1890). T: Ad sinum Nutkaensem, *T.Haenke*; holo: W.

Juncus arcticus subsp. *sitchensis* Engelm., *Trans. Acad. Sci. St. Louis* 2: 445 (1866), *nom. inval.* [not accepted by its author]; *Juncus arcticus* var. *sitchensis* Engelm., *Trans. Acad. Sci. St. Louis* 2: 491 (1968), *Juncus balticus* subsp. *sitchensis* (Engelm.) Hultén, *Acta Univ. Lund.*, ser. nov., sect. 2, 39(2): 420 (1943). T: Kodiak; syn: *n.v.*; Sitka; syn: *n.v.*; Kamschatka; syn: *n.v.*

Illustrations: V.I.Krechetovich & N.F.Goncharov, in V.L.Komarov, *Fl. SSSR* 3: 534, tab. 29 (1935); Y.Satake, *J. Jap. Bot.* 9(7): 422, fig. 20 (1933); E.Hultén, *Fl. Alaska* 285 (1968); V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 65, tab. 4 (1985).

Map: E.Hultén, *Kongl. Svenska Vetenskapskad. Handl.*, ser. 5, 8(5): map 18 (1962), as *Juncus arcticus* subsp. *sitchensis*; V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 68, fig. 17 (1985) [Russian Far East]; E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 99, map 198 (1986), as *Juncus arcticus* subsp. *sitchensis*.

Perennials, 30–50 (–65) cm tall, forming loose to dense stands, with ±short-noded, creeping rhizome. Cataphylls 3–4; upper cataphyll 7–10 cm long, with 0–1 mm long awnlike blade, yellowish-brown, dull distally, glossy at base. Stem leafless, terete, firm, 1.5–2.5 mm thick, green, smooth or 40–60 very inconspicuous ridges when dry, without subepidermal sclerenchyma strands; pith in mature stems cobwebby and partly evanescent; epidermis cells uniform; vascular bundles in two indistinct rows. Inflorescence pseudolateral, mostly 1–2.5 cm long, dense; flowers 6–10, loosely aggregated, Lower bract (6–) 12–20 (–30) cm long, several times longer than inflorescence and $\frac{1}{5}$ – $\frac{1}{2}$ as long as stem. Bracteoles 1.5–2.5 mm long, ovate, ±acute. Outer tepals (5–) 6.5–7.5 mm long, conspicuously longer than inner ones and often unequal, narrowly lanceolate, acuminate-cuspidate with often reflexed tip; inner tepals acute to acuminate, all reddish-brown with greenish central band and very narrow scarious margin, often ±wholly castaneous. Stamens 6; anthers (0.7–) 1.0–1.5 mm long, equalling to 1.5× as long as 0.8–1.0 mm filaments; style 0.3–0.4 mm long; stigmas c. 0.7–1.5 mm long. Capsule triseptate, trigonous, oblong-ovoid, 5–6.5 mm long, shorter than or rarely equalling tepals, abruptly tapering to c. 0.5 mm mucro, dark brown. Seeds ovoid to broadly ellipsoid, (0.6–) 0.7–0.8 × c. 0.4 mm, faintly reticulate; appendages absent. $2n = 80$, *vide* R.L.Taylor & G.A.Mulligan, *Fl. Queen Charlotte Is.* 2: 42 (1968).

N Pacific coast of N America, Japan, Russian Far East, Korea and probably also in NE China. 31: KAM, KHA, KUR, MAG, PRM, SAK. 38: JAP, KOR. 70: ALU, ASK. 71: BRC. Wet sandy places, often seashores. Map 463.

31. KAMCHATKA: Petropavlovsk, 16 Aug 1928, *W.J.Eyerdam* (S). KURIL IS.: Urup, Tokokan Bay, 5 Aug 1929, *S.Bergman* (S). SAKHALIN: Sorioska, 2 Sep 1908, *U.Faurie* 843 (W). **70.** ALEUTIAN IS.: St. Paul Is., 17 Jul 1938, *J.P.Anderson* 4021 (LD); Unalaska, 21 Jul 1938, *J.P.Andersson* 4160 (LD); Akutan, 26 Jul 1934, *Norberg* 538 (LD); Atka, 12 Jul 1932, *W.J.Eyerdam* 1333 (LD). ALASKA: Sitka [Sitcha], *Ledebour* (LD); Skagway, 24 Jul 1934, *J.P.Anderson* 1711 (S); Mendenhall, 14 Jun 1925, *J.P.Anderson* 2A173 (S). **71.** BRITISH COLUMBIA: Queen Charlotte Is., Copper Ck, 28 Jun 1957, *J.A.Calder*, *D.B.O.Savile* & *R.L.Taylor* 21929 (W).

248. *Juncus lesueurii* Bol., *Proc. Acad. Sci. Calif.* 2: 179 (1863)

T: [California] Swamps, San Francisco, *H.N.Bolander* 2343; lecto: CAS, *designated here*; iso: MO.

Juncus balticus subsp. *pacificus* Engelm., *Trans. Acad. Sci. St. Louis* 2: 442 (1866); *Juncus pacificus* (Engelm.) B.D.Jacks., *Ind. Kew.* 1258 (1895), *nom. illeg.* T: California, Swamps, San Francisco, *H.N.Bolander* 2343; lecto: MO, *designated here*; iso: CAS.

Illustrations: F.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 148, fig. 75 (1906); L.R.Abrams, *Ill. Fl. Pacific States* 1: 354, fig. 862 (1923); H.L.Mason, *Fl. Marshes California* 350, fig. 170 (1957).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 217 (2000).

Perennials, (25–) 40–140 cm tall, often forming extensive stands; rhizome up to 6 mm thick, tough, with nodes 5–10 mm long, some branches short with dense groups of stems. Stem leafless, ±soft, terete to slightly compressed, c. 1–3 mm thick, smooth (ridges inconspicuous or lacking); subepidermal sclerenchyma strands lacking; vascular bundles in two rows, separated by a row of tubes; pith a network of cells with ±irregular processes, cobwebby and evanescent in mature stems. Cataphylls 3–4; upper cataphylls 5–12 cm long, ±conspicuously lax, light stramineous to light reddish-brown, usually shining. Lower bract (3–) 5–15 (–25) cm long, much exceeding the inflorescence. Inflorescence pseudolateral, c. (1–) 1.5–5 cm, of (1–) 2–5 clusters; flowers usually (10–) 30–60 (–100), in one large sessile cluster and 1–4 pedunculate ones; peduncles stout, erect, 0.3–3 (–4.5) cm long, to c. 1 mm thick. Bracteoles broadly ovate, obtuse to acute, 2–3 mm long, brownish castaneous at base, distally membranous. Outer tepals 5–8 mm long, usually exceeding inner (to 6.5 mm long), all lanceolate, apiculate or inner acute, brown with green central band; margin membranous above, broader in the inner. Stamens 6; anthers (0.9–) 1.5–2.3 mm long; filaments 0.2–0.6 (–0.9) mm long; style 1.0–1.2 mm long; stigmas 2–3 mm long. Capsule 4–7 mm long, shorter than or subequal to tepals, obovoid to narrowly ovoid, acute, dark brown, trilobular, with mucro c. 0.3–0.4 mm long. Seeds 0.6–0.7 × 0.3–0.4 mm, obovoid to ellipsoid, dark amber, indistinctly reticulate; appendages absent.

Probably confined to Oregon and California. The taxon may represent a hybrid derivative of *J. breweri* and *J. balticus* parentage. Reported from Argentina and Chile but the Argentinean

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material differs from that of California in the shape of inflorescence and size of floral parts, and requires further study. The South American material assigned to *J. lesueurii* in herbaria mostly belongs to *J. balticus* subsp. *andicola*. 73: ORE. 76: CAL. Borders of salt or freshwater marshes, dune slacks, in sand on seashores and river courses, even in mobile dunes, 0–100 m in California, probably also much higher in Argentina. Map 464.

73. OREGON: Lincoln Co., Yakone Beach, S of Walport, 7 Aug 1938, *G.W.Turesson & C.G.Alm* 725 (LD). 76. CALIFORNIA: San Francisco Bay, 28 Jul, 12 Aug & Sep 1866, *A.Kellogg* [*G.Engelmann, Herb. Junc. Bor.-Amer. Norm.*] 6 (CAS, MO, PR, UC); Humboldt Co., Dry Lagoon, S of Orick, 5 Aug 1938, *G.W.Turesson & C.G.Alm* 697 (LD); Monterey Co., Monterey Peninsula, 17 miles Drive, *G.W.Turesson & C.G.Alm* 559 (LD). 85. ARGENTINA: Patagonia, Sysen R., 14 Jan 1897, *P.K.H.Dusén* (LD); Mendoza, Aconcagua, Puente del Inca, 2 Feb 1903, *G.O.A.Malme* 2874 (LD, S).

249. *Juncus fauriei* Lév. & Vaniot, *Bull. Soc. Bot. France* 51: 292 (1904)

T: Japan, Aomori, Oct 1900, *U.Faurie* 4323; lecto: E, designated here [the other original syntype, Japan, Yezo, Shirotoko, 25 Aug 1893, *U.Faurie* 10962 (K, two specimens), belongs to *Juncus beringensis*. The name *Juncus fauriei* is not considered a later homonym of *J. fauriensis*, see ICBN, Art. 53.3, Ex. 10.].

Juncus glaucus var. *yokoscensis* Franch. & Sav., *Enum. Pl. Jap.* 2: 97 (1879); *Juncus yokoscensis* (Franch. & Sav.) Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 59 (1938), *nom. superfl.* T: [Japan] Nippon, circa Yokoska, *P.A.L.Savatier* 1353bis; holo: P.

Juncus balticus var. *japonicus* Buchenau, *Bot. Jahrb. Syst.* 12: 215 (1890). T: [citation: Japan, auf Jesso und Kiusiu, gesammelt von C.J.Maximowicz] Japan [Hokkaido], Hakodate, 27 Jun 1861, *C.J.Maximowicz*; syn: W; Japan, Kyushu, Higo, Miadzi, 1863, *C.J.Maximowicz*; syn: BM, K, LE.

Juncus yokoscensis var. *laxus* Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 61 (1938). T: [Japan] Kyusyu, prov. Bungo, Ohita Pref., Ohno-gun, Sugao-mura, bank of Ohno R., 25 May 1930, *Z.Tashiro*; holo: TI.

Illustrations: Y.Satake, *J. Jap. Bot.* 9(7): 423, fig. 21 (1933); Y.Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 60, fig. 15 (1938); H.Balslev in [*The Asahi Shinbun World of Plants*; in Japanese] 122: 38 (1996).

Perennials, 20–50 cm tall; rhizome creeping, usually short-noded, or rarely internodes to c. 1 cm. Cataphylls 2–4; upper cataphylls c. 3–5 cm long, ±tight, abaxially pale to deep yellow-brown above, often glossy and brown at base, adaxially yellowish silvery. Stems in dense rows, leafless, subterete, ±compressed, ±twisted to flexuose or ±straight, thin, usually to 1 mm diam., deep green, shallowly, and irregularly striate; subepidermal sclerenchyma strands absent; pith continuous, of ±rounded to slightly astericiform cells. Lower bract c. (2–) 3–6 (–10) cm long, usually slightly to conspicuously longer than inflorescence, c. $\frac{1}{3}$ – $\frac{1}{6}$ as long as stem. Inflorescence pseudolateral, 2–4 (–8) cm long, usually loose, with 2–4 thin, often flexuose main branches, usually 5–10 (–14)-flowered; flowers solitary. Bracteoles ovate, acute to acuminate, to c. 1.5 mm long, scarious-yellowish. Tepals ±equal or outer ones slightly longer, (3.5–) 4.2–4.8 mm long, broadly lanceolate, acute to acuminate; central band greenish, distinct, usually bordered dark castaneous-brown to blackish brown; margins distinct, membranous. Stamens 6; anthers (1.2–) 1.4–2.0 mm long, at least 4–6× as long as c. 0.3 (–0.4) mm filaments; style c. 0.8–1.3 mm long; stigmas c. 0.8–1.4 mm long. Capsule triseptate (to almost trilocular), c. 4.5–5 mm long, ±exceeding perianth, dark brown, acute, mucronate; mucro 0.4–0.5 mm long, thick. Seeds ovoid, 0.5–0.7 × c. 0.3 mm, apiculate, (apices usually whitish); outer seed coat indistinctly sculptured.

Confined to the Russian Far East and Japan. 31: KUR. 38: JAP. Sandy shores, wet meadows, along streams. Map 465.

38. JAPAN: Honshu, Shimousa, May 1920, *T.Nakai* (TI); Honshu, Ishikawa, 16 Nov 1952, *N.Satomi* 16377 (TI); Honshu, Ishikawa, Hakui-gun, Takamatsu, 31 May 1951, *N.Satomi* 16375 (TI); Honshu, Niigata, *U.Faurie* 173 (P); Niigata Pref., Nenzugaseki, 29 Jul 1939, [*collector not transliterated from Japanese script*] (TI); Honshu, Aomori Pref., Jul 1909, *E.Kinashi* (TI); Hokkaido, Yubutsu, *U.Faurie* 7206 (W); Hokkaido, Hakodate, 1926, *T.Satow* (TI); Aburagawa in Aomori, 18 Aug 1913, *Anonymous* (S); Mutsu, Kita-tsugaru, Aichi, 20 Jun 1952, *M.Furuse* 20991 (S).

250. *Juncus nupela* Veldkamp, *Blumea* 23: 415 (1977)

T: Papua New Guinea, Star Mountains, West Sepik, Tel Basin, Camp 2, 2900 m, 8 Apr 1975, *J.F.Veldkamp* 6369; holo: L; iso: K, NSW.

Illustration: K.L.Wilson & L.A.S.Johnson, *Telopea* 9: 372, fig. 2 (2001).

Perennials, 30–60 cm tall; stems solitary and in small tufts from the creeping rhizome. Cataphylls 3–4; upper cataphylls to 8 (–10) cm long, tight, obtuse without mucro, stramineous above, dull, brown at base. Stem leafless, subterete, ±compressed, slightly twisted, 1–1.5 mm thick, dull-green (or ±greyish green), inconspicuously 30–35 (–50)-striate; subepidermal sclerenchyma strands absent; pith continuous, ±arachnoid, of astericiform cells. Lower bract 5–8.5 cm long, at least twice as long as inflorescence. Inflorescence pseudolateral, 1–3.5 cm long; flowers 3–9, solitary or loosely clustered on a branch. Bracteoles c. 2 mm long, ovate, brownish-membranous. Tepals 5–6 mm long, subequal or inner ones shorter, narrowly lanceolate, acuminate, castaneous with green central band and narrow whitish membranous margins, or margins entirely castaneous-brown. Stamens 6; anthers (1.2–) 1.6–1.8 mm long, 4–4.5× as long as 0.3–0.4 mm filaments; style c. 0.7–1.0 mm long; stigmas c. 1.0–1.3 mm long. Capsule unilocular, triseptate, mature unknown. Seeds unknown. Fig. 146.

Papua New Guinea, only known from the type locality. 42: NWG. Bank of rivulet in grassland, 2900 m. Map 466.

This species is certainly most closely related to *J. fauriei* and *J. balticus* subsp. *ater*. The New Guinea population may be a result of a relatively recent introduction, and then a derivative of either of the two most similar taxa.

251. *Juncus parryi* Engelm., *Trans. Acad. Sci. St. Louis* 2: 446 (1866)

Juncus drummondii var. *parryi* (Engelm.) M.E.Jones, *Bull. Montana Univ., Biol. Ser.*, 15: 22 (1910). T: Colorado, Clear Creek, 1861, *C.C.Parry* 360; syn: MO; Colorado, E.Hall & J.P.Harbour 561; syn: *n.v.*; Sierra Nevada, *W.Hillebrand*; syn: *n.v.*; Cascade Mountains, *D.Lyall*; syn: *n.v.*

Illustrations: W.L.Jepson, *Fl. Calif.* 1: 250, fig. 39h (1921); C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 206 (1969).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 213 (2000).

Perennials, 5–30 cm tall, densely caespitose, with very short-noded, 2–4 mm thick rhizome. Stem terete, 0.5–1 mm thick, smooth, greyish green, with c. 20 inconspicuous ridges; subepidermal sclerenchyma strands absent; pith in mature stems of astericiform cells, irregular or ±continuous. Cataphylls 3–4, ±tight, 1–5 cm long, stramineous or light reddish brown; lower cataphylls without blades or blade awn-like; uppermost cataphyll with a blade 3–6 cm long, grooved at base, terete above; auricles scarious, 0.2–0.3 mm long, obtuse to acute. Lower bract erect, 1.5–4 cm long, usually much exceeding inflorescence. Inflorescence pseudolateral, of 1–3 (–7) solitary flowers (rarely distal flowers in pairs) on erect peduncles 1–7 (–15) mm long. Bracteoles broadly ovate, ±obtuse to subacute, 2–3 mm long; outer bracteole sometimes with a mucro, castaneous at base, scarious above and along margins. Tepals unequal; outer tepals longer, 5.5–9 mm long, lanceolate, apiculate to cuspidate; central band greenish to stramineous, 3–5-veined, bordered castaneous; margins ±membranous. Stamens 6; anthers 1.1–1.6 mm long; filaments 0.6–1.0 mm long; style c. 0.3–0.6 mm long; stigmas 1.0–1.5 mm long. Capsule trilocular, narrowly oblong-triangular, c. 6–9 × 1.5–2.0 mm, usually exceeding perianth, subabruptly narrowing into acuminate mucro 0.3–0.8 mm long, light brown. Seeds c. 0.5–0.7 × 0.2–0.3 mm, finely striate, amber, with two appendages c. 0.4 mm long. Fig. 133.

Mountains of western USA and Canada, from British Columbia south to the Sierra Nevada. 71: ABT, BRC. 73: COL, IDA, MNT, ORE, WAS, WYO. 76: CAL, NEV, UTA. Exposed rocky slopes, stream-banks and meadows in montane to alpine areas, 1500–3500 m. Map 467.

71. BRITISH COLUMBIA: Noaxe Lake, 4 Aug 1957, *Brink* (LD, UBC); Garibaldi Park, Black Tusk Meadows, 3 Sep 1969, *T.C.Brayslaw & J.B.Foster* (PRA). 73. COLORADO: 'Rocky Mt. Alpine Flora, lat. 39°–41°', 1862, *E.Hall & J.P.Harbour* 561 (PR). IDAHO: Valley Co., Sawtooth Mtns, Gold Fork Lookout, *J.W.Thompson* 13762 (PR). WASHINGTON: Mt. Adams, 16 Aug 1882, *T.Howell* (PR); Mt. Baker, Aug 1915, *G.W.Turesson* (LD); Chinook Pass, Pierce Co., Mt. Rainier, 1400 m, 17 Aug 1935, *W.J.Eyerdam* (LD); Jefferson Co., Marmot Pass, 18 Aug 1933, *Thompson* 9884 (LD). WYOMING: Beartooth Mts, Park Co., Shoshone National Forest, Long Lake, 3 Aug 1937, *E.F.Williams* 3754 (LD).

JUNCACEAE (*Juncus*)



Figure 133. *Juncus parryi*. A, habit; B, flower with capsule. *Juncus drummondii*. C, habit; D, E, flower with capsule; F, seed. *Juncus hallii*. G, habit; H, flower with capsule; I, seed. Drawn by J.R.Janish. Reproduced with permission from C.L.Hitchcock, A.Cronquist, M.Ownbey & J.W.Thompson, *Vasc. Pl. Pacif. Northw.* 1: 192, 198, 206 (1969). © University of Washington Press.

252. *Juncus drummondii* E.Mey., in C.F. von Ledebour, *Fl. Ross.* 4: 235 (1853)

Juncus arcticus var. *gracilis* Hook., *Fl. Bor.-Amer.* 2: 189 (1840). T: At a great elevation in the Rocky Mts, *T.Drummond*; syn: K.

Juncus drummondii var. *humilis* Engelm., *Trans. Acad. Sci. St. Louis* 2: 445 (1866). T: [California] Mt. Shasta, 8400 ft. [c. 2600 m], 13 Sep 1862, *W.H.Brewer 1383*; holo: MO.

Juncus compressus var. *subtriflorus* E.Mey., *Linnaea* 3: 368 (1828); *Juncus subtriflorus* (E.Mey.) Coville, *Contr. U.S. Natl. Herb.* 4: 208 (1893), *nom. superfl.*; *Juncus drummondii* var. *subtriflorus* (E.Mey.) C.L.Hitchc., *Vasc. Pl. Pacif. Northw.* 1: 193 (1969). T: Unalaska, *A.Chamisso*; syn: W, LE.

Juncus drummondii var. *longifructus* H.St.John, *Proc. Biol. Soc. Wash.* 44: 29 (1931). T: Washington, Grouse Ridge, 8 Aug 1923, *H.St.John 5018*; holo: WS.

Juncus pauperculus O.Schwarz, *Feddes Repert. Spec. Nov. Regni Veg.* 64: 26 (1961), *nom. illeg., non Rafin.* (1840). T: Columbia canadensis, in monte Seymour prope Vancouver, ca. 1600 m, 'cult in Horto Botanico Jenensi ex seminibus loci natalis'; holo: JE.

Juncus drummondii f. *davisonii* H.St.John, *Proc. Biol. Soc. Wash.* 44: 30 (1931). T: Washington, Jefferson Co., Mt. Anderson, 31 Aug 1928, *R.T.Davison*; holo: WS.

Illustrations: F.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 143, fig. 73 (1906); C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 192 (1969).

Maps: E.Hultén, *Fl. Alaska* 287 (1968); R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 214 (2000).

Perennials, 10–40 cm tall, densely caespitose; rhizome very short-noded, sometimes with 2–3-leaved short-shoots. Stem leafless, terete, 0.5–1.5 mm in diam., greyish green, with 15–20 inconspicuous ridges; subepidermal sclerenchyma strands absent; pith of astericiform cells, initially continuous, later evanescent. Cataphylls 3–5, 2–6 cm long, tight, stramineous to pale brownish, abaxially ±glossy; uppermost cataphyll with a tiny blade 2–8 mm long. Lower bract erect, thin, c. 0.5–3.0 cm long, slightly shorter to conspicuously longer than inflorescence. Inflorescence pseudolateral, of 1–3 (–5) solitary flowers on 0.3–0.8 (–1.5) cm long peduncles. Bracteoles ovate, c. 2.5 mm long, castaneous at base; margins ±scarious. Tepals ±unequal with outer tepals slightly longer, 4–7 (–8) mm long, lanceolate, acuminate (inner ±acute), dark castaneous-brown to brown; central band greenish; margins ±membranous. Stamens 6; anthers c. 1.0–1.6 mm long; filaments 0.7–1.3 mm long; style c. 0.2 mm long; stigmas reddish, to 1.5 mm long. Capsule trilocular, trigonous oblong-ovoid, 4.5–8 × 1.8–2.2 mm, ±truncate (segments often ±emarginate), ±equalling to exceeding perianth, deep to dark castaneous-brown. Seeds ellipsoid, 0.5–0.6 × 0.2–0.3 mm, pale brown, striate; appendages 2, usually 0.5–1.0 mm long. Fig. 133.

Western USA and Canada from New Mexico and Arizona to Alaska. 70: ALU, ASK, NWT, YUK. 71: ABT, BRC. 73: COL, IDA, MNT, ORE, WAS, WYO. 76: CAL, NEV, UTA. 77: NWM. Exposed slopes, stream banks and meadows in montane to alpine areas. Map 468.

70. ALASKA: Whittier, 20 Jul 1979, *Jørgensen W38* (LD). 71. ALBERTA: Lake Louise, 20 Sep 1921, *S.J.Enander* (S). BRITISH COLUMBIA: 2 km WNW of Marble Peak, 15 Aug 1985, *A.Ceska & R.T.Oglivie 20161* (PRC). 73. MONTANA: Beartooth Mtns, SW of Red Lodge, *A.Cronquist 8042* (LD, NY, S). WASHINGTON: Mt. Paddo, 17 Aug 1910, *W.Suksdorf [A.Kneucker, Cyper. Junc. Exs.] 258* (PR, PRA); Chelan Co., Mt. Stuart, 27–31 Jul 1931, *Thompson 7702* (LD); Olympic Peninsula, Mt. Airgeler, Aug 1931, *Jones 3667* (LD). WYOMING: Telephone Mines, Albany Co., 1 Aug 1900, *A.Nelson 7890* (LD, RM); Beartooth Lake, Shoshone National Forest, Park Co., 23 Jul 1937, *E.F.Williams 3673* (LD). 76. UTAH: Uinta Mts, Mt. Agassiz, 3400–3600 m, 25 Aug 1973, *S.-W.Breckle 2806* (LD).

The species is variable in the length of tepals and capsule and in general habit. Plants with capsule much exceeding perianth (e.g., *A.Ceska & R.T.Oglivie 20161*) have sometimes been recognized as a separate species. The extreme variants, however, frequently coexist in populations and show little correlation with other characters, intermediates being quite common.

253. *Juncus hallii* Engelm., *Trans. Acad. Sci. St. Louis* 2: 433 (1866)

T: USA, Colorado, Lake Ranch, *E.Hall & J.P.Harbour 562*; holo: MO; iso: K.

Illustration: C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 198 (1969).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 213 (2000).

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Perennials, 20–40 cm tall, densely caespitose, with very short-noded rhizome 1–4.5 cm long. Stem with 1 (–2) basal leaves, terete, slender, 0.5–1.0 mm thick above upper sheath, with 10–20 low inconspicuous ridges (dried); subepidermal sclerenchyma strands lacking; pith white, hollow, not chambered. Cataphylls 4–6, 20–42 mm long, tight; lower cataphylls pale to medium brown, bladeless or with small awnlike blades 0.5–2.5 mm long; uppermost cataphyll with well-developed blade, green to pale brown, with wide fragile scarious margin; margins slightly loose and overlapping to within 1.5–4.0 mm of sheath apex; auricles scarious, obtuse, c. 0.5 mm long. Leaf blade 5–14 (–15) cm long, terete, grooved at base, with low inconspicuous ridges (dried), 0.45–0.9 mm thick at base. Inflorescence pseudolateral, 0.7–2.1 cm long, loose to congested; flowers 2–7, solitary; first bract erect, 10–27 mm long, less than to usually equal or exceeding inflorescence. Bracteoles ovate, pale. Outer tepals 3–5-veined, (4–) 4.6–5.1 (–5.3) mm long, longer than inner ones, all acute and lanceolate or broadly so, light to medium brown with green central band and scarious margin, loosely subtending capsule at maturity. Stamens 6; anthers 0.6–1.2 mm long (dried); filaments 0.7–1.2 mm long; anthers c. equalling filaments. Style c. 0.1 mm long; stigmas 0.3 mm long. Capsule shiny, brown, blunt, retuse, oblong-ovoid to oblong or oblong-obovoid, (3.5) 4.4–4.6 (5.0) × 1.5–3.0 mm, ±equalling perianth, trilocular. Seed body medium brown to amber, finely striate, 0.5–0.6 mm, with dark tips; appendages 2, pale, 0.2–0.35 mm long. Fig. 133.

Mountains of middle west USA. 73: COL, IDA, MNT, WAS, WYO. 76: UTA. Records from Washington are erroneous. Reported from New Mexico but material not seen. Exposed slopes, stream banks, and meadows in montane to alpine areas, 1600–3500 m. Map 469.

73. IDAHO: Bonneville Co., Caribou Range, Jensen Ck road, *N.H.Holmgren 5607 & V.Marttala* (WTU). MONTANA: Madison Co., Ennis, Call Rd., *F.J.Hermann 17883* (W). WYOMING: Sheridan Co., head of Marcum Ck, *L.O.Williams & R.Williams 3272* (WTU); Sheridan Co., South Tongue R. near the mouth of Marcum Ck, *L.O.Williams & R.Williams 3100* (C, WTU). 76. UTAH: Garfield Co., top of Boulder Mountain, pond in lower Long Draw, 18 Jul 1990, *J.S.Tuhy 3570* (WTU); Summit Co., Uinta Mtns, 1.6 km N of Henry's Fork Lake, *B.Maguire, D.A.Robbso, R.R.Maguire 14743* (WTU).

254. *Juncus jacquinii* L., *Mant. Pl.* 1: 63 (1767)

Juncus atratus Lam., *Encycl.* 3: 271 (1789), *nom. illeg., non Krock.* (1787). T: [Austria] Schneeberg austriae; holo: Jacquin *Vindob.* P. 237, tab. 4, fig 2 [N.J.Jacquin, *Enum. Stirp. Vindob.*, tab. iv, fig. 2 (1762)].

Juncus castaneus Clairv., *Man. Herbor. Suisse* 104 (1811), *nom. illeg., non Sm.* (1800). T: *Haller 1316* [Haller, *Hist. Stirp. Helv.* 2: no. 1316 (1768)] No. 26 Oberstafel; lecto: P-Haller, *designated here*.

Juncus jacquinii var. *biceps* Beck, *Fl. Nieder-Österreich* 1: 154 (1890). T: [Austria] Raxalpe, *Ötscher*; *syn: n.v.* Illustrations: N.J.Jacquin, *Enum. Stirp. Vindob.*, tab. iv, fig. 2 (1762); T.Host, *Icon. Descr. Gram. Austriac.* 3: tab. 93 (1805); H.E.Hess, E.Landolt & R.Hirzel, *Fl. Schweiz* 3: 506 (1967); S.Pignatti, *Fl. Ital.* 3: 437 (1982).

Perennials, 10–40 cm tall, caespitose or forming very dense stands of flowering and few non-flowering shoots; rhizome short-noded. Stem leafless except the first bract at base of peduncle, terete, c. 1 mm thick, smooth or with 10–15 inconspicuous ridges when dry; subepidermal sclerenchyma strands broad, outside, joining the largest vascular bundles; pith of cells with long irregular processes, ±evanescent and arachnoid in mature stems. Cataphylls 4–5; upper cataphyll 2–5 cm long; one or a few with a small awn-like blade. Non-flowering shoots also with several cataphylls and 1 (–2) stem-like leaves. Leaf 1, stem-like, erect, inconspicuously canaliculate at base, with a ±broad sheath, exceeding the inflorescence. Inflorescence appearing apical because of the up to 3 (–6) cm long peduncle, dense, headlike; flowers 5–15. Bracteoles short, broadly ovate, obtuse. Tepals 4–8 mm long, equal, or inner ones slightly longer, subulate, dark castaneous brown to blackish, shining. Stamens 6; anthers 1.8–2.5 mm long, 2–4× as long as filaments; style 1.5–2.5 mm long; stigmas 4.5–6.5 mm long, erect, purple. Capsule 3–4 mm long, shorter than or equalling tepals, trigonous-ovoid to prismatic, obtuse to retuse, mucronate, trilocular, dark. Seeds 1 mm long, narrowly spindle-shaped, yellowish to reddish-brown; appendages 2, fusiform, white, 0.5–0.8 mm long. $2n > 150$ (S.Snogerup, unpubl), no exact count available.



Figure 134. *Juncus patens*. A, habit; B, flower with capsule; C, seed. Drawn by J.R.Janish. Reproduced with permission from C.L.Hitchcock, A.Cronquist, M.Ownbey & J.W.Thompson, *Vasc. Pl. Pacif. Northw.* 1: 206 (1969). © University of Washington Press.

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Confined to the European Alps where it is relatively frequent. 11: AUT, GER, SWI. 12: FRA. 13: ITA, YUC. Alpine wet meadows and shores of alpine lakes on non-calcareous substrate, 1580–3400 m. Map 470.

11. AUSTRIA: Vorarlberg, Radsattel, 2652 m, *Sauer 24804* (M); Kärnten, Karnische Alpen, Rauchkogel, 1990–2300 m, *Sauer 15442* (M); Tirol, Weissenbach, 2240 m, *G.Treffer [F.W.Schultz, Herb Norm.] 946* (LD). SWITZERLAND: Zermatt in Wallis, Schwarzsee, 2589 m, *O.Wolf [A.Kneucker, Cyper. Junc. Exs.] 80a* (LD, PRA); Wallis, Fenetre Lake in Ferret Valley, 2400 m, *A.Charpin & M.-A.Thiébaud 74* (G, LD); Val d'Uina, Lais da Rims, Unter Engadin, 2566 m, 2 Aug 1949, *Simon* (LD). 12. FRANCE: Haute-Savoie, L'Ecot, *S.J. van Oostroom 22816* (L). 13. ITALY: Piemonte, Ghiaccino del Lys (Monte Rosa), Aug 1923, *Negri* (FI); Dolomiti, Val del Pan, 2400 m, *E.Werdermann & Meyer 161* (B, LD).

255. *Juncus patens* E.Mey., *Syn. Luzul.* 28 (1823)

T: California, Monterey, *T.Haenke s.n.*; lecto: PR, *designated here*; iso: PRC.

Illustrations: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 132, fig. 71 (1906); H.L.Mason, *Fl. Marshes California* 356, fig. 173 (1957); C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 206 (1969).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 215 (2000).

Perennials, 30–90 (–110) cm tall, forming dense often tussock-like stands; rhizomes short-noded, densely branching, 2.5–5 mm thick. Stem leafless, terete, 1–2.5 mm thick, ±hard, green or glaucous; ridges 15–25, conspicuous; subepidermal sclerenchyma strands present, forming radial lamellae and some connected to medium-sized vascular bundles; epidermis cells larger on the ridges; bundles in 2–3 rows; pith of astericiform cells, continuous, becoming arachnoid and partly evanescent. Cataphylls 3–4, lax; longest cataphylls 4–10 cm long, abaxially dull, dark red-brown and ±glossy at base, distally stramineous, adaxially stramineous-brownish; upper cataphylls with up to 5 mm long awn-like blade. Lower bract 6–25 cm long, exceeding inflorescence, often curved; sheath narrow with c. 0.3 mm wide membranous margin. Inflorescence pseudolateral, 2–9 cm long, loose to congested, usually 15–40-flowered. Bracteoles 0.5–1.2 mm long, often unequal, ovate, acute, membranous. Outer tepals 2.3–3 mm long, equalling or slightly longer than inner ones, all narrowly lanceolate, acuminate-cuspidate, widely spreading around the ripe capsule, greenish, light brown or reddish with broad scarious margins. Stamens 6; anthers 0.4–0.6 mm long; filaments 0.6–1 mm long; style c. 0.1 mm long; stigmas c. 0.5–0.8 mm long. Capsule 2–2.7 mm long, equalling or exceeding perianth, subglobose-trigonous, shortly mucronate, trilobular. Seeds 0.4–0.5 × c. 0.3 mm, obovate, inconspicuously reticulate, dark amber; appendages absent. Fig. 134.

W coastal part of USA, NW and C Mexico. 73: ORE, WAS. 76: CAL. 79: MXC, MXN. Shores of watercourses, wet sandy or clay soil, 0–300 m. Map 471.

73. OREGON: Polk Co., N of Monmouth, *R.R.Halse 2903* (UBC); Lane Co., Coyote Ck crossing road from Loraine to Crow, *Steward 6613* (LD). WASHINGTON: Clark Co., NW of Lacamas Lake, *P.F.Zika 15799* (WTU). 76. CALIFORNIA: San Francisco, Lobos Ck, *A.Kellogg [G.Engelmann, Herb. Junc. Bor.-Amer. Norm.] 13* (MO, PR); Laguna Honda, *L.S.Rose 38247* (LD); Napa Co., 5 km NE of Napa, *L.S.Rose 46264* (LD); Santa Cruz, 10 Jul 1882, *C.G.Pringle s.n.* (LD, NSW, PR); Santa Clara Co., Palo Alto, *L.R.Abrams 2231* (LD); Palo Alto, *C.F.Baker 3437* (NSW); Orange Co., Oak Flats, *S.Boyd 7714 & F.Roberts* (NSW). 79. MEXICO CENTRAL: Puebla, Santa Barbara, Jul 1909, *Nicolas s.n.* (P).

256. *Juncus gymnocarpus* Coville, *Mem. Torrey Bot. Club* 17: 106 (1894)

Juncus smithii Engelm., *Trans. Acad. Sci. St. Louis* 2: 444 (1866), *nom. illeg., non* Kunth (1841). T: USA, Pennsylvania, Broad Mountain near Pottsville, Jun 1865, *C.E.Smith*; holo: MO.

Illustrations: H.A.Gleason, *New Britton & Brown Illustr. Fl. NE. U.S.* 1: 389 (1958); R.K.Godfrey & J.W.Wooten, *Aquat. Wetl. Pl. S.E. U.S.* 547, fig. 316 (1979).

Map: R.E.Brooks & S.E.Clemants, *Fl. North Amer.* 22: 213 (2000).

Perennials, 35–80 (–100) cm tall; rhizome creeping, 2–4 mm in diam., with internodes c. 0.5–1.0 cm long. Stems in rows, forming loose stands, terete, 1.5–2.5 mm in diam., smooth, or slightly striate when dry; subepidermal sclerenchyma strands present; ridges c. 25–35; pith continuous, of astericiform cells. Basal cataphylls 1–2, ovate, red-brown to stramineous, shiny; other cataphylls 2–3, red-brown at base, otherwise stramineous to greenish, with longest one c. 5–9 cm long, tight, not shiny, with a short acicular blade. Lower bract erect,

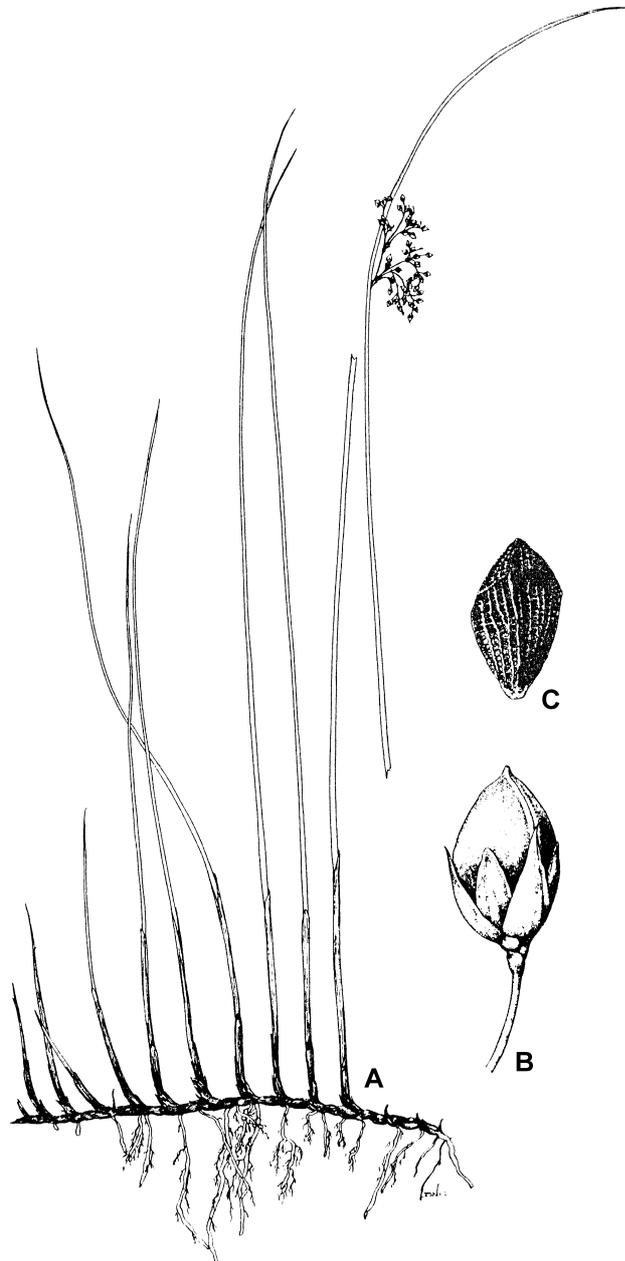


Figure 135. *Juncus gymnocarpus*. A, habit; B, perianth with capsule; C, seed. Drawn by B.N.Culbertson. Reproduced with permission from R.K.Godfrey & J.W.Wooten, *Aquat. Wetl. Pl. S.E. U.S.* 547, fig. 316 (1979). © The University of Georgia Press, Athens.

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an apparent prolongation of stem, c. 10–25 cm long, much exceeding inflorescence. Inflorescence ±loose, 8–30 (–50)-flowered, 1.5–4 cm long, usually of 2–6 main branches, flowers usually on distinct pedicels. Bracteoles broadly ovate, c. 1 mm long, membranous to scarious. Tepals subequal, ±appressed to capsule, ovate-lanceolate; outer tepals 1.8–2.5 mm long, ±acute; inner tepals to c. 2.2 mm long, acute to obtuse and mucronate; central band prominent, light brown to greenish-brown; margins broad, ±scarious. Stamens 6; anthers 0.5–0.7 mm long; filaments 1.0–1.3 mm long; style 0.3–0.5 mm long; stigmas c. 1 mm long. Capsule trilocular, ovoid, subobtuse, conspicuously exceeding perianth, 2.4–3.2 mm long including a broad-based c. 0.3 mm rostrum, shiny, pale brown to brown. Seeds ovoid, apiculate, c. 0.7–0.9 × 0.2–0.3 mm including loose apices of outer seed coat, indistinctly reticulate. Fig. 135.

Confined to E United States. 75: PEN. 78: FLA, MSI, NCA, SCA, TEN. Sphagnum swamps, low woods, edges of lakes, 600–1500 m. Map 472.

75. PENNSYLVANIA: Schuylkill Co., Broad Mtn, 24 Aug 1866, C.E.Smith & T.C.Porter [*G.Engelmann, Herb. Junc. Bor.-Amer. Norm.*] 15 (K, P, PR); C.E.Smith s.n. (K, P).

257. *Juncus conglomeratus* L., *Sp. Pl.* 326 (1753)

Juncus glomeratus Thunb., *Fl. Jap.* 145 (1784), *nom. illeg.*; *Juncus communis* var. *conglomeratus* (L.) E.Mey., *Junc. Gen. Monogr. Spec.* 20 (1819); *Juncus effusus* var. *conglomeratus* (L.) Bosch, *Prodr. Fl. Batav.* 1: 277 (1850); *Juncus communis* subsp. *conglomeratus* (L.) Čelak., *Prodr. Fl. Böhm.* 1: 80 (1867), *nom. inval.*; *Juncus mathioli* Bubani, *Fl. Pyren.* 4: 177 (1901); *Juncus conglomeratus* A.I. [unranked] *typicus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 445 (1904), *nom. inval.*; *Juncus effusus* subsp. *conglomeratus* (L.) Husn., *Joncées* 7 (1908); *Juncus effusus* f. *conglomeratus* (L.) Reichg., in S.J. van Ooststroom & al., *Fl. Neerl.* 6(1): 180 (1964). T: [Europe] In Europae borealis uliginosis; lecto: *L-van Royen 904145-425, fide* S.Snogerup, *Bot. Not.* 123: 428 (1970).

Juncus subuliflorus Drejer, *Fl. Excurs. Hafn.* 127 (1838); *Juncus conglomeratus* subsp. *subuliflorus* (Drejer) Nyman, *Consp. Fl. Eur.* 746 (1882); *Juncus leersii* T.Marsson var. *subuliflorus* (Drejer) Buchenau, *Bot. Jahrb. Syst.* 12: 233 (1890); *Juncus leersii* f. *subuliflorus* (Drejer) Neuman, *Sveriges Fl.* 654 (1901); *Juncus conglomeratus* II. [unranked] *subuliflorus* (Drejer) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 446 (1904). T: [Denmark; citation: Samlet i Omegnen af Fuursøen af Liebman og mig selv 1834] Fuuresøen, 1834, *F.M.Liebmann s.n.*; syn: C.

Juncus leersii T.Marsson, *Fl. Neu-Vorpommern u. Rügen* 451 (1869); *Juncus subuliflorus* f. *leersii* (T.Marsson) Reichg., in S.J. van Ooststroom & al., *Fl. Neerl.* 6(1): 181 (1964). T: [N Germany, numerous syntypes from the vicinity of Stralsund, Greifswald, from Wolgast and Usedom]; syn: *n.v.*

Juncus leersii var. *viridiflorus* Buchenau, *Abh. Naturwiss. Vereine Bremen* 10: 506 (1889); *Juncus conglomeratus* b. [unranked] *viridiflorus* (Buchenau) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 445 (1904); *Juncus leersii* f. *viridiflorus* (Buchenau) Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 138 (1906); *Juncus communis* subvar. *viridiflorus* (Buchenau) Rouy, *Fl. France* 13: 225 (1912). T: *n.v.*

Juncus leersii var. *laxus* Beck, *Fl. Nieder-Österreich* 1: 153 (1890); *Juncus conglomeratus* I. [unranked] *laxus* (Beck) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 445 (1904); *Juncus subuliflorus* f. *laxus* (Beck) Reichg., in S.J. van Ooststroom & al., *Fl. Neerl.* 6(1): 181 (1964); *Juncus conglomeratus* var. *laxus* (Beck) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 552 (1966). T: [Austria, otherwise not indicated].

Juncus leersii var. *praeflorens* Ade & Vollm., *Ber. Bayer. Bot. Ges.* 9: 53 (1904); *Juncus subuliflorus* f. *praeflorens* (Ade & Vollm.) Reichg., in S.J. van Ooststroom & al., *Fl. Neerl.* 6(1): 181 (1964). T: *n.v.*

Juncus conglomeratus II. [unranked] *umbrosus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 445 (1904); *Juncus conglomeratus* var. *umbrosus* (Asch. & Graebn.) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 552 (1966). T: not indicated.

Illustrations: T.Szynał & J.Mądalski, *Atlas Fl. Pol.* 2(2): 130 (1931); Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 182, fig. 51 (1971).

Map: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 7(1): map 145 (1958).

Perennials, 40–100 cm tall, densely caespitose; rhizome very short-noded. Stem leafless, terete, 1–2 mm thick; ridges 12–30, conspicuous, with subepidermal sclerenchyma strands coordinated with large vascular bundles; epidermis cells larger on the ridges; vascular bundles of two sizes in different rings; pith continuous of astericiform cells. Cataphylls mostly 3, with upper ones 5–15 (–20) cm long, usually light to dark reddish-brown, usually pale; uppermost cataphyll often with tiny awnlike blade. Inflorescence pseudolateral, dense or rarely of several clusters or diffuse; flowers numerous, usually densely clustered; lower

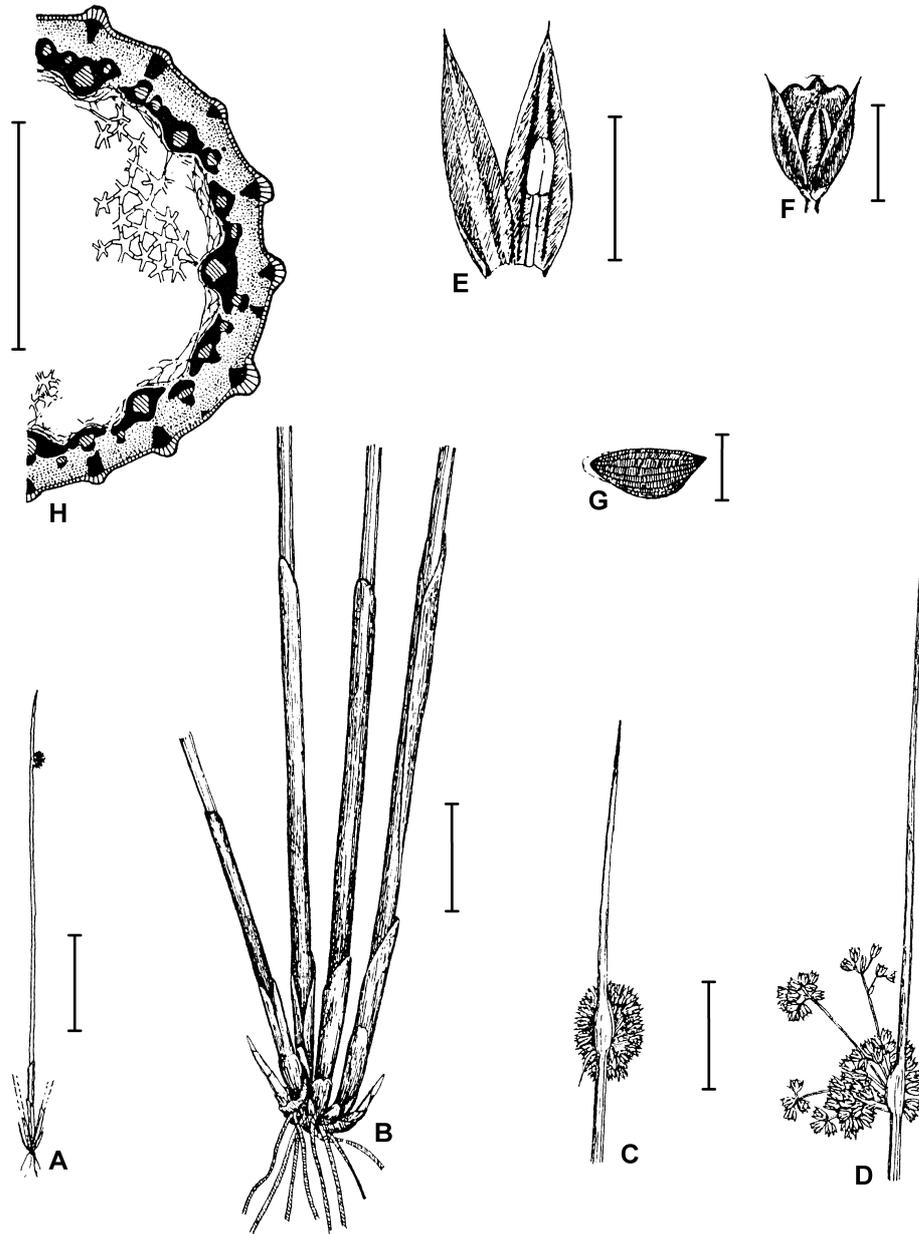


Figure 136. *Juncus conglomeratus*. **A**, habit; **B**, plant base; **C**, **D**, inflorescences; **E**, tepals and stamen; **F**, flower with capsule; **G**, seed; **H**, stem T.S. Scale bars: **A** = 25 cm; **B–D** = 3 cm; **E**, **F** = 1.5 mm; **G** = 0.25 mm; **H** = 1 mm. Drawn by Ö.Nilsson. Reproduced with permission from Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 182, fig. 51 (1971). © Lund Botanical Society.

JUNCACEAE (*Juncus*)

bract usually 10–20 cm long, several times longer than inflorescence, with wide broadly scarious-margined sheath; bract often reflexed after fruit ripening. Bracteoles 1–1.5 mm long, ovate, acute, membranous. Tepals (2–) 2.5–4 mm long, with outer ones slightly longer, lanceolate, apiculate, ±greenish stramineous or light brown to castaneous-coloured with broad greenish central band, margin and membranous margin. Stamens 3 (–6); anthers 0.4–0.7 mm long, usually shorter than filaments. Style very short; stigmas 0.6–1 mm long. Capsule 2–2.5 mm long, c. equalling tepals, trigonous ovoid to subspheroid, retuse or rarely obtuse, with conical projection below a short mucro, unilocular, triseptate, light to dark brown. Seeds 0.5 mm long, obliquely ovoid, reticulate, brown, without appendages. $2n = 42$, *vide* S.Snoogerup, *Bot. Not.* 116: 146 (1963). Fig. 136.

Native in Europe, NW Africa, W & SW Asia, S Temperate Asia east to China, and a few localities, probably as introduced, in N America, New Zealand and Venezuela. Also reported from additional places in S America but probably in error. Often an aggressive invasive species in new places. 10: DEN, FIN, FOR, GRB, IRE, IRE, NOR, SWE. 11: all. 12: COR, FRA, POR, SAR, SPA. 13: BUL, GRC, ITA, ROM, SIC, TUE, YUC. 14: all. 20: ALG, MOR. 21: mdr. 30: WSB. 33: NCS, TCS. 34: IRQ, TUR. 50: tas. 51: nzs. 71: BRC. 72: NFL, NSC, QUE. 75: MAI, NWY. 82: ven. Various seasonally and permanently wet places, slightly calcifuge and often in wet heathland, from near sea level to 1900 m and perhaps higher in the south. Map 473.

10. SWEDEN: Öland, Böda, Grankulla, 31 Aug 1987, *J.Lundqvist* (LD). **11.** CZECH REPUBLIC: Bohemia, Benešov, Jevany, 420 m, 6 Jul 1968, *B.Křisa* (LD, PRC). POLAND: Kraków, Bor near Czernichow, 16 Jul 1974, *T.Tacik & Necka* [*Pl. Polon. Exs.*] 684 (KRA, KRAM, LD, PRC) **12.** SPAIN: Cádiz, Tarifa-Algeciras, 300 m, 13 Jun 1963, *P.Montserrat* (JACA). **13.** GREECE: Xanthi, NE of Dimarion near Bulgarian border, 26 km N of Xanthi, 550 m, 28 Jul 1977, *A.Strid & Georgiadou* 13406 (C, LD). BOSNIA: Sarajevo, Mt. Trebovic, 1200 m, 26 Jun 1889, *S.Murbeck* (LD). **20.** ALGERIA: Tizirt, N of Tizi Ouzou, 670 m, *P.H.Davis* 59201 (E). MOROCCO: Jbel Dahar Zhiron 13 km SSW of Tanger, 12 Jun 1972, *R.Dahlgren & P.Lassen* 65.19 (LD). **34.** TURKEY: Bolu, Koru Motel, 860 m, *I.Kukkonen* 8338 (H). **71.** BRITISH COLUMBIA: Surrey, Patullo Bridge, 15 Jun 1994, *F.Lomer s.n.* (UBC). **72.** NEWFOUNDLAND: near Topsail, Conception Bay, *C.D.Howe & W.F.Lang* 1286 (LD, NY). **82.** VENEZUELA: Aragua, Colonia Tovar, 1900 m, *H.F.Pittier* 9961 (GH, US, VEN).

Best recognized by the combination of caespitose growth, conspicuous stem ridges and obtuse to retuse capsule.

258. *Juncus pylaei* Laharpe, *Essai Monogr. Jonc.* 31 (1825)

Juncus effusus L. var. *pylpei* (Laharpe) Fernald & Wiegand, *Rhodora* 12: 92 (1910). T: Ile de Saint-Pierre-de-Miquelon près Terre-Neuve, *De la Pylaie*; holotype: P; isotype: K, MO, fragment.

Juncus effusus var. *costulatus* Fernald, *Rhodora* 23: 239 (1921). T: Canada, Nova Scotia, Shelburne, Barrington, 1920, *M.L.Fernald, B.Long & D.H.Linder* 20654; holotype: GH.

[*Juncus decipiens* auct. amer., non (Buchenau) Nakai (1928): E.Hultén, *Kongl. Svenska Vetenskapsacad. Handl.*, ser. 5, 7(1): 172, map 153 (1958)].

Illustration: S.E.Clemants, *Junc. New York State* 6 (1990).

Maps: E.Hultén, *Kongl. Svenska Vetenskapsacad. Handl.*, ser. 5, 7(1): map 153 (1958); L.Hämet-Ahti, *Ann. Bot. Fenn.* 17: 185, fig. 9 (1980); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 98, map 195 (1986).

Perennials, (40–) 60–100 (–140) cm tall, densely caespitose; rhizome very short-noded. Cataphylls 3–5, with longest 10–20 cm long, not glossy, ±tight with overlapping margins, usually blackish to dark reddish-brown at base abaxially, greenish to stramineous-brown above, adaxially silvery stramineous. Stem leafless, terete, 1–2 mm thick, ±hard, dark green; ridges 10–20, conspicuous, with subepidermal sclerenchyma strands not above the largest vascular bundles, and with enlarged cells on the ridges; vascular bundles in one ring; pith of astericiform cells, continuous. Lower bract 10–20 cm long, much exceeding the inflorescence; sheath slightly widened, slightly constricted below; margins to 5 mm wide, scarious. Inflorescence (1–) 2–3 (–5) cm long, lax to compact; flowers many, solitary or densely aggregated. Bracteoles ovate, c. 1–1.5 mm long, scarious to stramineous. Tepals subequal, with outer ones slightly longer, 2–3 (–3.5) mm long, lanceolate, acuminate-cuspidate, pale brown; tip of outer tepals often reflexed. Stamens 3 (–6); anthers 0.5–0.7 mm long; filaments 0.5–0.9 mm long; style c. 0.1 mm long; stigmas to 1.0 mm long. Capsule

triseptate, broadly trigonous-ovoid, 2–2.5 mm long, shorter than to slightly exceeding perianth, obtuse to retuse, not mucronate, pale brown to medium brown. Seeds 0.3–0.4 (–0.5) mm long, obliquely obovoid, striate-reticulate, brown; appendages absent. $2n = 40$, *fide* N.A.Harriman & D.Redmond, *Rhodora* 78: 731 (1976), as *J. effusus*.

NE USA and E Canada, and isolated occurrences, probably as an introduction, in Idaho and Montana. 72: NBR, NFL, NSC, ONT, PEI, QUE. 73: IDA, MNT. 74: MIN, MSO, WIS. 75: CNT, INI, MAI, MAS, MIC, NWH, NWJ, NWY, OHI, PEN, RHO, VER, WVA. 78: DEL, MSI, NCA, VRG. Various wet, oligotrophic habitats, often on open soil and in bogs. Map 474.

72. NEWFOUNDLAND: Avalon Peninsula, Collier's R., Brigus Junction, *M.L.Fernald & K.M.Wiegand 5118* (GH, K, S). NOVA SCOTIA: Halifax, *E.Gorham 45.1401* (DAO, LD). ONTARIO: Whitesides, Muskoka Lake, 5 Aug 1914, *F.O.Grover* (LD). PRINCE EDWARD IS.: Charlottetown, *M.L.Fernald [Pl. Exs. Gray.] 182* (K, LD, PRA). QUEBEC: St-Adolphe, Argenteuil, *Fr. Rolland-Germain 6280* (LD, MT). 74. NEW HAMPSHIRE: Randolph, Lowe's Cabbins, 7 Aug 1963, *A.Røstad* (LD). 75. MASSACHUSETTS: Water Wheel Pond, Wellesley, 18 Jul 1971, [*collector not given*] (LD).

259. *Juncus effusus* L., *Sp. Pl.* 326 (1753)

Juncus communis E.Mey., *Junci Gen. Monogr. Specim.* 20 (1819), *nom. illeg.*; *Juncus laevis* Wallr., *Sched. Crit.* 1: 142 (1822), *nom. illeg.*; *Juncus laevis* var. *effusus* (L.) Wallr., *Sched. Crit.* 1: 143 (1822), *nom. inval.*; *Juncus conglomeratus* var. *effusus* (L.) Kostel., *Clav. Anal. Fl. Bohem.* 52 (1824); *Juncus communis* subsp. *effusus* (L.) Celak, *Prodr. Fl. Böhm.* 1: 80 (1867), *nom. inval.* T: 3 *effusus* Huds., [*Smith:*] *Mr W[oodward]*; lecto: LINN449.6, *fide* K.A.Lye, in S.Edwards, D.Sebebe & I.Hedberg, *Fl. Ethiop. Eritr.* 6: 387 (1997). [another original syntype, *Juncus culmo nudo panicula laterali*; syn: *L-van Royen 904.145-435* (left hand specimen); proposed on a label as Type by L.A.S.Johnson].

Juncus effusus var. *macranthelus* K.Koch, *Linnaea* 21: 626 (1848). T: [Turkey, Istanbul] in der Umgegend von Konstantinopel, *K.Koch*; syn: *n.v.*; [Romania, Orsova] bei Orschowa im Banate, *K.Koch*; syn: *n.v.*

Maps: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 7(1): map 153 (1958); H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentr. Eur. Fl.* 1: 83 (1965); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 98, map 195 (1986).

Perennials, 50–150 cm tall, densely caespitose; rhizome very short-noded. Stem leafless, terete, (1.5–) 2–3 (–4) mm thick, green; smooth to inconspicuously ridged; ridges 40–70, when fresh inconspicuous, when dry low; subepidermal sclerenchyma strands present, most connected by radial lamellae to small and medium-sized vascular bundles; epidermis cells uniform; bundles in 2 (–3) rows; pith continuous, of astericiform cells, remaining in mature stems. Cataphylls 3(–4). Upper cataphylls (4–) 10–15 (–20) cm long, usually light reddish-brown; uppermost cataphylls with tiny blade. Inflorescence pseudolateral, diffuse or rarely dense, of 50–120 (–many) separate flowers. Lower bract usually several times longer than inflorescence; sheath narrow, with membranous margin 0.5 mm wide, ±constricted below inflorescence; bracteoles 0.5–1.5 mm long, often unequal, ovate, acute, membranous. Tepals 1.5–3 mm long, with outer ones longest, lanceolate, apiculate, green to light brown with scarious margin. Stamens 3 (–6); anthers 0.4–0.7 mm long, slightly shorter than filaments. Style very short; stigmas 0.6–1 mm long. Capsule (1.6–) 2–2.5 mm long, subequal to or slightly exceeding perianth, subspheroid to ovoid, broadly ellipsoid or obovate, obtuse or slightly retuse, not or shortly mucronate, unilocular, triseptate, light brown. Seeds 0.5 × 0.2–0.3 mm, obliquely ovoid, reticulate, without appendages.

Probably native in Europe, W. and C. Asia, Africa, N. America and mountains of S. America; cosmopolitan as introduced and in many places naturalized.

Often confused with *J. conglomeratus* L.; in difficult cases best separated from it by many and faint ridges on the stem below the inflorescence and narrower sheath of the basal bract. The shape of the inflorescence is not diagnostic, varying even among individuals of the same population.

The great local and regional variation in shape of inflorescence, size and colour of floral parts etc. has led to descriptions of numerous taxa at various levels. The subspecies and separate closely related species recognized here reflect merely the recent specialized work in some areas. Following Balslev (1996), we leave the Central and South American forms in subsp. *effusus*. Any change on this point would require an extensive revision, preferably on a global scale and including the closely related species now recognized.

JUNCACEAE (*Juncus*)

- 1 Top of the upper cataphyll asymmetrical, with strongly convergent veins and thickened or broad sometimes wing-like margins; upper cataphylls tight
- 2 Distal half of the upper cataphyll chocolate-brown to castaneous-brown abaxially with margin distally thickened, overlapping to the very top **259d. subsp. pacificus**
- 2: Distal part of the upper cataphyll green, later to stramineous-brown abaxially, with margin distally not thickened but broad and scarious, not overlapping to the very top **259e. subsp. austrocalifornicus**
- 1: Top of the upper cataphyll symmetrical, with parallel to slightly convergent veins, and its margins narrow; upper cataphyll lax or tight
- 3 Anthers 0.4–0.5 mm long; lower inflorescence branches often pendulous **259b. subsp. laxus**
- 3: Anthers 0.6–0.8 mm long; inflorescence branches not pendulous
- 4 Tepals soft, erecto-patent, erect or loosely appressed to capsule at maturity **259a. subsp. effusus**
- 4: Tepals hard, tightly appressed to capsule at maturity **259b. subsp. solutus**

259a. *Juncus effusus* L. subsp. *effusus*

Juncus effusus var. *subglomeratus* DC., in J.B.A.P.M. de Lamarck & A.P. de Candolle, *Fl. Franç.* 3rd edn, 3: 165 (1805). T: Lob. Ic. t. 84. f.2 [*M. Lobelius, n.v.*].

Juncus bogotensis Humb., Bonpl. & Kunth, *Nov. Gen. Sp. Pl.* 235 (1815). T: [Colombia, Bogotá] Sta Fe, F.W.H.A.Humboldt & A.J.A.Bonpland; lecto: P, fide H.Balslev, *Fl. Neotrop. Monogr.* 68: 88 (1996); iso: B-W6871, P.

Juncus fistulosus Guss., *Fl. Sicul. Prodr.* 1: 431 (1827); *Juncus effusus* var. *fistulosus* (Guss.) Buchenau, *Krit. Verz. Juncac.* 20 (1880); *Juncus effusus* subsp. *fistulosus* (Guss.) Richt., *Pl. Eur.* 1: 178 (1890). T: *Fl. Sicul. Prodr.* t. 183, f. 1 [J.Gussone, *Fl. Sicul.* 1: tab. 183, fig. 1 (1815)]; syn; [Sicily] via della Piana de' Greci passato lo Gurgo di Ddingoli, *J. Gussone*; syn: FI, *n.v.*

Juncus laevis var. *diffusus* Wallr., *Sched. Crit.* 1: 143 (1822). T: not designated.

Juncus effusus Abart *compactus* Hoppe ex Mert. & W.D.J.Koch, *Deutschl. Fl.* 3rd edn, 2: 574 (1826) *Juncus effusus* var. *compactus* (Hoppe ex Mert. & W.D.J.Koch) Lej. & Courtois, *Comp. Fl. Belg.* 2: 23 (1831); *Juncus conglomeratus* a. ['Spielart'] *laxus* G.Mey., *Chloris Han.* 563 (1836); *Juncus bogotensis* var. *compactus* (Lej. & Courtois) Farw., *Amer. Midl. Naturalist* 10: 206 (1927); *Juncus effusus* var. *compactus* (Lej. & Courtois) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 548 (1966). T: not designated.

Juncus effusus var. *pauciflorus* Lej. & Courtois, *Comp. Fl. Belg.* 2: 23 (1831); *Juncus communis* var. *parviflorus* (Lej. & Courtois) Rouy, *Fl. France* 13: 225 (1912); *Juncus effusus* B. [unranked] *pauciflorus* (Lej. & Courtois) Asch. & Graebn., *Fl. Nordostdeutsch. Flachl.* 173 (1898); *Juncus effusus* B. [unranked] *pauciflorus* (Lej. & Courtois) Asch. & Graebn., in S.J. van Ooststroom & al., *Fl. Neerl.* 6(1): 180 (1964); *Juncus effusus* var. *pauciflorus* (Lej. & Courtois) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 551 (1966). T: Mich. Agr. no 282 [not traced, perhaps P.A.Micheli, *Nova Pl. Gen.*, no 282 (1729)].

Juncus lucens Burnham ex Anonymous, *Trans. Linn. Soc. London* 19: 492 (1842) T: *n.v.* [Authentic material not cited.]

Juncus effusus var. *dasyanthelus* K.Koch, *Linnaea* 21: 626 (1848). T: [Turkey] Im Gaue Sber auf Porphyrboden, *K.Koch*; holo: *n.v.*

Juncus effusus var. *prolifer* Sond., *Fl. Hamburg* 191 (1851); *Juncus effusus* f. *prolifer* (Sond.) Hegi, *Ill. Fl. Mittel-Eur.* 2: 152 (1909). T: Hamburg, an der Elbe, *O.W.Sonder*; syn: S, *n.v.*

Juncus zebrinus André, *Illustr. Hortic.* 27: 393 (1880); *Juncus effusus* f. *zebrinus* (André) Hegi, *Ill. Fl. Mittel-Eur.* 2: 152 (1909). T: [a garden plant, correctly a cultivar, 'Zebrinus'], *n.v.*

Juncus luxurians Colenso, *Trans. & Proc. New Zealand Inst.* 19: 269 (1887). T: New Zealand, County of Waipawa, Norsewood, 1885–1886, *W.C.Colenso s.n.*; holo: WELT11239.

Juncus effusus C. [Forma principalis] *compactus* Cout., *Bol. Soc. Brot.* 8: 93 (1890), *nom. illeg.* T: Portugal [numerous syntypes, several of them in COI].

Juncus effusus b. [unranked] *atratus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 443 (1904). T: not designated.

Juncus effusus b.1. [unranked] *elatus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 444 (1904); *Juncus effusus* var. *elatus* (Asch. & Graebn.) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 548 (1966). T: not designated.

Juncus effusus var. *longibracteatus* A.Fern. & R.Fern., *Anuár. Soc. Brot.* 15: 14, fig. 3 (1949). T: Portugal, Vendas Novas, Barranco de Malhada das Vacas, 25 May 1947, *J.Matos*; holo: COI.

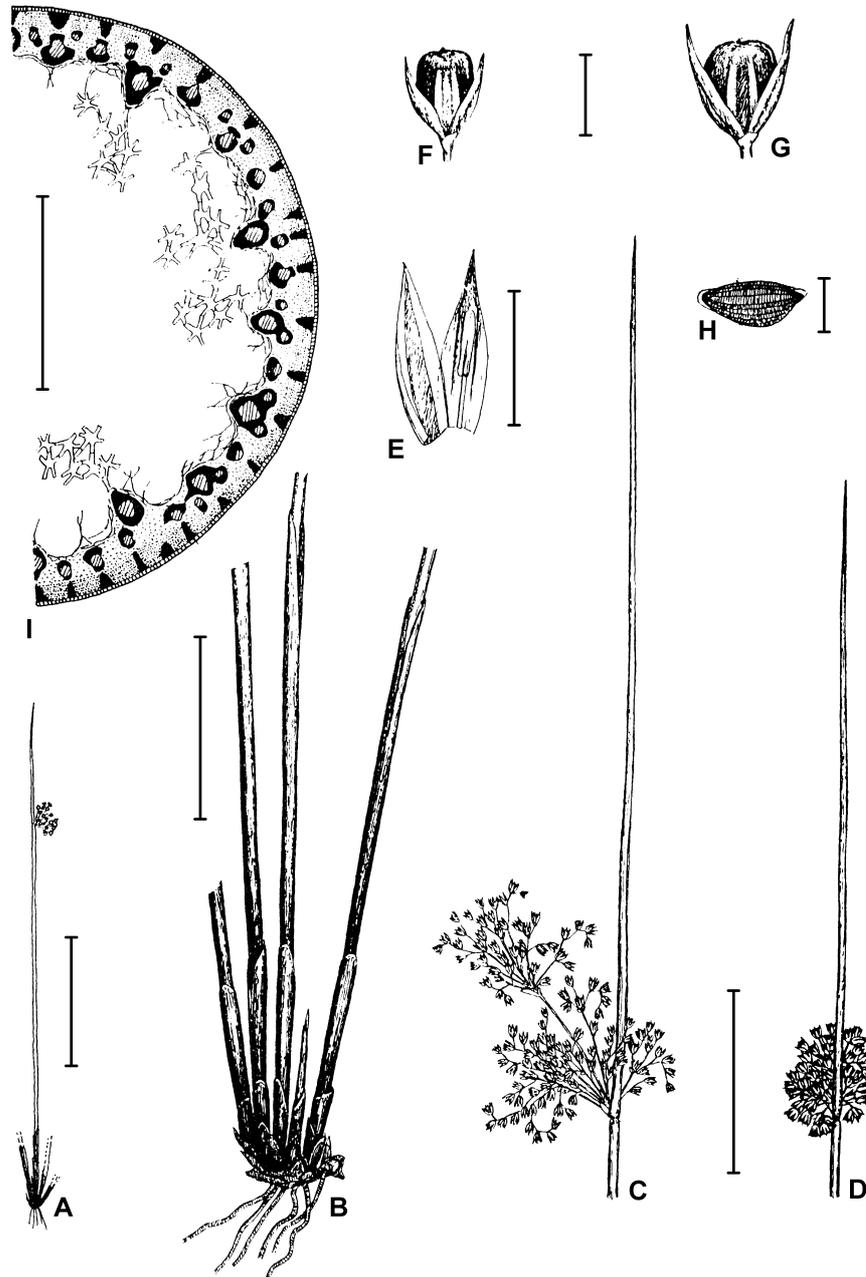


Figure 137. *Juncus effusus* subsp. *effusus*. **A**, habit; **B**, plant base; **C**, **D**, inflorescences; **E**, tepals and stamen; **F**, **G**, flower with capsule; **H**, seed; **I**, stem T.S. Scale bars: **A** = 40 cm; **B–D** = 5 cm; **E** = 1.7 mm; **F**, **G** = 1.5 mm; **H** = 0.25 mm; **I** = 2 mm. Drawn by Ö.Nilsson. Reproduced with permission from Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 180, fig. 50 (1971). © Lund Botanical Society.

JUNCACEAE (*Juncus*)

Juncus mauritanicus Bojer, *Hort. Maurit.* 360 (1837), *nom. inval.*

Illustrations: T.Szybal & J.Mądalski, *Atlas Fl. Pol.* 2(2): 129 (1931); Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 180, fig. 50 (1971).

Mostly 50–100 cm tall. Stem usually to 5–8 mm in diam., deep green, glossy, not hard; pith continuous, not dense; ridges usually 40–70, almost invisible when fresh (stem usually slightly translucent between the ridges). Cataphylls few, usually, 3, usually to 15 cm long, tight, with lowermost sometimes lax and upper not overlapping in distal $\frac{1}{3}$ – $\frac{1}{10}$, abaxially stramineous-brown to dark brown distally, dark castaneous-brown to blackish brown and dull to slightly glossy at base, adaxially usually silvery to golden glossy. Lower bract constricted below the inflorescence, usually 5–25 cm long, much exceeding inflorescence; sheath not dilated. Inflorescence variable, mostly 1–5 cm long but occasionally much larger, mostly dense to moderately lax with groups of subcontracted unilateral cymes. Tepals equal, mostly 2–3 mm long, lanceolate, acute to acuminate, thin and soft, loosely appressed to capsule to erect; central band greenish to stramineous-brown, not prominent; margins membranous, broad. Anthers 0.6–0.8 mm long, about equalling the filaments. Capsule 1.8–3 mm long, trigono-ovoid, obtuse or often slightly retuse. $2n = 42$, *vide* S.Snogerup, *Bot. Not.* 116: 145 (1963). Fig. 137.

Europe, SW Asia, N Africa. Introduced in N, C and S America, E Asia SE Australia and probably elsewhere, but it is almost impossible to distinguish primary and secondary occurrences. 10–14: All. 20: ALG, MOR. 21: AZO, CNY, MDR. 24: ?ETH. 29: mau, mdg. 33: NCS, TCS. 34: AFG, CYP, EAI, IRN, IRQ, TUR. 36: CHC, CHM, CHN, CHS, CHT. 38: TAI. 40: IND. 50: nsw, vic. 51: nzn, nzs. 70: ASK. 71: BRC, MAN. 72: NBR, NFL, NSC, ONT, PEI, QUE. 73: IDA, MNT, ORE. 74: ILL, IOW, KAN, MIN, MSO, NEB, OKL, WIS. 75: CNT, INI, MAI, MAS, MIC, NWH, NWJ, NWY, OHI, PEN, RHO, VER, WVA. 76: ARI, CAL. 77: TEX. 78: ALA, ARK, DEL, FLA, GEO, KTY, LOU, MRY, MSI, NCA, SCA, TEN, VRG, WDC. 79: MXC, MXE, MXG, MXI, MXS. 80: COS, ELS, GUA, HON, SMX. 81: HAI, LEE. 82: VEN. 83: VEN, BOL, CLM, ECU, PER. 84: BZL. 85: ags, cls. Wide range of wet sites from meadows and pastures, ditches, ponds, shores etc. to mountain tracks and meadows. Map 475.

10. DENMARK: Jylland: E of Varde, N of Mosevraa Plantage, 28 Jul 1960, *S.Snogerup s.n.* (LD). 11. AUSTRIA: Wurzenpass, 1100–1200 m, *S.Snogerup 1139* (LD). 12. PORTUGAL: Arredores de Coimbra, Trouxemil, *A.Moller [Fl. Lusit. Exs.] 444* (COI, LD). 13. GREECE: Kikladhes, Andros, 1.5–2 km NE of Vourkoti, 250–300 m, *S.Snogerup & B.Bothmer 31950* (LD). TURKEY-IN-EUROPE: Vilayet Istanbul, Belgrad Forest, Neset Suyu, 80 m, *E.Sauer 25160* (LD, M). 20. ALGERIA: Tiggirt, N of Tizi Ouzou, 630 m, *P.H.Davis 59201* (BM). MOROCCO: Cap Spartel. 21 May 1972, *R.Dahlgren & P.Lassen 5-43* (LD). 34. AFGHANISTAN: West-Nuristan, Kulam (Munui) im Kulam-Tal, 2150 m, *Kerstan 1051a* (M). IRAN: Mazanderan, S of Amol, 152 m, *Archibald 2285* (E, K). 83. ECUADOR: Pichincha, S of Quito towards Tambillo, *E.Asplund 7025* (G, S, UPS, US).

Occasionally cultivated as a horticultural curiosity; plants with cork-screw or twisted stems appear as *Juncus effusus* '*Spiralis*' in the literature (sometimes at various taxonomic ranks with the epithet *spiralis*), and plants with colour-banding on the stems are called '*Zebrinus*' (whitish stripes) or '*Aureus Striatus*' (yellowish stripes); another cultivar is '*Vittatus*'.

259b. *Juncus effusus* subsp. *laxus* (Robyns & Tournay) Snogerup, *in* S.Snogerup, P.F.Zika & J.Kirschner, *Preslia* 74: 259 (2002)

Juncus laxus Robyns & Tournay, *Bull. Jard. Bot. Etat* 25: 252 (1955). T: Congo, Kivu Province, Kundhuru-Ya-Tshuve, *G. de Witte 1976*; holo: BR.

Juncus canariensis Willd. ex E.Mey., *Syn. Luzul.* 29 (1823); *Juncus effusus* var. *canariensis* (E.Mey.) Buchenau, *Krit. Verz. Juncac.* 11 (1880); *Juncus effusus* A. [Forma principalis] *laxiflorus* Cout., *Bol. Soc. Brot.* 8: 93 (1890). T: [Canary Is.] in Canariis, *R.Desfontaines*; syn: B-W 6873.

Juncus oehlerii Graebn., *Bot. Jahrb. Syst.* 48: 506 (1913). T: [Tanzania] Deutsch-Ostafrika, Ossirwa-Seen, [Masai/Mbulu Distr., Lake Ossirwa], 20 Feb 1907, *E.Oehler 499*; holo: B, *n.v.*, probably destroyed.

Mostly 80–120 cm tall. Cataphylls to 20 cm long, stramineous above, dark red-brown below, ±dull; blade filiform, to 1 cm long. Inflorescence mostly lax, to 8 × 8 cm; branches thin and lower ones often pendulous; flowers solitary or clustered; bract not constricted below

inflorescence. Outer tepals 1.7–2.5 mm long; inner tepals 1.5–2 mm long, linear-lanceolate, acuminate-subulate. Anthers 0.4–0.5 mm long, shorter than c. 0.5 mm filaments; style c. 0.1 mm long; stigmas to 1 mm long. Capsule 1.6–2 (–2.5) mm long, trigonous, oblong-ellipsoid to obovoid, obtuse. Seeds c. 0.4 mm long.

Atlantic Islands. Africa south of Sahara, including Madagascar and neighbouring islands. Also reported as local in Spain and Portugal but material not seen. 12: ?POR, ?SPA. 23: BUR, RWA, ZAI. 25: KEN, TAN, UGA. 26: ZIM. 27: cpp, TVL. 29: MAU, MDG, ?REU. Mostly in the mountains, up to 3100 m in tropical Africa. Map 476.

21. MADEIRA: NW Casa de Arieiro, 1575 m, *Wängsjö 1184* (LD). Santo do Serra, Dec 1968, *Kraft* (LD). 25. KENYA: Mt. Kenya, Marimba Forest, *R.M.Polhill & B.Verdcourt 313* (K). 26. ZIMBABWE: Mare Dam in Nyanga Recreational Park, 2000 m, *S.Laegaard 16113* (LD). 27. CAPE PROVINCES: between Smitswinkel Bay and Stangkop Point, 18 Dec 1934, *Hafström* (LD). 29. MADAGASCAR: Andasibe, National Park 145 km E of Antanarivo, 16 Nov 1995, *Desfayes* (LD); Ambositra, c. 290 km S of Antanarivo, 11 Nov 1995, *Desfayes* (LD).

259c. *Juncus effusus* subsp. *solutus* (Fernald & Wiegand) Hämet-Ahti, *Ann. Bot. Fenn.* 17: 188 (1980)

Juncus effusus var. *solutus* Fernald & Wiegand, *Rhodora* 12: 90 (1910). T: Canada, New Brunswick, Scovil's Brook, Westfield, 1909, *M.L.Fernald & K.M.Wiegand 2223*; holo: GH.

Juncus griscornii Fernald, *Rhodora* 38: 41 (1936). T: USA, Virginia: Princess Anne Co., Little Neck, 1933, *M.L.Fernald, L.Griscom & B.Long 5604*; holo: GH.

Illustration: S.E.Clemants, *Junc. New York State* 6 (1990).

Map: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 7(1): map 153 (1958); L.Hämet-Ahti, *Ann. Bot. Fenn.* 17: 189, fig. 12 (1980); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 98, map 195 (1986).

Mostly 80–100 cm tall. Cataphylls loose, usually not overlapping in upper $\frac{1}{2}$ – $\frac{1}{3}$, abaxially reddish brown and slightly glossy at base, dull and stramineous-brown distally, obtuse to subacute, often with acicular blade, adaxially silvery stramineous-brown. Stem \pm smooth to inconspicuously striate. Inflorescence usually rich, (2–) 4–10 cm long, variable in form; branches mostly rigid. Tepals 2.2–3 mm long; outer tepals \pm broadly lanceolate, acute to acuminate, rigid, with prominent \pm hard central band, appressed to the capsule; inner tepals acute to mucronate, often with two prominent veins at midrib margins. Anthers 0.6–0.8 mm long, about equalling the 0.7–0.8 mm filaments. Capsule 2–2.5 mm long, ellipsoidal, slightly trigonous above, obtuse or rarely slightly retuse. Seeds 0.4–0.5 \times 0.2–0.25 mm.

Eastern Canada and USA from Newfoundland to Florida and Texas, single finds farther west probably represent introductions. 71: brc. 72: NBR, NFL, NSC, ONT, QUE. 74: ILL, IOW, KAN, MSO, OKL, WIS. 75: All. 78: All. Map 477.

72. NEWFOUNDLAND: valley of Exploits R., Norris Arm, *M.L.Fernald & K.M.Wiegand 5116* (S). QUEBEC: Annexe de Chateau-Richer, St-Achille, Co. Montmorency, *L.Cinq-Mars & al.* 69-192 (LD); Rigaud, Vaudreuil Co., *Roy 3190* (LD). 75. MASSACHUSETTS: Chatham, Lizzie's Pond, *M.L.Fernald [Pl. Exs. Gray.] 346* (S); Lancaster, banks of Narhua River, 4 Aug 1912, *F.F.Forbes* (LD). WEST VIRGINIA: Bailey Community, *L.J.Uttal 8173* (LD). 78. GEORGIA: College Park, Fulton Co., *P.O.Schallert 11433* (LD). LOUISIANA: N of Longview Access Area, N of Ark. 160 at Saline R. W of Fountain Hill, *R.Dale Thomas 92538* (LD); New Orleans, 1832, *T.Drummond 362* (LD).

259d. *Juncus effusus* subsp. *pacificus* (Fernald & Wiegand) Lint, in P.Zika, *Brittonia* [in press] (2002).

Juncus effusus var. *pacificus* Fernald & Wiegand, *Rhodora* 12: 89 (1910). T: Willamette Heights, Oregon, 1902, *Sheldon 10832*; holo: GH; iso: WS.

Juncus effusus var. *caeruleomontanus* H.St.John, *Res. Stud. State Coll. Wash.* 2: 110 (1931). T: Washington, Columbia Co., Tucannon R. Valley, 26 Jul 1913, *H.Darlington*; holo: WS; iso: WS.

Illustrations: H.L.Mason, *Fl. Marshes California* 354, fig. 172 (1957); C.L.Hitchcock & al., *Vasc. Pl. Pacif. Northw.* 1: 196 (1969).

Map: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 7(1): map 153 (1958); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 98, map 195 (1986).

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Plants c. 50–140 cm tall, densely caespitose; rhizome stout, horizontal. Stems in dense rows or tufts, rigid, stout, c. 2–4 mm in diam., terete, faintly striate to smooth; ridges inconspicuous, usually 40–70; pith continuous, dense. Cataphylls few; upper cataphylls usually 10–12 (–20) cm long, tight, with margins thickened distally and overlapping to the top, mostly asymmetrical and subtruncate to emarginate below the apical awn-like blade; abaxial side usually dull chocolate-brown to castaneous-brown distally, deep brown to deep castaneous-brown at base, dull and scabridulous, adaxially glossy stramineous. Lower bract much exceeding inflorescence. Inflorescence wide, with usually fastigiate branches, 3–8 cm long, many-flowered. Tepals subequal, 2–3 mm long, narrowly lanceolate, especially the outer ones conspicuously subulate, pale castaneous with green central band; margins broad, membranous. Stamens 3 (4–6); anthers 0.7–1.0 mm long; filaments c. 0.6 mm long; style 0.1–0.2 mm long; stigmas reddish, c. 1 mm long. Capsule triseptate, oblong-ovoid to ellipsoid, 2–2.5 mm long, conspicuously trigonous especially above, obtuse to subacute, shorter than perianth, pale to dark castaneous-brown. Seeds narrowly ovoid, 0.4–0.5 × c. 0.2–0.3 mm, apiculate, reticulate; appendages absent.

Western coastal N America from Baja California, California, Oregon, Washington, British Columbia to SE Alaska. Reports from two places in Idaho probably also refer to this subspecies. 70: ASK. 71: BRC. 73: IDA, ORE, WAS. 76: CAL. Map 478.

71. BRITISH COLUMBIA: New Westminster, 27 Aug 1911, *M.O.Malte* (LD); Vancouver Is., Sidney, N of Cole Bay, *A.S.Harrison 12.2* (PRA); Vancouver Is., Roche Cove, *J.A.Calder & MacKay 31530* (WS). 73. OREGON: Douglas Co., Umpqua R. valley, *W.C.Cusick 4335* (OSC, WS). WASHINGTON: Seattle, King Co., 6 Jun 1931, *W.J.Eyerdam* (LD); Olympia, 1896, *T.C.D.Kincaid* (LD).

259e. *Juncus effusus* subsp. *austrorcalifornicus* Lint, in P.F.Zika, *Brittonia* [in press] (2002)

T: California, San Bernardino Co., Miller Canyon, East Fork of West Fork Mojave R., San Bernardino Mtns, 22 Sep 2001, *P.F.Zika 16587*; holotype: WTU; isotype: CAS, ENCB, GH, MEXU, MICH, MO, NY, OSC, PRA, RSA, UC, US.

Plants 40–120 (–150) cm tall; stems erect in flower, finally lax in fruit, 1.2–3 (–3.5) mm in diam., faintly 11–35-striate with subepidermal sclerenchyma strands opposite the larger vascular bundles; upper part of stem shiny and smooth when fresh. Upper cataphylls (5–) 8.8–15.6 (–17.2) cm long, abaxially mostly brown or rufescent, chartaceous at base where sometimes lustrous; upper half green, stramineous brown when dry or overmature, dull, surface scabridulous to smooth; margins broadly scarious; not strongly overlapping at the apex; apex mostly asymmetrical, rarely truncate, with strongly convergent sometimes nearly parallel veins. Lower bract 7.3–19.2 (–24.5) cm long, $\frac{1}{6}$ – $\frac{2}{5}$ the length of the culm; basal sheath medium to narrow. Inflorescence usually lax, (1–) 3.4–6.5 (–8.5) × (1.2–) 1.4–6.0 (–7.5) cm; longest peduncle 1.1–4.7 (–6.0) cm long; middle bracts mostly with medium-sized membranous margin, 2.5–5.6 (1.4–7.3) mm long with an apical spine 1.3–4.5 (0.7–5.5) mm long. Tepals lanceolate, mostly acute, apiculate; outer tepals 1.9–3.0 (–3.6) mm long, with a narrow green midrib bordered by greenish or pale brown bands and narrow hyaline margins, spreading from fruit, acuminate; inner tepals subequal or shorter, 1.7–3 mm long. Capsule mostly trigonous-obovoid, sometimes elliptical, mostly subequalling or shorter than perianth, olive-brown; apex mostly apiculate, sometimes darker.

Endemic to the Sierra San Pedro Mártir of Baja California Norte, México, and the eastern Transverse Range and Peninsular Ranges of southwest California, from Los Angeles Co. and San Bernardino Co. southward. 76: CAL. 79: MXN. Riparian zones, springs, wet meadows, ditches, and rarely salt marsh margins, from sea level to 2375 m. Map 479.

76. CALIFORNIA: Los Angeles Co., Smiths Mt., 4 Jul 1896, *A.J.McClatchie s.n.* (NY); Santa Rosa Mtns, E ridge of Toro Peak, spring at head of Black Rabbit Canyon, *P.A.Munz 15367* (CAS, POM, WTU); San Bernardino Co., near Strawberry Peak, *L.R.Abrams 1999* (DS, NY, POM); [Big] Bear Lake, 23 Jul 1935, *Anderson s.n.* (CAS, DS, NY, UC, WTU); San Gabriel Mtns, San Sevaine Flat, *J.Ewan 11037* (CAS, DS); E of Running Springs, Arrowbear Lake, *Sanders 15351 & al.* (CAS); San Diego Co., Laguna Mt., 16 July 1889, *C.R.Orcutt s.n.* (US); Cuiamaca [Cuyamaca] Mtns, *E.Palmer 382* (NY). 79. MEXICO NORTHWEST: Baja California Norte, east flank of Sierra San Pedro Mártir, Cañón del Diablo, 12 km from canyon mouth, *K.L.Chambers 619* (DS); Sierra San Pedro Mártir, upper Arroyo Copal, *R.Moran 15506* (RSA, SD, UC, US).

Closely related to subsp. *pacificus*. They share an asymmetrical sheath apex, which is unknown in other members of the aggregate. Subsp. *austrorcalifornicus* can be distinguished from subsp. *pacificus* by the pale upper half of the cataphylls, with less thickened and less overlapping margins, which are broad and scarious. The pale upper sheaths are similar in colour to subsp. *effusus*, but lack a dark terminal stripe, and the summit tends to have a broad, thin wing-like margin with an asymmetrical (or rarely truncate) apex, rather than an apex symmetrically rounded and with a narrow thin margin.

260. *Juncus exiguus* (Fernald & Wiegand) Lint ex Snogerup & P.F.Zika, in S.Snogerup, P.F.Zika & J.Kirschner, *Preslia* 74: 260 (2002)

Juncus effusus var. *exiguus* Fernald & Wiegand, *Rhodora* 12: 87 (1910). T: Yosemite Valley, Jul 1866, H.N.Bolander 4949; holo: GH; iso: UC.

Perennials, usually 40–90 cm tall, densely caespitose; rhizome very short-noded. Stem leafless, terete, 0.8–1.4 (–1.6) mm in diam., smooth, green and shiny when fresh, blue-green and striate when dry; ridges c. 30–40, low, flat; subepidermal sclerenchyma strands 5–25; pith continuous, of astericiform cells. Cataphylls 3–4; upper cataphylls mostly (3–) 5–11 (–14) cm long, pale brownish castaneous at base, green above, drying to pale brown; sheaths dull, thin and membranous, tight, not papillose; sheath apex symmetrical, obtuse or rounded, slightly thickened, darkened, and inrolled, narrowly bordered with thin margin. Lower bract 4.3–21 cm long, exceeding the inflorescence, with sheath moderately widened; lower middle bract 2–7 mm long, with a ±narrow membranous margin and reduced c. 0.3–4 mm blade. Inflorescence usually diffuse, fastigiate, c. 1–7 cm long, 0.6–4 cm wide. Tepals subequal, lanceolate, acuminate to apiculate, soft, ±erect-spreading, with a greenish midrib bordered by medium (to dark) brown bands and a narrow scarious margin; outer tepals 1.8–3.0 mm long; inner tepals 1.5–2.3 mm long. Stamens 3; anthers 0.7–0.8 mm long, about equalling filaments; style 0.1–0.3 mm long. Capsule unilocular, trigonous obovoid, 2.2–3 mm long, ±shorter than or equalling tepals, pale olive-brown, rarely dark brown; mucro short or absent. Seeds 0.4–0.6 mm long, obliquely obovoid, reticulate, with pale apex; appendages absent.

From S Oregon (northernmost finds in Crater Lake National Park, Oregon) to N California and the W slopes of the Sierra Nevada. Also reported from S Arizona but material not seen. 73: ORE. 76: CAL. Borders of small streams, meadows, ditches, only in the mountains, 1000–2100 m. Map 480.

73. OREGON: Coos Co., Rock Creek, Iron Mtn, *W.M.Baker 5615* (OSC); Curry Co., Snow Camp Meadow, over peridotite, elev. 1070 m, *M.A.Greenleaf 881* (OSC); Douglas Co., Cow Creek, 10 km SW of Riddle, ca. 1250 m, *V.L.Crosby 221* (OSC); Jackson Co., wet ground near summit of Mt. Ashland, 2 Sep 1958, *Bellinger s.n.* (WILLU); Josephine Co., 40 km NW of Grants Pass, 1160 m, *M.F.Denton 3084* (WTU); Klamath Co., Thousand Springs, Crater Lake National Park, 1830 m, *P.F.Zika 12290*, *Newhouse & Brainerd* (CLNP, WTU); Lane Co., rill, Vesuvius/Bohemia Mine, 1430 m, 8 Aug 1927, *Henderson & Patterson s.n.* (ORE). 76. CALIFORNIA: Mariposa Co., Yosemite Valley, *H.N.Bolander [G.Engelmann, Herb. Junc. Bor.-Amer. Norm.] 9* (C, JEPS, RSA, PR, UC).

261. *Juncus laccatus* P.F.Zika, in S.Snogerup, P.F.Zika & Kirschner, *Preslia* 74: 261 (2002)

T: U.S.A., Washington, Clallam Co., low wet ground, south side of Route 101 near Dry Creek and Dry Creek Road, 6 air km SSE of Angeles Point, Olympic Peninsula, 140 m, 48° 6' N, 123° 31' W, 27 Sep 2001, *P.F.Zika 16611*; holo: WTU; iso: CAN, GH, MICH, MO, NY, OSC, PRA, UBC, UC, US.

Juncus effusus var. *gracilis* Hook., *Fl. Bor.-Amer.* 2: 190 (1840). T: [U.S.A.] N. W. coast [Oregon or Washington, probably shores of Columbia River], 1825, *D.Douglas s.n.*; lecto: K, *vide* S.Snogerup, P.F.Zika & J.Kirschner, *Preslia* 74: 261 (2002).

Illustrations: H.L.Mason, *Fl. Marshes California* 354, fig. 172 (1957); C.L.Hitchcock & *al.*, *Vasc. Pl. Pacif. Northw.* 1: 196 (1969), as *J. effusus* var. *gracilis*.

Perennials, usually 25–108 cm tall, densely caespitose; fresh upper stems shiny and smooth, green, wiry; dried stems c. (0.5–) 0.8–1.8 (–2.5) mm in diam., faintly striate with c. 16–25 ridges; subepidermal sclerenchyma strands 5–25; pith continuous, of astericiform cells. Cataphylls 3–4; upper cataphylls usually (5–) 6–15 (–18) cm long, deep brown to castaneous throughout, coriaceous, glossy, smooth, not papillose; veins inconspicuously raised, when dried

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cataphylls often wrinkled longitudinally, tight but deeply split; margins not overlapping; sheath apex symmetrical, rounded, firm (slightly thickened), black, glossy, sometimes slightly notched, never winged; apical veins convergent to parallel. Blade vestigial. Lower bract 3–12 (–17) cm long, much exceeding inflorescence; lower middle bract 1.8–7.0 mm long, with a narrow margin and 0.1–3.3 mm mucro. Inflorescence mostly compact and not conspicuously fastigiate, usually dense, usually 1–4 × 1–2 cm, sometimes loose and larger. Tepals \pm equal, lanceolate, acuminate, dark brown with narrow greenish central band; outer tepals 2.2–2.8 mm long; inner tepals 1.8–2.6 mm long, attenuate; margins very narrow. Stamens 3; anthers c. 0.6–0.8 mm long, about equalling filaments. Capsule unilocular, trigonous-obovoid, c. 2.5 mm long, conspicuously shorter than tepals, usually obtuse and shortly mucronate, brownish. Seeds obliquely ovoid, c. 0.4–0.6 mm long, apiculate, reticulate; appendages absent. $2n = 40, 42$, *vide* H.L.Lint, unpubl. thesis (1977); $2n = 80$, J.A.Calder, D.B.Savile & R.L.Taylor 23234 (UBC) cited in R.L.Taylor & G.A.Mulligan (1968). $2n = 40, 42$, *vide* H.L.Lint, unpubl.; $2n = 40$, B.Parfitt 2336 (ASU, unpubl.); $2n = 80$, *vide* R.L.Taylor & G.A.Mulligan, *Fl. Queen Charlotte Is.* 2: 43 (1968) [vouchers not seen].

From British Columbia, W Washington and Oregon to northern California, reaching the northern Sierra Nevada and Arizona. 71: BRC. 73: ORE, WAS. 76: ARI, CAL. Wet clay to sandy soils, edges of meadows, often disturbed wet places and ditches, coastal in the north, on mountain slopes in the south. Map 481.

71. BRITISH COLUMBIA: Queen Charlotte Islands, Moresby Is., Alliford Bay, *J.A.Calder, D.B.Savile & R.L.Taylor 23234* (MO, UBC); Queen Charlotte Islands, Graham Is., McIntyre Bay, *P.F.Zika 13554* (MICH, WTU). 73. WASHINGTON: Clallam Co., Lake Ozette, Ericson's Bay, *Buckingham 3926*, & al. (ONP); near Gilmer, *W.Suksdorf 5711* (WTU); Mason Co., Lilliwaup swamp, Melbourne Lake, 230 m, *Buckingham 1076* (ONP). OREGON: Clatsop Co., lower end of Saddle Mt. Road, *Peck 24287* (WILLU); Columbia Co., Rainier, 3 m, *P.F.Zika 13625* (WTU); Yamhill Co., Walker Flat, Coast Range, 552 m, *R.Halse 3183* (OSC). 76. CALIFORNIA: Tuolumne Co., Trout Creek, Stanislaus National Forest, *Wiggins 21714* (OSC); Trinity Co., between Dubakella & S Dubakella Mt., 1525 m, *Smith & Sawyer 7093* (WTU).

262. *Juncus hesperius* (Piper) Lint, in S.Snogerup, P.F.Zika & J.Kirschner, *Preslia* 74: 262 (2002)

Juncus effusus subsp. *hesperius* Piper, *Contr. U.S. Natl. Herb.* 11: 180 (1906); *Juncus effusus* var. *brunneus* Engelm., *Trans. Acad. Sci. St. Louis* 2: 491 (1868). T: [California] Bolinas Bay near San Francisco, 12 Aug. 1866, *A.Kellogg [G.Engelmann, Herb. Junc. Bor.-Amer. Norm.] 10*; lecto: MO, designated here; iso: LD, P, POM.

Illustration: H.L.Mason, *Fl. Marshes California* 354, fig. 172 (1957), as *Juncus effusus* var. *brunneus*; F.J.Hermann, *Man. Rushes Rocky Mountains* 35, pl. 9b (1975).

Perennial, (30–) 40–60 (–100) cm tall, densely caespitose; rhizome very short-noded. Stem leafless, terete, usually 1–2 mm thick, light green; ridges c. 20–30, conspicuous when dry; subepidermal sclerenchyma strands present; epidermis cells uniform; pith continuous, of astericiform cells. Cataphylls 3–4; upper cataphylls (4–) 10–15 (–20) cm long, with small awnlike blade, lax, pale brown to greenish above, reddish-brown and often shining and slightly scabrid at base. Inflorescence pseudolateral, 1–3 (–5) cm long, dense to loose; flowers numerous, solitary or loosely clustered. Lower bract (5–) 7–15 (–35) cm long, considerably exceeding inflorescence; sheath constricted below the inflorescence. Bracteoles ovate, c. 1.0–1.5 mm long, pale castaneous to scarious. Tepals 2–3 mm long; outer tepals usually slightly longer than inner ones, acuminate; inner tepals acute, all dark brown or deep castaneous-brown with greenish central band and narrow scarious margin. Stamens 3; anthers 0.5–0.7 mm long; filaments 0.5–0.6 mm long; style c. 0.1 mm long; stigmas 0.5–1.0 mm long. Capsule triseptate, 2–2.5 mm long, shorter than or about equalling tepals, trigonous oblong-obovoid to trigonous-oblong, slightly exceeding perianth, c. 2.0–2.7 mm long, obtuse or slightly retuse, shortly mucronate, dark olive-brown or castaneous-brown at apex. Seeds pale brown, 0.4–0.5 × c. 0.2 mm, obliquely obovoid, reticulate; appendages absent.

North American W coast from Queen Charlotte Island in British Columbia to near Santa Barbara in California. Reported to occur in Arizona but material not seen. 71: BRC. 73: ORE, WAS. 76: CAL. Roadside ditches, boggy fields, open places in regenerating forests, mostly in lowlands in the vicinity of the coast. Map 482.

71. BRITISH COLUMBIA: Loss Creek on road between Port Renfrew and Victoria, *J.A. Calder & MacKay 30975* (UC); Upper Victoria Lake, near S end of Moreby Island, *J.A. Calder & R.L. Taylor 39801* (MO). 73. OREGON: Boring, 18. Jul 1919, *W. Suksdorf s.n.* (WSU); Clatsop Co., at base of Onion Peak, *K.L. Chambers 3338 & R. Rodin* (WTU). WASHINGTON: Clallam Co., W of Port Angeles, *P.F. Zika 16610* (PRA, WTU); King Co., Kirkland Lake, 20 Jun 1939, *W.J. Eyerdam* (WS); Jefferson Co., on trail to Hoh, *I.C. Otis 1544* (WTU); Whatcom Co., Point Roberts, Benson Road, *P.F. Zika 16572* (WTU). 76. CALIFORNIA: Marin Co., Hearts Desire, S shore of Tomales Bay, *J. Ewan 8106* (POM); Humboldt Co., Big Lagoon, *J.P. Tracy 6763 & H.E. Parks* (WTU); San Mateo Co., W side of Route 1 near loop road to Pigeon Point, *P.F. Zika 16478* (WTU).

263. *Juncus aemulans* Liebm., *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 1850: 38 (1850)

Juncus effusus var. *aemulans* (Liebm.) Buchenau, in H.G.A. Engler, *Pflanzenr.* (iv.36) 25: 136 (1905). T: Mexico, Perote, Cerro Leon [Cerro de Leon], 2150 m, Jul 1841, *F.M. Liebmans s.n.*; lecto: C, *vide* H. Balslev, *Fl. Neotrop. Monogr.* 68: 92 (1996); iso: C, K, P.

Map: H. Balslev, *Fl. Neotrop. Monogr.* 68: 93, fig. 46 (1996) [Neotropical region].

Perennials, 50–110 cm tall, densely caespitose; rhizome very short-noded, 2–4 mm diam., up to 7 cm long. Stem erect, terete, 0.7–1.1 (–1.5) mm diam., medium green, shiny above and smooth when fresh; ridges usually 15–20, almost indistinct when fresh, distinct when dry; subepidermal sclerenchyma strands present; pith of astericiform cells, continuous; epidermis cells uniform. Cataphylls usually 3, tight or somewhat loose, not lax; upper cataphylls usually 9–14 cm long, with awnlike blade up to 5 mm long, green above, drying to stramineous, ±castaneous-brown to medium brown and dull to slightly shiny at base, smooth (not papillose) but distinctly veined; margins overlap within 2 cm of the apex; apex truncate to asymmetrical, with broad thin margins. Inflorescence pseudolateral, usually lax, strongly ascending; flowers many, solitary or upper ones short-pedicellate in arcuate rows; first bract erect, 10–17 cm long, with narrow sheath not constricted below. Bracteoles 0.8–1 mm long, broadly ovate, acuminate. Outer tepals 2–3.5 mm long, slightly exceeding inner tepals, all lanceolate, acuminate, dark castaneous-brown with green midrib. Stamens 3; anthers 0.5–0.7 mm long, about equalling filaments. Capsule 2 mm long, equalling or shorter than tepals, trigonous-obovoid, dark brown, unilocular, triseptate. Seeds ovoid, c. 0.7 × 0.3 mm long, pale brown; appendages absent.

Central Mexico Highlands, and at least locally S Mexico to Guatemala. 79: MXC, MXE, MXG, MXS, MXT. 80: GUA. 2200–3600 m. Buchenau (1906) cites this taxon also from the W coast of N America, but the record probably refers to *Juncus exiguus*. Map 483.

79. MEXICO CENTRAL: Distrito Federal, Llanos de Navarte, *E. Lyonnet 287 p.p.* (MEXU); Desierto de los Leones, 300 m, *R. Galván 612* (NY); Mexico State, 3 km E of San Rafael, Tlalmanalco, 2750–2900 m, *R.C. Cisneros 1645* (WIS). MEXICO NORTHEAST: Hidalgo, Real del Monte, Penas Largas near Tezoantla, 2750 m, *J. Rzedowski 22180* (NY). MEXICO GULF: Veracruz, 11 km toward Cofre de Perote from Hwy. 140 and Perote, *C. Cowan 3906* (TEX); Orizaba, Vaqueria, 3600 m, *M. Chazaro & G. Cortes 2716* (WIS). MEXICO SOUTHWEST: Oaxaca, Vivero Rancho Tejo, 2200 m, *E. Judziewicz 3287* (WIS); 18 miles [29 km] SW of Oaxaca, 2300–2900 m, *E.W. Nelson 1335a, 1335e, 1406a* (US). MEXICO SOUTHEAST: Chiapas, Tenejapa, Achlum, 2800 m, *A.S. Ton 2360* (DS, DUKE, NY, WIS). 80. GUATEMALA: Tonicapán, Sierra Madre Mts near Polagua, 20–25 km N of Cristóbal, 2800 m, *L.O. Williams & al. 22666* (F, NY, US, WIS); Tonicapán, Momostenango, Xoljoj, *D.N. Smith 962* (AAU).

Similar to *J. hesperius* but having smooth (not scabrid) and ±tight cataphylls, and usually lower number of stem ridges.

264. *Juncus decipiens* (Buchenau) Nakai, *Veg. Kamikochi* 35 (1928)

Juncus effusus var. *decipiens* Buchenau, *Bot. Jahrb. Syst.* 12: 229 (1890); *Juncus effusus* subsp. *decipiens* (Buchenau) Weim., *Svensk Bot. Tidskr.* 40: 143 (1946). T: [Type citation: 'Japan prope Yokohama, Nagasaki et Hakodate leg. cel. C.J. Maximowicz; Yokoska, Nippon; P.A.L. Savatier, 1353 (!; forma intermedia).'] Japan, Yokohama, *C.J. Maximowicz, Iter Secundum*; syn: LE, W; Nagasaki, 1863, *C.J. Maximowicz, Iter Secundum*; syn: L, W; Hakodate, 1861, *C.J. Maximowicz, Iter Secundum*; syn: LE, S, W, n.v.; Yokoska, *P.A.L. Savatier 1353*; syn: P, W, n.v.

Perennials 25–60 (–120) cm tall, caespitose or forming dense stands, with short-noded rhizome. Stem leafless, soft, terete, 1–2 (–3) mm diam., greyish green to mid-green, smooth;

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ridges 20–50, ±hardly conspicuous when dry; subepidermal sclerenchyma strands narrow but most connected by radial lamellae to vascular bundles; epidermis cells uniform; bundles in three rows; pith of perfectly astericiform cells, continuous, very loose; sterile stems present. Cataphylls 3–4, 3–19 cm long, ±tight, abaxially pale stramineous and dull distally, ±dark red-brown and ±glossy at base, adaxially whitish with a pearly sheen. Inflorescence 2–4 (–9) cm long, usually dense but not congested; flowers many, solitary, short-pedicellate. Lower bract (5–) 10–20 (–35) cm long, $\frac{1}{4}$ – $\frac{1}{3}$ as long as stem, much exceeding inflorescence; sheath narrow with membranous margin to 0.3 mm wide, often constricted below inflorescence. Tepals subequal, lanceolate, 1.9–4.0 mm long, acuminate, light green or later stramineous with darker reddish stripes along central band and membranous margin. Stamens 3; anthers (0.3–) 0.6–0.7 (–0.8) mm long. Capsule trilocular, 2–3 mm long, equalling or slightly exceeding perianth, trigonous-ovoid to ellipsoid, golden brown to dark red-brown. Seeds 0.4–0.6 mm long, obovoid, brown.

A variable, widely distributed species extending from E India to the Far East and Japan, and to New Guinea in the south. The species is most closely related to *J. effusus* and *J. setchuensis*. It differs from the former by the glossy abaxial surface of its cataphylls; from both it can be distinguished by its trilocular capsule. The whole group requires a taxonomic revision. Three subspecies are recognized.

- 1 Tepals 1.7–3.0 mm long, stramineous, sometimes with red-brown stripes along central band; capsule golden brown to red-brown; cataphylls abaxially stramineous in distal $\frac{1}{4}$ – $\frac{3}{4}$, red-brown only near the base
- 2 Tepals 1.7–2.2 mm long; capsule golden to dark golden brown; cataphylls stramineous in distal $\frac{1}{2}$ – $\frac{3}{4}$ **264a. subsp. decipiens**
- 2: Tepals 2.1–3.1 mm long; capsule dark golden brown to red-brown; cataphylls stramineous in distal $\frac{1}{4}$ – $\frac{1}{2}$ **264b. subsp. medianus**
- 1: Tepals 3.0–4.0 mm long, stramineous with dark red-brown stripes along central band; capsule dark red-brown; cataphylls stramineous in distal $\frac{1}{4}$ – $\frac{1}{3}$, usually red-brown for rest of their length **264c. subsp. sundaicus**

264a. *Juncus decipiens* (Buchenau) Nakai subsp. decipiens

Juncus effusus f. *glomeratus* Makino, *Bot. Mag.* 12: 163 (1898), n.v.; *Juncus decipiens* var. *glomeratus* (Makino) Satake, *J. Fac. Sci. Univ. Tokyo, sect. 3 Bot.* 4(2): 178 (1933). T: n.v.

Juncus effusus f. *gracilis* Buchenau ex Matsum., *Ind. Pl. Jap.* 2: 184 (1905), nom. illeg., non Hook. (1840); *Juncus decipiens* var. *gracilis* [Buchenau ex Matsum.] Nakai, *Rep. Veg. Daisetuzan* 60 (1930), n.v. T: [Japan, Hokkaido] Yezo, Isikari, Zyozankei, 1899, *J. Matsumura*; syn. n.v.; Isikari, Daisetuzan, 1928, *T. Nakai*; syn. n.v.

Juncus effusus f. *utilis* Makino, in T. Makino & K. Nemoto, *Fl. Japan* 1290 (1925); *Juncus decipiens* f. *utilis* (Makino) Satake, *J. Fac. Sci. Univ. Tokyo, Sect. 3 Bot.* 4(2): 177 (1933). T: [cultivated].

Juncus effusus f. *spiralis* Makino, *J. Jap. Bot.* 7: 27 (1931); *Juncus decipiens* f. *spiralis* (Makino) Satake, *J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot.* 4(2): 177 (1933). T: [cultivated]

Juncus decipiens var. *robustior* Satake, in T. Nakai & M. Honda, *Nov. Fl. Jap.* 1: 57 (1938). T: [Japan] not designated.

Illustrations: T. Makino, *New Illustr. Fl. Jap.* 821, 822 (1964), as *J. effusus* var. *decipiens* and f. *utilis* respectively; M.-T. Kao & C.E. De Vol, in H.L. Li, *Fl. Taiwan* 5: 149, pl. 1302 (1978), as *J. effusus* var. *decipiens* (but capsule depicted as triseptate); V.I. Krechetovich & N.F. Goncharov, in V.L. Komarov, *Fl. SSSR* 3: 534, tab. 29 (1935); Y. Satake, *J. Jap. Bot.* 10(1): 39, fig. 22, 40, fig. 23 (1934); Muh-Tsuen Kao & C.E. DeVol, in Hui Lin Li & al., *Fl. Taiwan* 5: 149, tab. 1302 (1978).

Maps: V.S. Novikov, in S.S. Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 67, fig. 16 (1985) [the Russian Far East]; E. Hultén & M. Fries, *Atlas N. Eur. Vasc. Pl.* 1: 98, map 195 (1986).

Rhizome very short-noded, horizontal. Stems densely tufted, 30–80 cm long, 1.0–2.0 mm diam.; striations c. 20–50, hardly distinct in dry condition; pith loose, continuous. Cataphylls few, ±tight (sometimes ±lax), 8–16 cm long, abaxially stramineous for $\frac{1}{2}$ – $\frac{3}{4}$ of their length above, yellow-brown, castaneous or red-brown, slightly glossy at base. Lower bract 8–20 cm long; sheath narrow. Inflorescence 2–3 cm long; many-flowered; flowers ±solitary but on abbreviated peduncles. Bracteoles ovate, c. 1 mm long, acute, stramineous. Tepals ±equal, acuminate to acute, stramineous-brown, with ±broad membranous to scarious margins; outer tepals 1.9–2.2 mm

long. Anthers 0.4–0.7 mm long, shorter than 0.9–1.0 mm filaments; style c. 0.1 mm long; stigmas 0.5–0.7 mm long. Capsule ±trilocular, usually slightly exceeding or equalling outer tepals, narrow-ellipsoid to ovoid, 2.2–2.7 mm long, subobtuse to truncate, pale to golden brown or dark golden brown, umbonulate. Seeds ovoid, 0.5–0.6 × c. 0.25 mm, pale brown, faintly reticulate.

East Asia from E India to Japan and the Russian Far East. Also reported from Malaysia but record uncertain. 31: KUR, PRM, SAK. 36: CHM, CHS. 38: JAP, KOR. 40: ASS. 41: LAO, THA. Various wet places from near sea level to the mountains. Map 484.

31. KURIL IS.: Kunashir Is., between Mendeleev and Sernovodsk, 22 Sep 1968, *V.Vašák, J.M.Egorova & L.A.Alexeeva* (PR307401–307407). 36. CHINA SOUTHEAST: Hong Kong, Tai Mo Shan, *Shiu Ying Hu* 7607 (K). 38. JAPAN: Tonosyo, Syodoshima, Kagawa-ken, 5 May 1955, *Arima* (LD); Tokyo, 13 Jun 1896, *K.Onuma* (LD); Honshu, Yamanashi Pref., Uchino-mura, Minamitsuru-gun, *M.Togashi* 38 (K, TNS). KOREA: Quelpaert, *U.Faurie* 2246 (P). 40. ASSAM: Cherrapunjee, Khasi Hills, *Thakur Rup Chand* 5500 (L). 41. LAOS: Muang Cha, Chingkwang, *A.F.G.Kerr* 20989 (BM, K). THAILAND: Doi Ngao Ng Chen, *A.F.G.Kerr* 5438 (BM, K, L).

Widely cultivated as a number of cultivars in Japan. Used for making tatami mats or decorative mats in Japan and also as a source of medicinal drugs in China and Malaysia. Records from North America belong to *J. pylaei*.

264b. *Juncus decipiens* subsp. *medianus* L.A.S.Johnson & K.L.Wilson, *Telopea* 9: 377 (2001)

T: Papua New Guinea, J. Leahey's mill site, Goroka Subdistrict, 7,300 ft [2200 m], 18 Nov 1954, *A.G.Floyd & J.S.Womersley* 6297; holo: NSW; iso: CANB, L, LAE.

Illustration: K.L.Wilson & L.A.S.Johnson, *Telopea* 9: 372, fig. 2c, d (2001).

Stem 25–120 cm long, 1.1–2.5 (–3.0) mm in diam.; striations 23–47. Cataphylls 3–19 cm long, abaxially stramineous or pale red-brown for $\frac{1}{4}$ – $\frac{1}{2}$ of its length, grading to red-brown or dark red-brown towards base. Lower bract 9–35 cm long. Inflorescence 2–9 cm long. Tepals acute to acuminate, stramineous-brown, often with darker yellow-brown or red-brown band on each side of midrib, with broad membranous margins; outer tepals 2.1–2.7 (–3.0) mm long. Anthers 0.4–0.8 mm long, shorter than or exceeding filament. Capsule slightly shorter than or slightly exceeding outer tepals, ellipsoid to oblong or ovoid, dark golden brown to red-brown, umbonulate. Seeds 0.4–0.5 mm long. Fig. 138.

Islands of New Guinea (Irian Jaya and Papua New Guinea), Philippines (Luzon and Mindanao), Borneo, Java; also in Taiwan. 38: TAI. 42: BOR, JAW, NWG, PHI. Wet sites and along streams on mountain slopes, 1200–3000 m. Map 485.

38. TAIWAN: Mt Ta-tung, Taipei Co., *H.O.Lee & M.T.Kao* K3951 (L); Mt Ali, 2200 m, Central Formosa, *C. van Steenis* 20833 (L). 42. JAVA: Priangan, Tegal Kirinjoeh, Papandajan, 2060 m, *L. van der Pijl* 567 (K). NEW GUINEA: Irian Jaya, 9 km NE of Lake Habbema, 2800 m, *L.Brass* 10745 (BRI); Papua-New Guinea, Lake Onim, Subdistrict Lalibu, 2300 m, *M.Andrew* LAE57133 (NSW); Chimbu Valley, Konatna, 2080 m, *J.Sterly* 80-160 (L); Chimbu Valley, Aragli, 2200 m, *J.Sterly* 75-456 (L); Bomkane, 2150 m, Simbu Prov, Gembogl Subprov., *J.Sterly* 1666 (L). PHILIPPINES: Mt Apo, Mindanao, *M.S.Clemens* BS15665 (MEL); Mt Pulog and vicinity, Benguet Province, Luzon, *M.S.Clemens* 5075 (UC); Pauai Benguet, Mt Data, Bontoc Province, Luzon, *M.S.Clemens* 16259B (UC).

264c. *Juncus decipiens* subsp. *sundaicus* (Ridl.) L.A.S.Johnson & K.L.Wilson, *Telopea* 9: 378 (2001)

Juncus sundaicus Ridl., *J. Bot.* 73: 342 (1935). T: [Indonesia] Sumatra, Korinchi Peak, 7300 ft [2225 m], 25 May [19]14, *H.C.Robinson & C.B.Kloss*; holo K; iso: BM.

Illustration: C.A.Backer, *Fl. Males.* 4: 213, fig. 2b (1951).

Stem 20–50 cm long, 1.0–2.0 mm in diam.; striations c. 20–30, quite distinct; pith loose, continuous. Cataphylls 5–10 cm long, tight, abaxially more or less evenly red-brown to dark red-brown and glossy except for the most distal 1–2 cm; blade acicular, to 3 mm long. Lower inflorescence bract 7–15 cm long; sheath narrow. Inflorescence 2–4 cm long, lax, 12–many-flowered. Bracteoles ovate, c. 1.5–2 mm long, acuminate to mucronate, castaneous-brown. Tepals equal, 3.0–4.0 mm long, acuminate; central band prominent, greenish to stramineous-brown, with a broad darker red-brown band along each side; margins broad to narrow,

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Figure 138. *Juncus decipiens* subsp. *medianus*. **A**, inflorescence; **B**, perianth with capsule (**A**, **B**, L.A.S.Johnson, NSW75499). *Juncus laeviusculus* subsp. *laeviusculus*. **C**, inflorescence; **D**, perianth with capsule (**C**, **D**, E.N.McKie, NSW6946). *Juncus continuus*. **E**, perianth with capsule; **F**, inflorescence (**E**, **F**, H.S.McKee 6749, NSW). *Juncus bassianus*. **G**, inflorescence; **H**, perianth with capsule (**G**, **H**, K.L.Wilson 6349, NSW). *Juncus brevibracteus*. **I**, inflorescence; **J**, perianth with capsule (**I**, **J**, B.G.Briggs, NSW49058). *Juncus alexandri* subsp. *alexandri*. **K**, inflorescence; **L**, perianth with capsule (**K**, **L**, A.C.Beaglehole 79373, NSW). *Juncus firmus*. **M**, inflorescence; **N**, perianth with capsule (**M**, **N**, K.L.Wilson 6308, NSW). Scale bars: **A**, **C**, **F**, **G**, **I**, **K**, **M** = 2 cm; **B**, **D**, **E**, **H**, **J**, **L**, **N** = 1 mm. Drawn by D.Mackay. Reproduced with permission of the authorities of Royal Botanic Gardens, Sydney.

membranous to scarious. Anthers 0.5–1.0 mm long, shorter than c. 1.0 mm filaments; style c. 0.3 mm long; stigmas 0.8–1.0 mm long. Capsule trilocular, sometimes imperfectly so, slightly shorter than or equalling outer tepals, obovoid to narrow-ellipsoid, c. 3.5 mm long, subobtuse, shortly mucronate (mucro c. 0.2 mm), very dark red-brown, shining. Seeds c. 0.6–0.65 × 0.3 mm, deep brown, apiculate, irregularly faintly reticulate.

Endemic to Malesia, only on the islands of Sumatra; a single record from Java requires confirmation. 42: ?JAW, SUM. Wet sites in the mountains. Map 486.

42. JAVA: [cult.] Mt Gedeh (plants from Mt Papandajan, C. van Steenis), 7 Sep 1932, *J.Clemens & M.S.Clemens 30421* (K). SUMATRA: Gunung Bandahara, Camp 4, 2400–2600 m, & Camp 6, *W. de Wilde & D. de Wilde-Duyfjes 15174* (K, L); Gunung Leuser West top, camp 1, 2000–2300 m, *W. de Wilde & D. de Wilde-Duyfjes 15944* (K, L); Laut Poepandji, Atjeh, *C. van Steenis 6396* (K); Mt Gosir, c. 2200 m, *C. van Steenis 8411* (L); Gaju and Alas Lands, Mt Kemiri, east slope, 3250–3314 m, *C. van Steenis 9605* (L).

265. *Juncus setchuensis* Buchenau, *Bot. Jahrb. Syst.* 37, Beibl. 82: 17 (1905)

T: China, Setchuen [Sichuan], Nanch'uan, Shihtru K'on, Chinfu shan, 7 Jul 1891, *C.Bock & A. von Rosthorn 78*; holotype: O.

Juncus setchuensis var. *effusoides* Buchenau, *Bot. Jahrb. Syst.* 36, Beibl. 82: 18 (1905). T: China, Shensi, *G.Giraldi 6701, 6706, 6710, 6712-6714, 6716, 6718*; syn: W, partly *n.v.*; Japan, Tokio, *J.Matsumura*; syn: *n.v.*

Juncus setchuensis var. *compactus* Satake, *J. Fac. Sci. Univ. Tokyo, Sect. 3 Bot.* 4(2): 180 (1933); *Juncus setchuensis* f. *compactus* (Satake) Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 64 (1938). T: Korea, Kyurei, 1913, *T.Nakai 548*; holotype: *n.v.*

[*Juncus pauciflorus* auct. fl. sinens. p.p., non R.Br. (1810): Wu Kuofang, *Fl. R.P. Sinicae* 13(3): 158 (1997)].

Illustrations: Y.Satake, *J. Jap. Bot.* 9(7): 420, fig. 19 (1933); Wu Kuofang, *Fl. R. P. Sinicae* 13(3): 161, tab 35 (1997).

Perennials, (20–) 40–80 cm tall, forming dense often tussock-like stands; rhizome horizontal, very short-noded, densely branched, 1.5–3 mm diam. Stem leafless, straight or ±curved, terete, 1–1.5 mm diam., greyish green; ridges 15–30, c. 10–15 prominent, others distinct in dry condition; subepidermal sclerenchyma strands mostly small, sometimes some connected to vascular bundles; epidermis cells on the ridges enlarged; bundles in two rows; pith continuous, usually dense, of irregularly astericiform cells, becoming arachnoid. Cataphylls 3–5; upper cataphylls 4–9 (–12) cm long, loose, with up to 3 mm long awn-like blade, abaxially greenish to stramineous above, dull, dark reddish-brown and glossy below, adaxially silvery stramineous. Lower bract 5–15 (–20) cm long, straight or curved, considerably exceeding the inflorescence. Inflorescence pseudolateral, 1–5 cm long, dense to lax; flowers (4–) 15–50, solitary, on abbreviated or elongated peduncles. Bracteoles 0.8–1.2 mm long, broadly ovate, acute, scarious to stramineous. Tepals ovate-lanceolate, subequal, acuminate to acute; outer tepals 2–3 × 0.9 mm, equalling to slightly longer than c. 2.2–2.5 mm inner tepals; central band prominent, broad, stramineous to greenish, bordered pale castaneous; margins broad, membranous. Stamens 3, slightly shorter than tepals; anthers c. 0.4–0.7 mm long, shorter than c. 0.7–0.9 mm filaments; style c. 0.1 mm long; stigmas reddish, c. 0.5–0.8 mm long. Capsule triseptate, septa not reaching halfway to capsule centre, obovoid to broadly so, 2.5–3 mm long, exceeding perianth, obtuse, greenish to light brown, shining, unilocular, triseptate. Seeds obliquely ovoid to subglobose, 0.5–0.6 × 0.2–0.3 mm, apiculate, indistinctly striate, faintly irregularly reticulate, pale brown; appendages absent.

Widely distributed in China, Japan and Korea. 36: CHC, CHN, CHS, CHX. 38: JAP, KOR. Various more or less moist habitats, wet sand, damp field margins, meadows, often on mountain slopes, 500–1700 m. Map 487.

36. CHINA SOUTH-CENTRAL: Guizhou, Liang Feng Yah, Tsunyi Hsien, *A.N.Steward, C.Y.Chiao & H.C.Cheo 59* (S); Sichuan, Guan Xian, Luojiaping, 1300 m, *Wang Zhong-tao & al. 870367* (LD, PE); Sichuan, Guan Xian, Longchi, 1800 m, *Wang Zhong-tao 870244* (LD, PE); 870192 (PE, UPS); N Sichuan, Yin-hsiu-wan, 1800 m, *H.Smith 2391* (LD, UPS). CHINA NORTH-CENTRAL: Shen-si septentr. [N Shaanxi], Quae-Hu-sil-li, 1897, *G.Giraldi s.n.* (K). CHINA SOUTHEAST: Jiangxi, Kiu-kiang Hsien, Lu-shan, *H.H.Hu 2265* (S); Hunan, Xining Co., Luo Lin-bo 0126 (PE, WU). 38. JAPAN: Tokyo, 30 May 1894, *K.Onuma* (LD); Honshu, Mutsu, Shimo-kita, 16 Jun 1955, *M.Furuse s.n.* (S); Otu, *U.Faurie 1793* (WU); Shichinoke, *U.Faurie 625* (WU).

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In herbarium collections *J. setchuensis* is most often confused with *J. decipiens*. The former has triseptate capsule (with septa usually reaching up to 1/2 of the capsule radius), thinner stems with prominent ridges, and paler green to slightly greyish stem colour. *Juncus setchuensis* is a variable taxon and requires further study.

266. *Juncus durus* L.A.S.Johnson & K.L.Wilson, *Telopea* 9: 380 (2001)

T: Papua New Guinea, Western Highlands, Yobobos grassland area (source of Lagaip River), Laiagam subdistrict, c. 8500 ft [2590 m], 25 Aug 1960, *R.D.Hoogland & R.Schodde 7595*; holo: NSW; iso: BM, CANB, L, LAE.

Illustration: K.L.Wilson & L.A.S.Johnson, *Telopea* 9: 372, fig. 2g, h (2001); L.A.S.Johnson & K.L.Wilson, *Telopea* 9: 400, fig. 1 (2001).

Perennials, shortly rhizomatous. Stem terete, hard, mid-green?, c. 120 cm long, 1.8–2.3 mm in diam.; culm striations c. 50; pith strongly interrupted, dense. Sterile leaf-like culms present but real leaves reduced to cataphylls c. 15 cm long, lax, shiny (less so towards apex), abaxially yellow-brown to very dark golden brown towards base, adaxially dark golden brown. Lower bract c. 13 cm long, apparently continuous with culm, exceeding inflorescence. Inflorescence c. 2 cm long, diffuse, with more or less densely clustered flowers; flowers 5–10 per cluster and 2–10 clusters per inflorescence. Tepals acute to acuminate, stramineous-brown, with ±broad membranous margins; outer tepals 2.0–2.5 mm long, slightly longer than or equalling inner tepals. Stamens 3, shorter than outer tepals; anthers c. 0.4 mm long, shorter than filaments. Capsule trilocular, equalling or slightly exceeding outer tepals, elliptic to obovate, golden brown, acute to obtuse, not or scarcely beaked. Seeds c. 0.5 mm long. Fig. 142.

Known only from two gatherings from the Yobobos grassland area of the Western Highlands, Papua New Guinea. 42: NWG. Treefern grasslands at about 2,600 m altitude. Map 488.

42. PAPUA NEW GUINEA: Yobobos grassland area (source of Laiagam River), c. 8,500 ft [2590 m], 17 Aug 1960, *R.Hoogland & R.Schodde 7460* (CANB, LAE).

Apparently related to the Australian *J. gregiflorus* L.A.S.Johnson and New Zealand *J. edgariae* L.A.S.Johnson & K.L.Wilson. All three species have tough culms with dense pith (variously interrupted) and loose cataphylls that are dark golden brown both abaxially and adaxially. *J. durus* differs from *J. edgariae* in having finer culm striations (c. 0.05 mm wide) that are all similar (in the latter, the striations are mostly broader (to c. 0.1 mm wide) but mixed with some finer ones as well. The striations in *J. gregiflorus* are similar to those of *J. durus*. The pith in *J. durus* culms has larger lacunae than in *J. edgariae*, while the pith in *J. gregiflorus* differs from both in being usually much reduced to mere septa-like plates of pith separating very large lacunae. Differs from *J. decipiens*, its closest relative in New Guinea, in having more rigid, thicker culms with much denser pith, which is frequently interrupted, and with lax dark golden brown cataphylls.

267. *Juncus textilis* Buchenau, *Abh. Naturwiss. Vereine Bremen* 17: 336 (1903)

T: [California] San Gabriel Canyon, Feb 1861, *W.H.Brewer 168*; syn: US; San Bernardino Mtns, Jun 1891, *S.B.Parish 2232*; syn: US; Los Angeles Co., Jun 1888, *H.E.Hasse*; syn: US; Jul 1890, *H.E.Hasse*; syn: US; 1891, *H.E.Hasse*; syn: US; Santa Catalina Is., Avalon, *B.Trask*; syn: US; San Diego Co., 1901, *C.H.Merriam*; syn: US; Orange Co., Jun 1901, *L.R.Abrams 1752*; syn: US.

Juncus lesueurii var. *elatus* S.Watson, *Bot. California* 2: 205 (1880). T: California, Los Angeles, 1868, *A.Wood*; lecto: GH, designated here by S.E.Clemants.

Illustration: F.Buchenau, *Abh. Naturwiss. Vereine Bremen* 17: tab. 6, fig. 1–9 (1902).

Perennials, usually (50–) 100–210 (–300) cm tall, forming dense to loose stands; rhizome creeping, ±short- to long-noded, 6–11 mm diam. Stem leafless, terete, (2–) 4–7 mm thick, hard, grey-green; ridges (30–) 50–80, low but conspicuous; subepidermal sclerenchyma strands present, forming thin radial lamellae connected to vascular bundles, these in several circles; pith continuous but not dense, later becoming irregularly interrupted, of a network of imperfectly astericiform cells with rounded forms when young, degenerating in mature stems. Cataphylls usually 5–6; inner cataphylls 15–30 (–40) cm, ±lax, pale stramineous-brown with dark base; upper cataphylls with small awnlike blade. Lower bract 10–30 cm

long, shorter than or exceeding inflorescence, hard and acute. Inflorescence pseudolateral, usually 10–15 cm long, very lax, many-flowered. Bracteoles ovate, c. 1 mm long, acute to subobtusate, pinkish-membranous to scarious. Outer tepals 3.5–5 mm long, usually slightly longer than inner ones, all lanceolate, obtuse to acutish, greenish to pale brown with membranous margins, loosely subtending capsule at maturity. Stamens 6; anthers 1.2–2.2 mm long; filaments 0.4–0.8 mm long; style 1–1.5 mm long; stigmas to c. 1.5 mm long. Capsule triseptate, rounded trigonous, ellipsoid to narrowly ovoid, 3–4 (–5) mm long, about equalling or shorter than perianth, subobtusate, mucronate, dark red-brown, shining. Seeds 0.5–0.8 mm long, obovoid to ellipsoid, dark amber; appendages absent.

Endemic to southern California. 76: CAL. Moist places along watercourses, mostly rivulet ravines. Map 489.

76. CALIFORNIA: Foothills of Santa Monica Range, Jun 1890, *H.E.Hasse* (probable isosyn: LD); Lytle Creek near San Bernardino, *S.B.Parish 199* (LD, UC); Berkeley, Los Angeles Co., 8 km above mouth of Bouquet Canyon, *J.Ewan 3431* (RSA); Middle Ranch Canyon, Santa Catalina Island, *R.F.Thorne & P.Everett 34962* (RSA); Santa Cruz Co., Santa Cruz Mtns, Big Basin, *F.R.Fosberg 5276* (S); Riverside Co., San Jacinto Mtns, Snow Creek, below old Fish Hatchery *E.K.Balls 11362* (BM); San Bernardino Co., Cajon Canyon below Cajon Station, *P.H.Raven 16696* (BM); San Luis Obispo Co., Oak Park, *R.F.Hook 1405* (BM); Los Angeles, *J.C.Arvin 180* (BM); Ventura Co., Ventura Oil Fields, 7 Oct 1947, *H.M.Pollard s.n.* (BM); Santa Barbara Co., Carpinteria, 26 Aug 1958, *H.M.Pollard* (W).

268. *Juncus tobdeniorum* Noltie, *Edinburgh J. Bot.* 55: 42 (1998)

T: India, Sikkim, Yakche, N of Lachung, 27°43'17"N, 88°45'02"E, 3105 m, 14 Jul 1996, *Long & H.Noltie 209*; holotype: E; isotype: TI, PE, GH, CAL, BSHC. [as '*tobdenii*']

Illustration: H.Noltie, *Edinburgh J. Bot.* 55: 40, fig 1A (1998).

Perennials, 9–33 cm tall, forming dense stands; rhizome short-noded, creeping. Stem leafless, terete with a single shallow groove, 0.7–1 mm diam., ±soft, green; ridges 20–25, inconspicuous, ±distinct when dry; subepidermal sclerenchyma strands present, some connected to vascular bundles in one circle; pith interrupted or continuous, of astericiform cells. Cataphylls few, ±tight; uppermost cataphylls 2–3 cm long, striate, abaxially stramineous above, yellow-brown to brown and glossy at base, adaxially stramineous-silvery, glossy; apex truncate with small awn-like blade. Probably some single, terete leaves from brachyblasts of the rhizome. Lower bract 4–6 cm long, exceeding the inflorescence; sheath very narrow. Inflorescence pseudolateral, c. 2 × 2 cm, diffuse; flowers 9–35, solitary. Bracteoles ovate, 0.9–1.0 × 0.8 mm, papery, reddish-brown. Tepals subequal; outer tepals 2.4–3 × 0.5–0.7 mm, concave, narrowly lanceolate, acuminate, reddish-brown, shining; inner tepals 2.5–2.7 × 0.6–0.7 mm, similar to outer ones but flatter and with broader green midrib; margins red-brown. Stamens 3; anthers c. 0.6 mm long; filaments 1.0–1.4 mm long; style 0.3–0.4 mm long; stigmas recurved, c. 0.2 mm long. Capsule unilocular, ±trigonous-ovoid, 2.6 × 1.1 mm, equalling or slightly shorter than tepals, ±obtuse with c. 0.2 mm mucro, dark brown, shining. Seeds 0.5 × 0.3 mm, oblong-ellipsoid, orange-brown, dark at base.

Sikkim. 40: BHU. Gravelly marsh, 3000–3500 m. Map 490.

40. SIKKIM: Lachen, 3 Aug 1849, *J.D.Hooker s.n.* (K); Yakla, 10000 ft, 20 Sep 1869, *C.B.Clark 9935* (K).

269. *Juncus gubanovii* Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 80(3): 130 (1975)

T: Afghanistan, provincia Parvan, montium Gindukusch [Hindukush] declivitas meridionalis, 5 km supra pagum Aingoron, ad viam Kabul-trajectus Salang, 6 Jul 1974, *A.I.Gubanov & al. 377*; holotype: MW; isotype: LE.

Illustration: V.S.Novikov, *Bjull. Moskovsk. Obšč. Prir., Odt. Biol.* 80(3): 131 (1975).

Perennials, 50–120 cm tall, densely caespitose; rhizome very short-noded, stout. Stem leafless, terete, 2.5–3 mm diam., ±hard, with c. 20–25 conspicuous ridges formed by strong subepidermal sclerenchyma strands; pith of astericiform cells interrupted, reduced to plates between numerous lacunae of variable size; epidermis cells above ridges enlarged. Cataphylls 3 (–5); upper cataphylls to c. 10–12 cm long, lax, obtuse to acute, without blade, abaxially ±stramineous distally, ±dark castaneous-brown to reddish, glossy, stramineous glossy adaxially. Lower bract 6–25 cm long, equalling to exceeding inflorescence. Inflorescence

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pseudolateral, diffuse, many-flowered, supradecomposed, usually with 3–5 branches bearing loose groups of contracted unilateral cymes, to c. 8 cm long. Bracteoles up to 1.5 mm long, triangular-ovate, acute, pale. Tepals 2.5–3 mm long, equal or outer ones slightly longer, narrowly lanceolate, acuminate; central band greenish-stramineous, later stramineous, bordered castaneous to purplish; margins broad, scarious. Stamens 6; anthers 0.6–0.7 (–1.0) mm long, \pm equalling c. 0.5–0.7 mm filaments; style c. 0.1–0.2 mm long; stigmas 0.6–1.0 mm long. Capsule triseptate, trigonous, broadly ovoid to subglobose, 1.5–2 mm long, equalling or shorter than inner tepals, subobtuse, with short mucro, blackish castaneous-brown. Seeds 0.4–0.5 mm long, obliquely ovoid; appendages absent.

An imperfectly known species. Recorded from Afghanistan and Middle Asia. 34: AFG, KAZ. Shores of mountain rivers. Map 491.

32. KAZAKHSTAN: Turkestan, 'Vorberge von Nelki', Jun 1879, *A.Regel s.n.* (LE).

270. *Juncus inflexus* L., *Sp. Pl.* 326 (1753)

Juncus glaucus Sibth., *Fl. Oxon.* 113 (1794), *nom. illeg.* [through indirect reference to *Juncus inflexus*]; *Juncus tenax* Poir., *Encycl.*, Suppl. 3: 156 (1813), *nom. illeg.* [through a reference to *Juncus glaucus* Sibth.]; *Juncus tenax* var. *glaucus* (Sibth.) Poir., *Encycl. Meth. Bot.* 3: 156 (1813), *nom. inval.*; *Juncus glaucus* var. *inflexus* (L.) Spenn., *Fl. Friburg.* 1: 180 (1825), *nom. inval.* T: citation: '... in Europa australi'; numerous references to syntypes, e.g.: *Juncus acutus* panicula sparsa, Bauh. pin. 412; J.Burser II.7; syn: UPS

Juncus tenax Banks & Solander ex A.Russell [& P.Russell], *Nat. Hist. Aleppo*, 2nd edn, 2: 251 (1794). T: [Madeira], 1768, *J.Banks & D.C.Solander*; syn: BM [an alternative, less probable explanation of the authentic material is given in A.B.Rendle, *J. Bot.* 38: 80–2 (1900)].

Juncus glaucescens Laharpe, *Essai Monogr. Junc.* 28 (1825). T: [India] Montagnes de Nelly-Gerry, dans l'Indostan, J.B.Leschenault; holo: P.

Juncus glaucus var. *acutissimus* Buchenau, *Monogr. Junc. Cap* 417 (1875); *Juncus acutissimus* (Buchenau) Adamson, *J. Linn. Soc., Bot.* 50: 6 (1935). T: Cape, Wodehouse, Klein Buffels Vallei near Gaatjie, *J.F.Drège 8796c*; syn: LD, S, W.

Juncus inflexus subsp. *austroroccidentalis* K.F.Wu, *Fl. R. P. Sinicae* 13(3): 261 (1997). T: China, Sichuan, Shimian, 1955, *Chao-chun Hsieh 42386*; holo: SZ, *n.v.*

[*Juncus pallidus* Hoppe, in E.Mey., *Syn. Junc.* 14 (1822), *nom. inval.*, synonym of '*Juncus glaucus* Ehrh. var. γ ']

Perennials, usually 50–120 cm tall, densely caespitose; rhizome very short-noded, stout. Stem leafless, terete, 1.2–3 mm diam. (locally to 8–10 mm at base), bluish green, glaucous, soft; ridges 10–22, conspicuous, flat, widely separated from one another; subepidermal sclerenchyma strands present and coordinated with, but scarcely connected to the largest vascular bundles; epidermis cells enlarged on the ridges; bundles in three distinct rows; pith interrupted, subdense sometimes reduced to septa-like plates, of astericiform cells. Cataphylls 3–5; upper cataphylls mostly 5–15 cm long, usually loose, sometimes tight, blunt or with small, awn-like blade glossy, distally rarely stramineous-brown, adaxially pale stramineous above, deep golden brown at base. Lower bract usually 12–20 cm long, several times as long as inflorescence, with narrow sheath. Inflorescence pseudolateral; flowers mostly 50–120 but occasionally fewer or up to 200, solitary. Tepals (2.5–) 3–4 mm long with outer ones usually longer, lanceolate, acuminate to apiculate, variously coloured, often castaneous with broad green central band, becoming stramineous in ripe fruit; margins narrow, membranous. Stamens 6 (very rarely 3–5); anthers 0.7–0.9 (–1.2) mm long, 1–1.5 \times as long as c. 0.5–0.7 mm filaments; style c. 0.5 mm long; stigmas 0.8–1.5 mm long. Capsule trilocular, trigonous-ovoid to trigonous-ellipsoid, 2.5–4 mm long, slightly shorter than or considerably exceeding perianth, acute, mucronate, usually pale brown to castaneous, often glossy. Seeds obliquely ovoid, c. 0.4–0.6 \times 0.2–0.3 mm, reticulate; appendages absent.

Very variable both locally and regionally. In the literature several infraspecific taxa are often recognized. Two subspecies are accepted here, the C Asian subsp. *brachytepalus* with robust growth, and the type subspecies. However some other conspicuous variants, e.g. the S African var. *acutissimus*, a slender form with paler cataphylls, might also deserve the subspecific status. The character combinations reported to characterize most of these taxa are rather weakly correlated, and similar forms are found in the regions outside the ranges given in the literature. The species requires further study.

Stem usually above 5 mm in diam. in lower part; capsules usually exceeding perianth

270b. subsp. **brachyepaluis**

Stem usually up to 3 mm in diam. in lower part; capsules usually subequalling perianth

270a. subsp. **inflexus**

270a. *Juncus inflexus* L. subsp. *inflexus*

Juncus glaucus Ehrh. ex P.Gaertn., B.Mey. & Scherb., *Fl. Wetterau* 1: 495 (1799), *nom. illeg., non Sibth.* (1794); *Juncus glaucus* 1. [unranked] *typicus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 448 (1904), *nom. inval.* T: [Germany] Hannoverae, *F.Ehrhart [Calam. Tripet.] 85*; lecto: LINN-SMITH, *designated here.*

Juncus diaphragmarius Brot., *Fl. Lusit.* 1: 511 (1804) [as *diaphramarius*]. T: [Portugal] In Lusitania boreali, *F.A.Brotero*; *syn: n.v.*

Juncus longicornis Bastard, *J. Bot. (Desvaux)* 3: 21 (1814); *Juncus glaucus* var. *longicornis* (Bastard) Grognot, *Mém. Hist. Nat. Soc. Eduenne* 1: 198 (1865) *vel* Carion, *Catal. Pl. Départ. Saone-et-Loire*, Suppl. 198 (1864), *n.v.*; *Juncus glaucus* subsp. *longicornis* (Bastard) Richt., *Pl. Eur.* 1: 178 (1890); *Juncus glaucus* Rasse B. *longicornis* (Bastard) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 449 (1904); *Juncus inflexus* var. *longicornis* (Bastard) Briq., *Prodr. Fl. Corse* 1: 256 (1910); *Juncus inflexus* Race *longicornis* (Bastard) Rouy, *Fl. France* 13: 226 (1912). T: [France, Dept. Angers] sur les coteaux de la Loire, *T.Bastard*; *syn: n.v.*

Juncus glaucus var. *strictus* Spenn., *Fl. Friburg.* 1: 180 (1825). T: [not indicated, several references to older descriptions given].

Juncus paniculatus Hoppe ex Schult. & Schult.f., *Syst. Veg.* 7 (1): 183 (1829); *Juncus glaucus* var. *paniculatus* (Schult. & Schult.f.) Bosch, *Tijdschr. Geschied. Physiol.* 8: 46 (1841); *Juncus glaucus* var. *prolifer* Sond., *Fl. Hamburg* 192 (1851); *Juncus glaucus* subsp. *paniculatus* (Schult. & Schult.f.) Trab., in J.A.Battandier & L.C.Trabut, *Fl. Algerie Mon.*, 2nd edn, 81 (1895). T: [Croatia or Slovenia] inter Duinum et Monfalcone, *D.H.Hoppe*; *syn: n.v.*; [ad litus Maris Adriatici, *D.H.Hoppe [Herb. Viv. Pl. Gramin] 156*; later authentic material from the same area: BRNM, LI.

Juncus angelisii Ten., *Fl. Neap.* 4: 52 (1830) [vel Ten., *Atti Accad. Pontan.* 1: 207 (1830–1832)]; *Juncus deangelisii* Bertol., *Fl. Ital.* 4: 179 (1839), *nom. inval.* [not accepted by the author]; *Juncus glaucus* subsp. *angelisii* (Ten.) Arcang., *Comp. Fl. Ital.* 714 (1882). T: [Italy, Abruzzo] St. Spiritus Magellae, *M.Tenore*; *syn: K.*

Juncus depauperatus Ten., *Atti Acad. Nap.* 1: 208 (1832); *Juncus paniculatus* subsp. *depauperatus* (Ten.) Nyman, *Consp. Fl. Eur.* 746 (1882); *Juncus glaucus* subsp. *depauperatus* (Ten.) Richt., *Pl. Eur.* 1: 178 (1890); *Juncus glaucus* 2. [unranked] *depauperatus* (Ten.) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 448 (1904); *Juncus inflexus* var. *depauperatus* (Ten.) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 555 (1966). T: Italy, Mauri alla Macchia dei Mattei, *M.Tenore*; *syn: K* [further authentic material: valle dell'Inferno, *M.Tenore* (K); a very depauperate form of *J. inflexus*].

Juncus glaucus a. ['Spielart'] *melanocarpus* G.Mey., *Chloris Han.* 564 (1836); *Juncus glaucus* var. *subglomeratus* G.Mey., *Fl. Hanov. Excurs.* 584 (1849); *Juncus glaucus* 2. [unranked] *melanocarpus* (G.Mey.) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 448 (1904); *Juncus inflexus* f. *melanocarpus* (G.Mey.) I.Grint., in E.J.Nyárády, *l. Rep. Soc. Roman.* 11: 555 (1966). T: not indicated.

Juncus glaucus var. *pallidus* Sond., *Fl. Hamburg.* 192 (1851); *Juncus inflexus* f. *pallidus* (Sond.) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 555 (1966). T: [Germany, Hamburg] am Elbufer hinter Ritscher, *O.W.Sonder*; *holo: n.v.*

Juncus elatus Steud., *Syn. Pl. Glumac.* 2: 295 (1855). T: Un. It. Arab. Ad scaturigines regionis Raphidim, 17 Jul 1835, *Schimper 287*; *syn: BM, E, G, HUJ, K.*

Juncus glaucus var. *laxiflorus* Lange, in M.Willkomm & J.Lange, *Prodr. Fl. Hispan.* 1: 182 (1861); *Juncus inflexus* subvar. *laxiflorus* (Lange) Rouy, *Fl. France* 13: 226 (1912). T: [Spain] in aquaeducto Alhambrae, *M.Willkomm*; *holo: n.v.*

Juncus equisetosus Dumort., *Bull. Soc. Roy. Bot. Belgique* 7: 365 (1868); *Juncus glaucus* β. [unranked] *equisetosus* (Dumort.) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 448 (1904); *Juncus inflexus* f. *equisetosus* (Dumort.) Sôo, *Acta Bot. Acad. Sci. Hung.* 16: 366 (1971). T: [Belgium] 'littoral vers Blankenberghe, Heyst, et Knocke, ainsi qu'à l'île de Cassandria', *B.C.J.Dumortier*; *syn: n.v.*

Juncus leptocarpus Buchenau, *Nachr. Ges. Wiss. Göttingen, Math.-Phys. Kl.*, 1869: 244 (1869); *Juncus glaucus* var. *leptocarpus* (Buchenau) Buchenau, *Bot. Jahrb. Syst.* 6: 20 (1885). T: W Himalaya, Prov. Dzhamu, Padri Pass to Bhadrar, 17–22 Jul 1856, *H.A.R.Schlagintweit 3059*; *holo: n.v.*

Juncus luetkei Buchenau, *Nachr. Ges. Wiss. Göttingen, Math.-Phys. Kl.*, 1869: 243 (1869). T: Kashmir, Baltal to Nunner, 15–16 Oct 1856, *H.A.R.Schlagintweit 4790*; *syn: n.v.*

Juncus glaucus var. *fasciculatus* Buchenau, *Bot. Jahrb. Syst.* 12: 244 (1890). T: Syrien: Giss el hajor, *C.Ehrenberg*; *holo: n.v.*

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Juncus inflexus L. var. *trimenii* Cout., *Bol. Soc. Brot.* 8: 91 (1890). T: [Portugal] Centro litoral, entre Odivellas e a Povoia, *F.M.J. Welwitsch*; syn: *n.v.*; Gollega, ribeira de Paul, *R. da Cunha*; syn: *n.v.*; Alto Alemejo, Portalegre, Boi d'Agua, *R. da Cunha*; syn: *n.v.*; Beira litoral, Coimbra, Baleia, Castro Freire [Soc. Brot. Exs.] 53; syn: COL.

Juncus inflexus var. *proliferus* Cout., *Bol. Soc. Brot.* 8: 91 (1890), *nom. illeg., non* Sond. (1851). T: Centro litoral, Barro, entre Caldas e Obidos, *J. Daveau*; syn: *n.v.*; Prope Friellas & Povoia, *F.M.J. Welwitsch*; syn: *n.v.*

Juncus glaucus f. *virescens* Neuman, *Sveriges Fl.* 654 (1901). T: [Sweden], Skåne, Ystad, *L.M. Neuman*; holo: *n.v.*

Juncus glaucus 1.a. [unranked] *strictus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 448 (1904), *nom. illeg.*; *Juncus inflexus* f. *strictus* (Asch. & Graebn.) Sóo, *Acta Bot. Acad. Sci. Hung.* 16: 366 (1971). T: not designated.

Juncus glaucus 1.b. [unranked] *curvatus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 448 (1904). T: not designated.

Juncus glaucus 3. [unranked] *brunneus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 448 (1904). T: not designated.

Juncus glaucus γ . [unranked] *farctus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 448 (1904). T: not designated.

Juncus glaucus 2. [unranked] *oligocarpus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 448 (1904); *Juncus inflexus* var. *oligocarpus* (Asch. & Graebn.) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 555 (1966). T: not designated.

Juncus glaucus 1. [unranked] *microcarpus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 448 (1904). T: [Sardegna] Sardinien, Isili, [collector not given]; syn: *n.v.*

Juncus glaucus II.a. [unranked] *aggregatus* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 449 (1904); *Juncus inflexus* f. *aggregatus* (Asch. & Graebn.) I.Grint., in E.J.Nyárády, *Fl. Rep. Soc. Roman.* 11: 555 (1966). T: [Germany] Paderborn, an der Alme, *V. Everken*; holo: *n.v.*

Juncus glaucus II. [unranked] *magnagutii* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 449 (1904). T: [Italy] am Strande zwischen Pisa und Livorno, Jul 1863, *Magnaguti*; holo: *n.v.*

Juncus glaucus f. *macrocarpus* Zapal., *Consp. Fl. Galic.* 1: 133 (1906). T: [Ukraine] Nowosielica w Bessrabii, *J.C. Paczoski*; holo: *n.v.*

Juncus warakensis Nábělek, *Spisy Přír. Fak. Masarykovy Univ.* 105: 42 (1929). T: [Turkey] In Tauro Armeno in monte Warak-Dag prope Wan, 23 Jun 1910, *F. Nábělek 907*; lecto: SAV, *designated here*; iso: BRNU.

Juncus cyprius H.Linb., *Årsb. Soc. Sci. Fenn.* 20B, no. 7: 5 (1942). T: Cyprus, Paphos, Kannavion, in fl. Ezusa, 19 Jul 1939, *H. Lindberg s.n.*; syn: H, W.

Illustrations: T.Szynał & J. Małdalski, *Atlas Fl. Pol.* 2(2): 131 (1931); R.Maire, *Fl. Afr. Nord* 4: 271, fig. 708 (1957); Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 183, fig. 52 (1971).

Map: H.Meusel, E.Jäger & E.Weinert, *Vergl. Chorol. Zentraleur. Fl.* 1: 83 (1965).

Stems mostly 1.5–3 mm in diam. above the cataphylls. Cataphylls usually castaneous to dark (almost blackish) red-brown. Inflorescence usually diffuse, usually 3–10 cm long. Capsule c. 2.5–3.3 mm long, usually subequalling perianth. $2n = 40$, *vide* S.Snogerup, *Bot. Not.* 116: 146 (1963); N.A.Harriman & D.Redmond, *Rhodora* 78: 731 (1976). Fig. 139.

Extremely widely distributed in Eurasia and N and S Africa where it is considered native. Probably introduced in North and South America, Jawa, Australia and New Zealand. 10: DEN, fin, GRB, IRE. SWE. 11: AUT, BGM, CZE, GER, HUN, NET, POL, SWI. 12: BAL, COR, FRA, POR, SAR, SPA. 13: ALB, BUL, GRC, ITA, KRI, ROM, SIC, TUE, YUC. 14: BLR, BLT, KRY, RUC, RUE, RUS, RUW, UKR. 20: ALG, MOR, TUN. 21: CNY, MDR. 23: ZAI. 27: CPP, LES, OFS. 29: MDG. 32: KAZ. 33: NCS, TCS. 34: AFG, CYP, EAI, IRN, IRQ, LBS, PAL, SIN, TUR. 35: SAU, YEM. 36: CHC, CHN, CHS, CHT, CHX. 37: MON. 40: EHM, IND, PAK, srl, WHM. 41: vie. 42: jaw. 50: vic. 51: nzn, nzs. 72: ont, que. 75: mic, nwy, pen. 78: vrg. 85: uru. 90: asp. A variety of wet, mineral rich to saline habitats, near springs, along streams, in wet meadows etc. Map 492.

10. DENMARK: Hestehaven, Kalø, *S. Jeppesen [Fl. Jutl. Exs.] 577* (AAU, C, LD). **11.** AUSTRIA: Niederösterreich, Wienerwald, Gütenbachtal, 24 Jul 1919, *K. Ronniger* (W). **12.** FRANCE: Basses-Pyrénées, St. Palais, 12 Aug 1967, *C.E. Sonck* (H). **13.** GREECE: Kikladhes, Andros, S of Akra Gria, *S. Snogerup & B. Bothmer 33066* (LD). ITALY: Calabria, Neto R. SE of Belvedere di Apinello NW of Crotone, *S. Snogerup 2017* (LD). TURKEY-IN-EUROPE: Kırklareli, Demirköy, Igneada, NE of Erikli Lake, *I. Delice 28073* (ISTF). **20.** MOROCCO: St. Echded, c. 18 km W of Twtouan, 500 m, *R. Dahlgren & P. Lassen 4-10* (LD). TUNISIA: Djebel Bargou, 21 May 1903, *S. Murbeck* (LD). **34.** IRAN: Sultanabad, 3 Jul 1892, *J. Bornmüller & Strauss s.n.* (LD). PALESTINE: Ain Arrub, 835 m, *F.S. Meyers & J.E. Dinsmore 4811* (LD). TURKEY: Mughla, Girdev Dag at Bel Yayla, 2000 m, *P.H. Davis 13970* (E, K). **41.** VIETNAM: Annam, Bi-Doup Massif, Haut-Donai, 2280 m, 12 Aug 1940, *E. Poilane* (P).



Figure 139. *Juncus inflexus* subsp. *inflexus*. **A**, habit; **B**, perianth with capsule; **C**, outer tepal; **D**, inner tepal; **E**, capsule L.S.; **F**, capsule; **G**, seed; **H**, capsule T.S.; **I**, stem T.S.; **J**, cataphyll T.S. (A–J, B. Błocki, KRA). Scale bars: **A** = 3 cm; **B–F**, **H** = 2 mm; **G** = 0.5 mm; **I**, **J** = 1 mm. Drawn by T. Szynal. Reproduced with permission from T. Szynal & J. Mądalski, *Atlas Fl. Pol.* 2/2: 131 (1931).

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270b. *Juncus inflexus* subsp. *brachytepalus* (V.I.Krecz. & Gontsch.) Novikov, *Nov. Sist. Vyssh. Rast.* 15: 86 (1979)

Juncus brachytepalus Trautv. ex V.I.Krecz. & Gontsch., in V.L.Komarov, *Fl. SSSR* 3: 547 & 630 (1935). T: Songoria, Kentau, 3 Sep 1843, *A.G.Schrenk* 58; lecto: LE, *fide* V.S.Novikov, *Nov. Sist. Vyssh. Rast.* 15: 86 (1979).

Stem mostly thick, up to 10 mm above the cataphylls. Cataphylls light brown to orange, ± shining. Inflorescence mostly 5–7 cm long, rather dense. Capsule to 4 mm long, usually exceeding perianth.

A variable taxon probably centred in Kazakhstan, Kirgizistan, Tadzhikistan, Uzbekistan, Iran, and Afghanistan, probably also in SC, N and NW China (material of lower quality seen). 32: KAZ, KGZ, TKM, TZK, UZB. 34: AFG, IRN. 36: CHC, CHN, CHX. Wet, subsaline soils, margins of lakes, along streams, wet pastures. Map 493.

34. AFGHANISTAN: Nuristan, Vama, *L.Edelberg 399A* (C); Afghanistan, *W.Griffith 5411* (C, K). 36. CHINA NORTH-CENTRAL: E Gansu, 1885, *G.N.Potanin* (LE).

271. *Juncus filiformis* L., *Sp. Pl.* 326 (1753)

Juncus filiformis var. *aphyllus* E.Mey., *Syn. Junc.* 17 (1822), *nom. inval.* T: In Europae uliginoso-paludosis turfosis; lecto: LINN449/9, *designated here, fide* etiam S.Snogerup, in P.H.Davis, *Fl. Turkey* 11 (1986).

Juncus filiformis var. *pusillus* Fr., *Novit. Fl. Sueciae* 31 (1814), *n.v.*; *Juncus filiformis* var. *foliatus* E.Mey., *Syn. Junc.* 17 (1822), *nom. illeg.*; *Juncus balticus* f. *pusillus* (Fr.) Neuman, *Sveriges Fl.* 655 (1901). T: [Sweden] Varberg, *E.Fries*; syn: UPS.

Juncus transsilvanicus Schur, *Verh. Mitth. Siebenbürg. Vereins Naturwiss. Hermannstadt* 2: 169 (1851), *n.v.*, vel *Verh. Mitth. Siebenbürg. Vereins Naturwiss. Hermannstadt* 4: 77 (1853), *n.v.*; *Juncus filiformis* Abart *transsilvanicus* (Schur) Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 441 (1904); *Juncus filiformis* var. *transsilvanicus* (Schur) Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 127 (1906). T: [Romania] In uliginosis humidis Transsilvaniae in monte Arpas, *F.Schur*; syn: WU.

Juncus filiformis var. *kulezynskii* Racib., *Sprawozd. Kom. Fizyogr. Akad. Umiej.* 22(2): [p. separ.] 11 (1888). T: [Poland] Borek Fałęcki pod Krakowem, *W.Kulezyński*; holo: *n.v.*

Juncus filiformis lusus *prolifer* Asch. & Graebn., *Syn. Mitteleur. Fl.* 2(2): 441 (1904). T: [Norway] Bergen, Solsvig, *P.Magnus*; holo: *n.v.*

Juncus filiformis f. *flaccidus* Zapał., *Consp. Fl. Galic.* 1: 132 (1906). T: [Poland] Tatry Mtns, Mihulcze, *B.Kotula*; syn: *n.v.*

Juncus filiformis f. *prostratus* Freiberg, in A.Kneucker, *Bemerk. Cyper. Junc. Exs.* 10 (1911). T: [Russia] Tilsit [Sovetsk] in Ostpreussen [Kaliningradskaya oblast'], *W.Freiberg* [*A.Kneucker, Cyper. Junc. Exs.*] 257; syn: PR, PRA.

Juncus filiformis var. *pluriflorus* Krylov, *Fl. Alt.* 6: 1411 (1912). T: [the Altai, otherwise not indicated].

Juncus filiformis f. *flaccidus* Borza & Nyár., *Bull. Grad. Bot. Cluj.* 19: 32 (1939). T: [Romania] Crișana, *Stina de Vale*; syn: *n.v.*

Illustrations: T.Szynal & J.Mądalski, *Atlas Fl. Pol.* 2(2): 133 (1931); C.L.Hitchcock & *al.*, *Vasc. Pl. Pacif. Northw.* 1: 198 (1969); Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 312, fig. 55 (1971).

Map: E.Hultén, *Kongl. Svenska Vetenskapsakad. Handl.*, ser. 5, 8(5): map 94 (1962); E.Hultén & M.Fries, *Atlas N. Eur. Vasc. Pl.* 1: 100, map 199 (1986).

Perennials, 10–60 (–80) cm tall, forming dense rows of stems; rhizome ±short-noded sparsely branched, with several flowering stems and rarely a few 1-leaved sterile shoots. Stem usually leafless, terete, 1–1.5 mm diam., smooth; ridges low, 20–25, inconspicuous when fresh; subepidermal sclerenchyma strands present, often irregular in form and distribution, sometimes a few connected to vascular bundles; epidermis cells uniform; bundles in one row; pith in mature stem diffuse, arachnoid. Cataphylls 3–4; uppermost cataphylls 3–10 cm long, with short awnlike or rarely to 20 cm long blade, ±tight, light stramineous. Lower bract 5–30 (–40) cm, (1/2–) 1–1.5 times as long as stem, with narrow sheath. Inflorescence pseudolateral, usually dense, 4–10-flowered. Bracteoles ovate, c. 1 mm long, acute. Tepals lanceolate; outer tepals longer, 2.5–3.5 mm long, apiculate to mucronate; inner tepals obtuse, stramineous with broad scarious margin. Stamens 6; anthers 0.5–0.6 mm long; 1/2–2/3 as long as c. 0.7–0.9 mm filaments; style 0.1 mm long; stigmas c. 1 mm long. Capsule triseptate, broadly trigonous-ovoid to ±globose, 2.5–3.5 mm long, equalling to

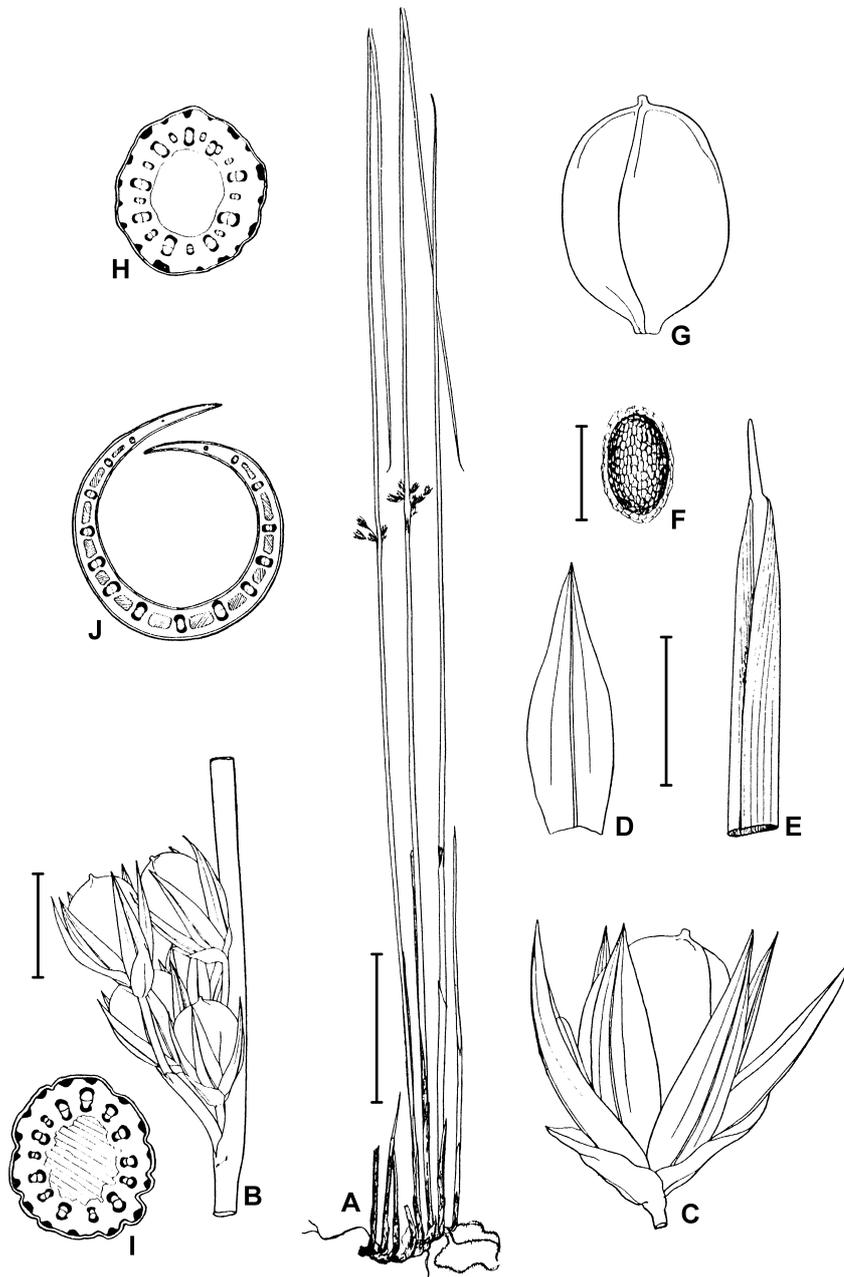


Figure 140. *Juncus filiformis*. **A**, habit; **B**, inflorescence; **C**, perianth with capsule; **D**, tepal; **E**, distal part of cataphyll; **F**, seed; **G**, capsule; **H**, **I**, stem T.S.; **J**, cataphyll T.S. (A–J, F.F.Schulz, KRA). Scale bars: **A** = 3 cm; **B** = 3 mm; **C–E**, **G** = 2 mm; **F**, **H–J** = 0.5 mm. Drawn by T.Szynal. Reproduced with permission from T.Szynal & J. Małdański, *Atlas Fl. Pol.* 2/2: 133 (1931).

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slightly shorter than outer tepals, obtuse, shortly or not mucronate, greenish to light brown. Seeds 0.5×0.3 mm, obliquely ovoid, irregularly and inconspicuously reticulate, with one indistinct appendage. $2n = 80$, *vide* Å.Löve & D.Löve, *Univ. Colorado Stud.*, ser. biol., 24: 25 (1966); $2n = 84$, *vide* S.Snogerup, in Ö.Nilsson & S.Snogerup, *Bot. Not.* 124: 311 (1971); R.L.Taylor & G.A.Mulligan, *Fl. Queen Charlotte Is.* 2: 44 (1968); $2n = 70$, *vide* N.A.Harriman & D.Redmond, *Rhodora* 78: 731 (1976). Fig. 140.

Temperate areas of N hemisphere. 10: DEN, FIN, GRB, ICE, NOR, SWE. 11: AUT, BGM, CZE, GER, NET, POL, SWI. 12: FRA, POR, SPA. 13: BUL, ITA, ROM, YUC. 14: BLR, BLT, RUC, RUE, RUN, RUW. 30: ALT, BRY, CTA, IRK, KRA, TVA, WSB, YAK. 31: KAM, KHA, KUR, MAG, PRM, SAK. 33: NCS, TCS. 34: TUR. 36: CHM, CHX. 38: JAP. 70: ASK, GNL, NWT, YUK. 71: ABT, BRC, MAN, SAS. 72: LAB, NBR, NFL, NSC, ONT, PEI, QUE. 73: COL, IDA, MNT, ORE, WAS, WYO. 74: MIN, NEB, WIS. 75: MAI, MAS, MIC, NWH, NWJ, NWY, PEN, VER, WVA. 76: UTA. Various at least temporarily wet habitats, usually on acid soils. In the north from near sea level to low alpine zone, in the south mostly in high mountains up to 2200 m or more. Map 494.

10. DENMARK: FINLAND: Pohjois-Pohjanmaa, 5 km S of Kuivaniemi, seashore S of Halttula, *S.Snogerup* 3319 (LD). 11. POLAND: Silesia, Niwnice nera Lwówek Śląski, *E.Kozioł [Fl. Sil. Exs.]* 893 (KRA, KRAM, LD, WRSL). 12. SPAIN: Huesca, Tortiella, Alto de Candanchu, 2100 m, 21 Aug 1970, *P.Montserrat* (JACA). 30. IRKUTSK: Slyudyanka, Khamar-Daban Mtns, Slyudyanka Ck, 16 Aug 1968, *V.Vašák* (PR). 34. TURKEY: Coruh, Savval Tepe above Murgul, 2100 m, *P.H.Davis & I.C.Hedge* 32368 (BM, E, K). 70. ALASKA: Copper Center, *F.Went* 233 (LD). 72. LABRADOR: Goose Bay, *J.M.Gillett & W.I.Findlay* 5585 (DAO, LD). QUEBEC: Gaspé County, Table-top Mtn, *M.L.Fernald & J.F.Collins* 190 (GH, LD). 73. OREGON: Hood River Co., Lost Lake, Mt. Hood, *Thompson* 11201 (LD). 75. NEW HAMPSHIRE: Plainfield, 7 Sep 1879, *H.G.Jesup* (LD).

272. *Juncus brachyspathus* Maxim., *Mém. Acad. Petersb.* 9: 293 (1859)

Juncus filiformis var. *brachyspathus* (Maxim.) Regel, *Mem. Acad. Imp. Sci. Saint Pétersbourg*, ser. 7, 4(4): 157 (1861). T: Russia, berega Amura u g. Nikolaevska, mys ChirkraKh [banks of the Amur R. near Nikolaevsk, ChirkraKh Promontory], 22 Aug 1854, *C.J.Maximowicz*; holotype: LE; isotype: K, L, ZT, W.

Juncus brachyspathus var. *magadanicus* Novikov, *Nov. Syst. Pl. Vasc.* 19: 55 (1982). T: Russia, prov. Magadan, ad pag. Ust-Belay, 12 Aug 1964, *T.G.Dervis-Sokolova* 127; holotype: MW.

Illustrations: V.I.Krechetovich & N.F.Goncharov, in V.L.Komarov, *Fl. SSSR* 3: 534, tab. 29 (1935); V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 65, tab. 4 (1985); N.K.Kovtonyuk, in L.I.Malyshv & G.A.Peshkova, *Fl. Sibiri (Araceae – Orchidaceae)* 22, tab. 2, fig. 2 (1987).

Maps: V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 67, fig. 16 (1985) [the Russian Far East]; N.K.Kovtonyuk, in L.I.Malyshv & G.A.Peshkova, *Fl. Sibiri 4 (Araceae – Orchidaceae)* 153, map 12 (1987) [Siberia].

Perennials, (4–) 15–30 cm tall, with creeping short- or medium long-noded, ±densely branched rhizome, forming dense or loose stands. Stem terete, (0.3–) 0.5–0.8 mm diam., ±hard, mid-green; ridges (5–) 7–10 (–20), indistinct; subepidermal sclerenchyma strands present; pith continuous, arachnoid, later ±evanescent. Cataphylls 2–3, to c. 4 cm long; upper cataphylls yellowish stramineous distally, proximally brownish, with filiform blade to 1 mm thick, 2–12 cm long and often nearly reaching inflorescence, brownish. Lower bract c. 3–10 cm long, 3–4× length of the inflorescence, much shorter than stem. Inflorescence pseudolateral, short, fasciculate to capitate; flowers 1–6, subsessile or on pedicels to 1.5 cm long. Bracteoles to 1.8–2.5 mm long, ovate, subacute, membranous. Tepals lanceolate, 3.5–5.0 mm long, with outer ones longer, acute, greenish; central band prominent, often suffused pale reddish; margins broad, membranous. Stamens 6; anthers 0.8–1.4 mm long, equalling to usually 2× as long as 0.6–1.0 mm filaments; style c. 0.1–0.2 mm long; stigmas c. 0.5–0.8 mm long. Capsule triseptate, trigonous, ±obovoid, 2.5–4.5 mm long, equalling or slightly shorter than outer tepals, obtuse with short mucro c. 0.1–0.2 mm long, brownish. Seeds ovoid, c. 0.5×0.3 mm, apiculate, faintly striate, subferruginous; appendages absent.

From NE European Russia (lower Pechora R. basin), through W Siberia to the Russian Far East. 14: RUN. 30: BRY, CTA, IRK, KRA, WSB, YAK. 31: AMU, KAM, KHA, MAG, PRM, SAK. 36: CHM. 37: MON. 38: KOR. Wet meadows and shores, along streams. Map 495.

30. YAKUTIYA: Neryungrin, Nagornyi, Timpton R., 10 Jul 1982, *N.K.Kovtonyuk & N.Vlasova [Gerb. Fl. SSSR]* 6358 (AAU, K, LE, NSW, PRC). 38. KOREA: N Korea, Yalu R., 30 Jun 1897, *V.I.Komarov* 349 (K).

273. *Juncus beringensis* Buchenau, *Bot. Jahrb. Syst.* 12: 226 (1890)

T: Karaginskiy Ostrov, *K.H.Mertens*; lecto: LE, *fide* V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 69 (1985); iso: S.

Illustrations: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 129, fig. 69 (1906); Y.Satake, *J. Jap. Bot.* 9(7): 418, fig. 18 (1933).

Map: V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 69, fig. 18 (1985) [the Russian Far East].

Perennials, (15–) 20–40 cm tall, forming small very dense stands; rhizome creeping, very short-noded, dark brown. Stem leafless, \pm terete, 1.5–2.5 mm diam., smooth even when dry, indistinctly 15–20-striate; subepidermal sclerenchyma strands present; pith continuous, later sparsely arachnoid or occasionally evanescent, of astericiform cells. Cataphylls 3–4, \pm tight; upper cataphylls to c. 8 cm long, abaxial side dull, stramineous distally, yellow-brown to deep red-brown and \pm glossy at base, with adaxial side \pm stramineous, obtuse or with a small awn-like blade. Lower bract 2–5 cm long, equalling or slightly exceeding inflorescence; sheath conspicuously constricted below inflorescence. Inflorescence pseudolateral, to 2 cm long, diffuse; flowers (1–) 2–5 (–8), with central ones sessile and side flowers with pedicels up to 1 cm long. Bracteoles broadly ovate, 2–2.5 mm long, obtuse, usually red-brown or marginally membranous. Tepals subequal, narrowly lanceolate to linear-lanceolate, usually 4.5–5 mm long; outer tepals often slightly longer, acuminate; inner tepals often acute, shining blackish to dark castaneous-brown to purple, with a narrow scarious margin above. Stamens 6; anthers 1.2–2.0 (–2.5) mm long, usually at least 3 \times as long as c. 0.5–0.6 mm filaments; style 1.5–2.0 mm long; stigmas (1.5–) 2–3 mm long. Capsule triseptate, trigonous-ovoid to ellipsoid, 5–6 mm long, exceeding the tepals, obtuse, mucronate (mucro c. 0.2–0.3 mm), dark brown to blackish-purple, shining. Seeds c. 0.9–1.0 \times 0.4 mm, ellipsoid, with two slender membranous to whitish appendages 0.8–1.0 mm long.

Russian Far East, NE China, Japan, Korea. 31: KAM, KUR, MAG, SAK. 38: JAP. Wet meadows in the hills, along streams, often on sandy and gravelly substrate. Map 496.

31. KAMCHATKA: Kamchatka R., *G.I.Karev 190* (LE, NSW); Petropavlovsk, Koryatskaya Volcano, 14 Aug 1928, *W.J.Eyerdam* (S); Avatcha Volcano, 675 m, 30 Jul 1920, *E.Hultén 605* (S); Mutnovskaya Volcano, 28 Aug 1922, *E.Hultén 4027* (S); Opala Volcano, 1040 m, 28 Jul 1921, *E.Hultén 2307* (S). 38. JAPAN: Honshu, Prov. Kai, Mt. Komagadake, Shinshu, 2 Aug 1894, *Anonymous* (WU); Honshu, Toyama, Syakushidake, Mt. Shizouma, 13 Aug 1958, *M.Furuse* (S); Hokkaido, Mt. Daisetsu, 5 Sep 1928, *J.Ohwi* (K).

The name *J. fauriei* used to be listed among synonyms of *J. beringensis* because one of the syntypes, Japan, Hokkaido, Shirotoke, 25 Aug 1893, *U.Faurie 10962* (K, two specimens), belongs to it. The lectotype of the name belongs to what was called *J. yokoscensis*.

274. *Juncus curvatus* Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 128 (1906)

Juncus filiformis var. *curvatus* (Buchenau) R.R.Kudo, *Contr. Fl. N. Saghal.* 26 (1923); *Juncus brachyspathus* var. *curvatus* (Buchenau) Satake, in T.Nakai & M.Honda, *Nov. Fl. Jap.* 1: 58 (1938). T: Japan, Djoosankai, Yezo, *J.Matsumura*; syn: W; Iwakiyama, Nipon, *J.Matsumura*; syn: TI; Ose, Prov. Iwasira, *J.Matsumura*; syn: n.v.; Nikko, *K.Saida*; syn: n.v.

Illustration: F.G.P.Buchenau, in H.G.A.Engler, *Pflanzenr.* (iv.36) 25: 128, fig. 68 (1906).

Map: V.S.Novikov, in S.S.Kharkevich, *Sosud. Rast. Soviet. Dal. Vost.* 1: 67, fig. 16 (1985) [the Russian Far East].

Perennials, 30–70 (–90) cm tall, forming dense stands, with short-noded creeping rhizome. Stem leafless, slender, terete or slightly compressed, 0.8–1.5 mm in diam.; ridges 15–25 (–30), conspicuous when dry; subepidermal sclerenchyma strands present, flat and not connected to vascular bundles; epidermis cells uniform; bundles in one \pm regular row and sometimes interspaced with aerial tubes; pith arachnoid, later evanescent. Cataphylls usually 2–3; upper cataphylls to c. 4–6 cm long, \pm loose, acuminate, abaxially dirty stramineous above, darker at base. Inflorescence pseudolateral, lax, usually simple; flowers 3–5, 1 or 2 subsessile and the rest with pedicel up to 18 mm long and curved before anthesis; first erect bract (10–) 15–25 cm long, $\frac{1}{4}$ to almost as long as stem. Bracteoles 2–2.5 mm long, ovate, acute, membranous. Tepals unequal; outer tepals conspicuously longer, 3.3–4.7 mm long, narrowly lanceolate, apiculate to subulate, usually incurved; inner tepals oblong-lanceolate, subobtuse, all light green to stramineous with wide membranous margins. Stamens 6; anthers c. 0.5 mm long;

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filaments c. 1 mm long; style c. 0.1 mm long; stigmas c. 1 mm long. Capsule trigonous-ellipsoid to subglobose, c. 3 mm long, about equalling inner tepals, obtuse, mucronate (mucro c. 0.2–0.3 mm long), greenish to stramineous, glossy. Seeds 0.6–0.7 × c. 0.3 mm, ±obliquely obovate, reticulate, reddish-brown; appendages absent.

Japan, S Sachalin. 31: SAK. 38: JAP. Wet and swampy sites in the mountains. Map 497.

38. JAPAN: Nippon, Hakkoda, 1300 m, *U.Faurie* 5729 (W); Honshu, Nagano, Mt. Kiso, 20 Aug 1954, *M.Mizushima* 13396 (S).

275. *Juncus ramboi* Barros, *Darwiniana* 11: 283 (1957)

T: Brazil, Rio Grande do Sul, Fazenda Englert pr. Francisco de Paula, 2 Jan 1955, *B.Rambo* 56439; holo: PACA; iso: LIL.

Perennials, 20–80 (–110) cm long, densely caespitose; rhizome very short-noded, 2–5 mm diam. Stem leafless, terete, 0.6–1.5 mm diam., rigid, with 12–20 inconspicuous ridges; subepidermal sclerenchyma strands present, ±triangular in transect. Pith dense, continuous, parenchymatous of rounded cells, with some vascular bundles located up to halfway into the stem transect. Cataphylls 3–5; middle cataphylls ±lax; upper cataphylls tighter, 4–12 cm long, with awn-like up to 10 mm blade, stramineous above, shining castaneous-brown below. Inflorescence pseudolateral, dense, head-like or rarely of several pedunculate heads; flowers 10–40, congested in 2–4 confluent cymes per head, erect; first bract 2–7 cm long, much exceeding or rarely equalling the inflorescence, sharply pointed. Bracteoles 1.5–2 mm long, broadly ovate, obtuse to acute, castaneous-coloured to scarious. Outer tepals 3.5–4.5 mm long, slightly exceeding inner ones, all lanceolate, acute or inner tepals subobtusate, castaneous-coloured with greenish central band, becoming stramineous. Stamens 6; anthers 0.5–0.8 mm long, shorter than c. 1.0 mm filaments; style to 0.1 mm long; stigmas to 0.5 mm long, recurved. Capsule 2.5–3.5 × 1.5–2.2 mm, about equalling tepals, round to trigonous, ovoid to obovoid, obtuse and without mucro, shining castaneous-coloured with ±lighter base. Seeds 0.4–0.6 × c. 0.2 mm, ±obliquely ellipsoid, reticulate, pale castaneous-brown, with persistent seedcoat forming one or two inconspicuous appendages.

This species has a stem anatomy similar to that of sect. *Juncus*, combined with other characters typical of sect. *Juncotyplus*. Two subspecies are recognized.

Stem 0.9–1.2 mm thick; cataphylls 5.5–12 cm long; flowers 20–40 per inflorescence

275a. subsp. *ramboi*

Stem 0.6–1.2 mm thick; cataphylls to 4.5 cm long; flowers 10–20 per inflorescence

275b. subsp. *colombianus*

275a. *Juncus ramboi* Barros subsp. *ramboi*

Juncus ramboi f. *explicatus* Barros, *Darwiniana* 11(2): 284, fig. 1 (1957). T: Brazil, Rio Grande do Sul, Francisco de Paula, *B.Rambo* 54677; holo: PACA; iso: LIL.

Illustrations: M.Barros, *Darwiniana* 11(2): 284, fig. 1 (1957); M.Barros, *Sellowia* 14: 28, fig. 7 (1962).

Map: H.Balslev, *Brittonia* 35: 307, fig. 4 (1983).

Plant 60–80 (–110) cm tall. Stem 0.9–1.2 mm diam. Cataphylls 5.5–12 cm long, with outer ones loose, and uppermost tight. Flowers 20–40 per inflorescence.

S Brazil, Rio Grande do Sul and Santa Catarina. 84: BZS. Bogs, wet pastures, stream banks, woods, 900–1600 m. Map 498.

84. BRAZIL SOUTH: Santa Catarina, Matos Costa, 1200 m, 9 Dec 1962, *R.Klein* 3592 (L); 10 km S of São Joaquin, 5 Jan 1965, *L.B.Smith* & *P.R.Reitz* 14324 (P).

275b. *Juncus ramboi* subsp. *colombianus* Balslev, *Brittonia* 35: 305 (1983)

T: Colombia, Cundinamarca, Quebrada de las Delicias, 11 Jul 1939, *J.Cuatrecasas* 5437; holo: COL; iso: F, US.

Illustration: H.Balslev, *Fl. Neotrop. Monogr.* 68: 99, fig. 49 (1996).

Map: H.Balslev, *Brittonia* 35: 307, fig. 4 (1983); H.Balslev, *Fl. Neotrop. Monogr.* 68: 96, fig. 48 (1996).

Plants 20–30 (–65) cm tall. Stem 0.6–1.2 mm diam. Cataphylls short, to 4.5 cm long with up to 4 mm awn-like blade. Flowers 10–20 per inflorescence. Capsule without mucro.

Cordillera Oriental of the northern Andes in the departments Boyacá and Cundinamarca of Colombia. 83: CLM. Mossy damp soil and shallow water in páramos, 2650–3300 m. Map 499.

83. COLOMBIA: Boyaca: Páramo de Guantiva near km marker 230 on road between Belen and Susacon, 3200 m, *J.H. Langenheim 3644* (LL, NY, UC, US); Esparto, *Pombo s.n.* (COL); Cerinza-Duitama, *J.H. Torres & E. Cárdenas 3312A* (COL); Santa Rosa de Viterbo, Portachuelo, La Meseta rd., 3200–3600 m, *E. Cárdenas & Torres 1* (COL); Cundinamarca, Alto de Páramo ca 15 km NW of Zipaguira, 3200 m, *S. Galen Smith 1373* (COL, F, GH, UC, US); Páramo de Guasca, 3300 m, *F. Sarmiento 908 p.p.* (COL).

276. *Juncus uruguensis* Griseb., *Abh. Königl. Ges. Wiss. Göttingen* 24: 317 (1879)

T: Uruguay, Entre Ríos, prope Concepción, *P.G. Lorentz 1126*; holotype: GOET; isotype: BAF, CORD, photo AAU.

Illustrations: F.G.P. Buchenau, in H.G.A. Engler, *Pflanzenr.* (iv.36) 25: 131, fig. 70 (1906); M. Barros, *Darwiniana* 10: 389, fig. 36 (1953).

Map: H. Balslev, *Fl. Neotrop. Monogr.* 68: 87, fig. 43 (1996) [Neotropical region].

Perennials, 20–60 cm tall, caespitose; rhizome 1–3 mm in diam., densely branched or creeping with short internodes. Stems erect, rigid, 1–2.5 mm in diam., with 10–25 longitudinal ridges, ±bulbous at base, with the thickening covered with brown to castaneous scales; pith of rounded parenchymatous cells. Cataphylls 0–2 per stem, to 7 cm long; blade rudimentary, to 5 mm long; upper cataphylls with blades, 1–2 per stem, 10–25 cm long, usually to half as long as stem; sheaths 3–11 cm long, with scarious margins and auricles 0.5–1.0 mm long; blades filiform, 0.7–2.0 mm wide; leaf round or elliptic in T.S., ±striate, with adaxial enlarged (bulliform) cells absent. Lower bract 1.5–4.5 cm long, ±shorter than or equalling inflorescence, with well developed sheath and short blade. Inflorescence ±terminal or ±pseudolateral, compound, 1.5–7 × 1.5–3 cm, 15–100-flowered, of several unilateral, clustered cymes. Bracteoles 1.5–2.0 mm long. Tepals unequal, lanceolate, acute, green, later bright castaneous; margins scarious; outer tepals 4–5 mm long, with central band thicker, extending to a mucro; inner tepals c. 3.5 mm long. Stamens 3, 1.5–2.5 mm long; anthers 0.8–1.5 mm long, longer than 1 mm filaments. Capsule ellipsoid, obtuse to truncate, trigonous to trilobed in T.S., ±trilocular, 3.5–4.0 × 1.5–2.0 mm, castaneous, glossy, thick-walled, ±shorter than perianth. Seeds ellipsoid, apiculate, 0.3–0.4 × 0.15–0.2 mm, rugose or ridged, brown; appendages absent.

Uruguay and Argentina, disjunctly also in Bolivia. 83: BOL. 85: AGE, AGW, URU. Wet clayey soils, shores. Map 500.

83. BOLIVIA: Cochabamba, Chimore, Chapare, *W.J. Eyerdam 24997* (F, G, K, UC). 85. ARGENTINA NORTHEAST: Buenos Aires, Pigüé, *A. Burkart 4840* (SI); Buenos Aires, Verónica, *Gautier 2433* (BAB); Tornquist, Cerro Tres Picos, 30 Jan 1986, *C.B. Villamil & Cazzaniga 4020 & 4037* (BBB, MCNS, SI). ARGENTINA NORTHWEST: Salta, Valle Encantado, 3000 m, *L. Novara & G. Hoy 1101* (MCNS). URUGUAY: Montevideo, *Felippone 4553* (SI); Montevideo, *E. Gibert 482* (K).

The species is intermediate between the sections *Juncotypus* and *Steirochloa*. The leaf blade anatomy does not support its inclusion in the sect. *Steirochloa* where it was placed by H. Balslev (1996).

277. *Juncus kleinii* Barros, *Sellowia* 14: 27 (1962)

T: Brazil, Santa Catalina, Anitápolis, 2 Apr 1953, *R. Klein 451*; holotype: LIL.

Illustration: M. Barros, *Sellowia* 14: 29, fig. 8 (1962).

Perennials, to 50 cm tall, densely caespitose; rhizome short, stout, many-headed. Stem rigid, erect, terete, finely 12–15-striate; subepidermal sclerenchyma strands present; pith continuous, of rounded parenchymatous cells. Two basal cataphylls stramineous-scarious, the others deep castaneous; uppermost cataphyll bearing a leaf-blade 20–30 cm long; auricles developed, short; blade ±canaliculate, acute (subpungent). Lower bract erect, forming an apparent prolongation of stem, 3–4 cm long, shorter than inflorescence. Inflorescence pseudolateral, ±loose, compound, c. 20–40-flowered, of c. 6–12 main branches with loose unilateral cymes. Bracteoles ovate, acute, c. 1 mm long, scarious. Tepals subequal (outer slightly longer), ±lanceolate, 3.0–3.5 mm

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long, acute to acuminate, pale brown; central band 3-veined with veins dark; margins broad, membranous. Stamens 6, \pm half as long as tepals; anthers c. 0.5–0.6 mm long; filaments c. 1–1.2 mm long; style c. 0.1 mm long. Capsule \pm ovoid, triseptate, c. 3 mm long, shorter than perianth; apex truncate to retuse, pale castaneous. Seeds ovoid-ellipsoid, c. 0.5 \times 0.2–0.3 mm, distinctly apiculate, reticulate; appendages absent.

Confined to S Brazil; known only from the type collection. It is obviously closely related or similar to *J. uruguensis* but differs in having six stamens and outer tepals up to 3.5 mm long. In the absence of information about the leaf blade anatomy, *Juncus kleinii* is retained in the sect. *Juncotypos* where it was originally classified. Map 501.

PREDOMINANTLY AUSTRALASIAN SPECIES

278. *Juncus alexandri* L.A.S.Johnson, in M.R.Banks & al., *Asp. Tasman. Bot. Trib. W. Curtis* 37 (1991)

T: Australia, Cumberland Falls road turnoff from Lake Mountain road, east of Marysville on Main Divide, 24 Apr 1973, L.A.S.Johnson 7672a; holotype: NSW; isotype: MEL.

Perennials, 45–160 cm tall, with creeping rhizome. Stem leafless, 1.5–4 mm thick, hard, mid-green, not glaucous; ridges 37–60 (–80), prominent; cells on ridges \pm radially enlarged; stomata superficial; subepidermal sclerenchyma strands present, forming radial lamellae; pith continuous, of astericiform cells. Cataphylls 3–4, with upper ones (10–) 12–25 cm long, lax, abaxially yellow-brown to dark red-brown or black towards base, adaxially coppery to golden brown. Lower bract 3–18 (–30) cm long, exceeding or shorter than inflorescence, with narrow sheath. Inflorescence pseudolateral, 2–11 cm long, diffuse, often with some branches reflexed; flowers numerous, loosely to densely clustered or solitary. Outer tepals 1.5–3 mm long, longer than or equalling inner, all stramineous-brown with narrow to broad membranous margins. Stamens 3. Capsule 2–2.2 mm long, shorter than to exceeding outer tepals, obovoid to ovoid, obtuse to subacute, not or shortly mucronate, golden brown or occasionally red-brown near apex.

A SE Australian endemic. Moist forest on soils of moderate to high fertility. Two subspecies are recognized.

Cataphylls yellow-brown, dark yellow-brown or red-brown towards the base; tepals acute, usually 1.6–2.2 mm long

278a. subsp. alexandri

Cataphylls very dark (dark red-brown to black) towards the base at maturity; tepals acuminate, usually 2.2–2.6 mm long

278b. subsp. melanobasis

278a. *Juncus alexandri* L.A.S.Johnson subsp. **alexandri**

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 277 (1993).

Stems \pm crowded along stout rhizome, 40–150 cm tall, 1.5–2.7 (–3.5) mm in diam.; ridges 37–55, distinct. Cataphylls 7–14 cm long, abaxially yellow-brown distally, light to dark castaneous-brown towards the base, dull; upper cataphylls loose, adaxially stramineous to yellow-brown, dull to slightly glossy; blade acicular, to 5 mm long; cortical air-spaces of stem absent, few or small. Lower bract 3–10 cm long, shorter than to exceeding inflorescence; sheath narrow. Bracteoles ovate, c. 1 mm long, membranous to scarious. Tepals 1.5–2.2 (–2.6) mm long, acute, with inner ones sometimes subacute; margins broad, membranous. Anthers c. 0.5 mm long; filaments c. 0.5 mm long; style c. 0.1 mm long. Capsule triseptate, obovoid, \pm obtuse, slightly exceeding or equalling perianth, occasionally red-brown at apex. Seeds 0.5–0.6 \times 0.2–0.3 mm, c. 15–20-striate, densely transversely reticulate; appendages absent. Fig. 138.

SE Australia, in SE New South Wales and E Victoria. 50: NSW, VIC. Moist cool forest country. Map 502.

50. NEW SOUTH WALES: Southern Tablelands, New Chum Road, Cotter Valley (ACT), *N.T.Burbridge* 7424 (CANB, NSW); S Tablelands, Bunberry Creek on the Wadbilliga fire trail, 39 km ESE of Cooma, *R.G.Coveny*

& *al.* 6600 (NSW). VICTORIA: East Gippsland, Bonang Hwy, north of Mt Tingaringy turn off, *A.C.Beauglehole* 35659 (NSW); East Gippsland, Tambo River, E of Omeo, *A.C.Beauglehole* 41550 (NSW, MEL); Victorian Highlands, Big Hill Lookout, SSE of Mt Beauty, *A.N.Rodd* 396 (NSW); Victorian Highlands, Annie River, south of junction with Bucklans River, 17 miles south of Bright, *A.C.Beauglehole* 43642 (NSW, MEL); Snowfields, Caledonia Swamp, upper reaches of Caledonia River, NNW of Mt Wellington, *A.C.Beauglehole* 40997 (NSW, MEL); Snowfields, between the Link Rd turnoff and Matlock, c. 1000 m, 22 Jan 1967, *L.A.S.Johnson* (NSW 95592); Rubicon State Forest, *A.C.Beauglehole* 70738 (NSW, MEL); Lake Mtn, *M.D.Tindale* 771 (NSW).

278b. *Juncus alexandri* subsp. *melanobasis* L.A.S.Johnson, in M.R.Banks & *al.*, *Asp. Tasman. Bot. Trib. W. Curtis* 38 (1991)

T: New South Wales, Warung State Forest, near Norfolk Falls, western end of Liverpool Range northeast of Coolah, 25 Oct 1966, *L.A.S.Johnson*; holo: NSW96382; iso: CANB, MEL.

Stems 70–150 cm tall, 2–4 mm diam., dark green; ridges 45–75; cortical air-spaces of stem well developed. Cataphylls loose, 10–25 cm long, abaxially very dark red-brown to black and ±glossy towards the base, ±brown to deep stramineous-brown distally, adaxially golden brown, ±glossy. Lower bract 9–30 cm long, exceeding inflorescence; sheath narrow. Bracteoles to c. 1 mm long, ovate, acute, scarious to membranous. Tepals (2.0–) 2.2–2.9 mm long, acute, with narrow to broad membranous margins. Anthers 0.4–0.6 mm long; filaments c. 0.5 mm long; style c. 0.1 mm long; stigmas c. 0.5–0.8 mm long. Capsule triseptate, obtuse, stramineous-brown to golden brown, not red-brown at apex. Seeds c. 0.5–0.6 × c. 0.2 mm, pale brown, c. 16–20-striate, densely reticulate, apiculate to minutely appendiculate.

Australia: New South Wales, North Coast ranges, Northern Tablelands and Central Tablelands. 50: NSW. Wet, often disturbed places, in forest country. Map 503.

50. NEW SOUTH WALES: North Coast, 1 km S of Mt Paterson, 19 May 1973, *J.Pickard* 2317 (NSW); North Coast, Upper Allyn, 30 May 1970, *L.A.S.Johnson* (NSW, PRA); Northern Tablelands, 6 km W of Ebor on Guyra Rd, *K.L.Wilson* 6168 (NSW, CHR, UNE); Northern Tablelands, 3 km NE of Polblue Swamp, Barrington Tops area, *B.G.Briggs & L.A.S.Johnson* 3182 (NSW); Central Tablelands, Mt Coricudgy to Kerry Mountains, Sep 1953, *C.K.Ingram* (NSW); Central Tablelands, below Mt Coricudgy summit, 46 km by road ESE of Rylstone, *R.G.Coveny & P.D.Hind* 6626 (NSW).

279. *Juncus amabilis* Edgar, *New Zealand J. Bot.* 2: 186 (1964)

T: New Zealand, Lincoln, opposite school, in damp hollow near golf course, 13 Jan 1964, *E.Edgar*; holo: CHR145441.

Illustrations: *E.Edgar*, *New Zealand J. Bot.* 2: 187, fig. 7 (1964); *K.L.Wilson*, in *G.J.Harden* (ed.), *Fl. New South Wales* 4: 280 (1993).

Map: *E.Edgar*, *New Zealand J. Bot.* 2: 194, fig. 29 (1964) [New Zealand only].

Perennials, (20–) 45–125 cm tall, densely caespitose; rhizome short, short-noded, 3–4 mm diam. Stem leafless, 1–2.5 mm diam., ±soft, grey-green, ±glaucous; ridges 30–60, not distinct or slightly so, subepidermal sclerenchyma strands present; pith interrupted, of astericiform cells; epidermis cells on ridges not enlarged. Cataphylls few, lax, to c. 10 × 0.7 cm, abaxially dull yellow-brown distally, very dark red-brown or black and glossy at base, adaxially silvery or stramineous, glossy. Lower bract 10–33 cm long, exceeding inflorescence; sheath narrow. Inflorescence pseudolateral, 1–5 (–10) cm long, diffuse or head-like; flowers numerous, densely to loosely clustered. Bracteoles ovate, c. 1 mm long, scarious to membranous. Tepals ±lanceolate, stramineous-brown with broad membranous margins; outer tepals longer than or equalling inner, 1.8–2.5 mm long, ±acute; inner tepals broadly acute to ±obtuse. Stamens 3 (–6); anthers c. 0.5–0.6 mm long; filaments c. 0.5 mm long; style c. 0.1 mm long; stigmas to c. 0.5 mm long. Capsule triseptate, ellipsoid, 2–2.5 mm long, longer than or equalling perianth, obtuse, not or shortly mucronate, golden brown. Seeds narrowly ovoid, c. 0.4 × 0.2 mm, apiculate, pale brown, c. 12–16-striate, densely reticulate; appendages absent. Fig. 142.

New Zealand and southern Australia. Temporarily introduced in England. 10: gbr. 50: NSW, SOA, TAS, VIC, WAU. 51: nzn, nzs. Damp places, along streams and shores, wet sites along tracks. Map 504.

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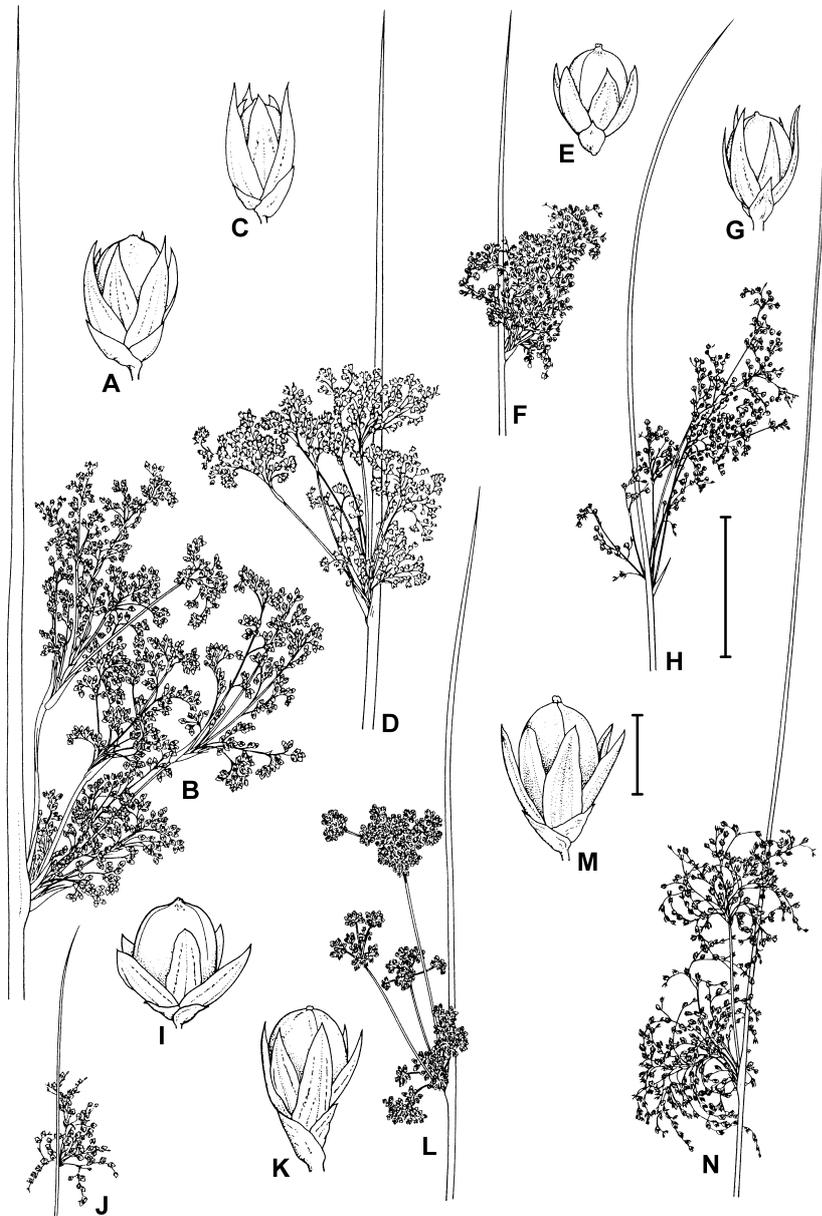


Figure 141. *Juncus semisolidus*. **A**, perianth with capsule; **B**, inflorescence (**A**, **B**, A.C.Beaglehole 68871, NSW). *Juncus procerus*. **C**, perianth with capsule; **D**, inflorescence (**C**, **D**, R.Melville 2805, NSW). *Juncus polyanthemus*. **E**, perianth with capsule; **F**, inflorescence (**E**, **F**, B.G.Briggs 3262, NSW). *Juncus mollis*. **G**, perianth with capsule; **H**, inflorescence (**G**, **H**, B.G.Briggs, NSW75068). *Juncus usitatus*. **I**, perianth with capsule; **J**, inflorescence (**I**, **J**, M.Tindale, NSW49852). *Juncus subglaucus*. **K**, perianth with capsule; **L**, inflorescence (**K**, **L**, E.F.Constable, NSW56876). *Juncus aridicola*. **M**, perianth with capsule; **N**, inflorescence (**M**, **N**, E.J.McBarron 5991, NSW). Scale bars: **A**, **C**, **E**, **G**, **I**, **K**, **M** = 1 mm; **B**, **D**, **F**, **H**, **J**, **L**, **N** = 2 cm. Drawn by D.Mackay. Reproduced with permission of the authorities of Royal Botanic Gardens, Sydney.

50. NEW SOUTH WALES: SW Plains, Gulpa Ck, E of Mathoura, *S.W.L.Jacobs 3259* (NSW, PRA); SW Plains, Native Dog Ck, 11 km W of Tocumwal, 12 Mar 1959, *L.A.S.Johnson & E.F.Constable* (NSW, PRA). VICTORIA: S of Lake Corringale and W of Snowy R. mouth, E Gippsland, *A.C.Beauglehole 35329* (MEL, NSW, PRA). **51.** NEW ZEALAND NORTH: Near St. John's Lake, Auckland, 26 Jan 1926, *H.Carse* (CANTY2107); Whangamarino R., Waikato County, *R.Mason & N.T.Moar 7029* (CHR). NEW ZEALAND SOUTH: Henley, Otago, 24 Jan 1948, *H.H.B.Allan* (CHR); Waihola, Otago, 24 Jan 1948, *H.H.B.Allan* (CHR).

280. *Juncus aridicola* L.A.S.Johnson, in J.M.Black, *Fl. S. Australia*, 3rd edn, 1: 322 (1978)

T: Australia, New South Wales, 32 km E of Makatana, 16 Apr 1970, *L.A.S.Johnson*; holotype: NSW105140.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 280 (1993).

Perennials, 65–145 cm tall; stems not densely tufted; rhizome short, short-noded. Stem leafless, 1.5–5.5 mm diam., soft, grey-green, often glaucous; ridges 40–115, slightly prominent; dorsal cells not enlarged; pith interrupted, of astericiform cells. Cataphylls few, ±lax, abaxially dull, yellow-brown to stramineous, often pinkish distally, brown to red-brown at base, adaxially usually stramineous-silvery, less often to golden brown. Lower bract 10–40 cm long, exceeding inflorescence; sheath narrow. Inflorescence pseudolateral, 6–14 cm long, very diffuse; branches often flexuous; flowers numerous, solitary or occasionally loosely clustered. Tepals broadly lanceolate, stramineous-brown with very broad membranous margins; outer tepals 1.8–3 mm long, longer than or equalling inner ones, acute to acuminate; inner tepals subacute to subobtusate, often ±mucronate. Stamens 3 (–6); anthers 0.4–0.6 mm long; filaments 0.5–0.6 mm long; style to 0.1 mm long; stigmas 0.3–0.5 mm long. Capsule triseptate, ellipsoid, 2.1–2.6 mm long, exceeding perianth, obtuse to acutish, not or shortly mucronate, golden brown. Seeds narrowly ovoid, 0.4–0.5 × c. 0.2 mm, apiculate, 15–20-striate, densely reticulate, brown to pale brown; appendages absent. Fig. 141.

Widespread in inland mainland Australia. Temporarily introduced in England. 10: gbr. 50: NSW, NTA, QLD, SOA, VIC, WAU. Various seasonally or permanently wet places, often along streams, on clayey soils. Map 505.

50. NEW SOUTH WALES: N Far West Plains, 48 km NE of Wilcannia, Talyawalka Ck, *E.F.Constable 4634* (AD, MO, NSW, PRA); NW Plains, Narran Lake, *D.J.McGillivray 2885* (BRI, CHR, K, NSW, PRA); NW Plains, Murndale Lane, Merrywinebone, 8 Nov 1956, *J.T.Waterhouse* (NSW, PRA).

281. *Juncus astreptus* L.A.S.Johnson, in M.R.Banks & al., *Asp. Tasman. Bot. Trib. W. Curtis* 41 (1991)

T: Tasmania, Castle Forbes Bay, 43°08' S, 146°58' E, 22 May 1978, *W.M.Curtis & B.Allen* 3; holotype: NSW; isotype: HO.

Map: M.R.Banks & al., *Asp. Tasman. Bot. Trib. W. Curtis* 42 (1991).

Perennials, 60–100 cm tall; rhizome stout, creeping, covered with dark, ±glossy scales. Stem leafless, 1.5–4 mm diam., hard, mid-green to ±yellowish green, not glaucous; ridges 30–50, conspicuous; cells on ridges scarcely radially elongated; stomata superficial; subepidermal sclerenchyma strands present, forming radial lamellae; pith of astericiform cells, wholly or partly interrupted, rarely continuous in small individuals. Cataphylls loose; upper cataphylls 4–12 (–15) cm long, 7–13 mm wide, abaxially yellow-brown distally, brown to dark brown and glossy towards base, adaxially coppery to golden brown, ±glossy. Inflorescence pseudolateral, (0.7–) 1–3 cm long, condensed, of 1 or a few clusters; flowers numerous, densely clustered. Lower bract 3–18 (–30) cm long, exceeding or shorter than inflorescence; sheath narrow. Outer tepals 1.8–2.5 mm long, longer than or equalling inner ones, all acute, stramineous-brown with narrow to broad membranous margins. Stamens 3; anthers 0.5–0.6 mm long; filaments c. 0.5 mm long; style to 0.2 mm long; stigmas 0.5–0.8 mm long. Capsule triseptate, obovoid to ovoid, 2–2.4 mm long, equalling perianth, obtuse to subacute, abruptly contracted in c. 0.2 mm mucro, pale castaneous-brown to brown, shining. Seeds narrowly ovoid, c. 0.5 × c. 0.25 mm, apiculate, pale brown, c. 15–20-striate, reticulate; appendages absent. Fig. 142.

Widespread in Tasmania, more common in the east. 50: TAS. Moderately moist forest, along forest roads. Map 506.

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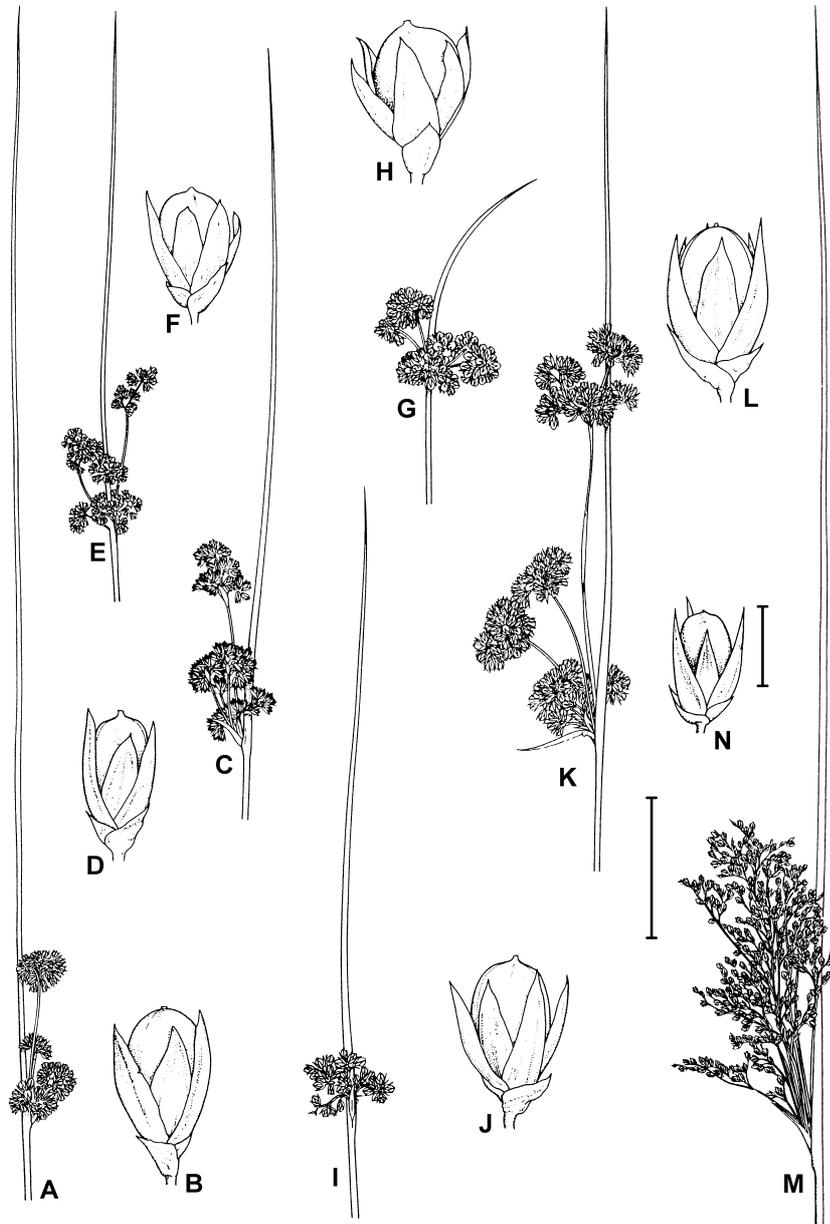


Figure 142. *Juncus amabilis*. **A**, inflorescence; **B**, perianth with capsule (**A**, **B**, A.C.Beaglehole 70413, NSW). *Juncus edgariae*. **C**, inflorescence; **D**, perianth with capsule (**C**, **D**, B.G.Briggs, NSW90837). *Juncus gregiflorus*. **E**, perianth with capsule; **F**, inflorescence (**E**, **F**, K.L.Wilson 953 & L.A.S.Johnson, NSW). *Juncus astreptus*. **G**, inflorescence; **H**, perianth with capsule (**G**, **H**, W.M.Curtis, NSW278765). *Juncus durus*. **I**, inflorescence; **J**, perianth with capsule (**I**, **J**, R.D.Hoogland 7595, NSW). *Juncus australis*. **K**, inflorescence; **L**, perianth with capsule (**K**, **L**, A.C.Beaglehole 70573, NSW). *Juncus sarophorus*. **M**, inflorescence; **N**, perianth with capsule (**M**, **N**, A.C.Beaglehole 50412, NSW). Scale bars: **A**, **C**, **F**, **G**, **I**, **K**, **M** = 2 cm; **B**, **D**, **E**, **H**, **J**, **L**, **N** = 1 mm. Drawn by D.Mackay. Reproduced with permission of the authorities of Royal Botanic Gardens, Sydney.

50. TASMANIA: North East, Whites Mill Road, Lilydale, *A.M.Buchanan 330 p.p.* (NSW); West Coast: Rosebery, *R.Mason 13221* (HO); Central Highlands, Gun Lagoon Creek, Devils Gullet State Reserve, *A.Moscal 1664* (HO); Interlaken road, 14 km from Bothwell, 18 Feb 1976, *W.M.Curtis* (HO, NSW); Midlands, 1 mile west of Poatina, 4 Jan 1965, *L.A.S.Johnson* (NSW, HO); Ben Lomond, 5.8 km from A3 highway on Mt Barrow Road, *K.D.Hill 1589 & al.* (NSW); East Coast: 34 km north of highway near Little Swanport along M forest road, *K.D.Hill 1566, L.A.S.Johnson & D.F.Blaxell* (NSW); Sheepdip Ck, *A.Moscal 8108* (HO, VALD); South West, Kermadie, 21 Aug 1978, *M.Franklin & W.M.Curtis* (HO); 7 km W of Lake Echo Dam on Bronte Rd, *K.L.Wilson 6301* (NSW).

282. *Juncus australis* Hook.f., *Fl. Tasm.* 2: 66, tab. 134a (1858)

T: Tasmania, Penquite, *R.Gunn 568*; lecto: K, *designated here* by K.L.Wilson; iso: NSW6844.

Illustrations: E. Edgar, *New Zealand J. Bot.* 2: 184, fig. 6a–c (1964); K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 281 (1993).

Perennials, 60–120 cm tall; rhizome 3–5 mm in diam., forming large loose clumps. Stem leafless, terete, 1.5–3.5 (–5) mm diam., hard, various shades of green, pale, subglaucous; ridges 35–75, conspicuous; subepidermal sclerenchyma strands present, some connected to small vascular bundles; epidermis cells over the ridges radially enlarged; pith interrupted, of perfectly astericiform cells, often almost lacking in mature stems, or in high altitude forms continuous. Cataphylls 3–4; upper cataphylls 5–18 cm long, very lax, abaxially dull above, dark yellow-brown to red-brown and ±glossy at base, adaxially silvery or occasionally pale golden brown. Lower bract 8–18 cm long, exceeding inflorescence, with narrow sheath. Inflorescence pseudolateral, 2–6 (–14) cm long, diffuse or head-like; flowers (20–) 50–80, densely to loosely clustered. Bracteoles ovate, scarious. Tepals initially pale green, later stramineous-brown, occasionally tinged red-brown, with ±narrow membranous margins; outer tepals 2–2.5 (–3) mm long, longer than inner, acuminate-subulate; inner tepals acute. Stamens 3 (–6); anthers c. 0.5–0.7 mm long; filaments 0.4–0.6 mm long; style c. 0.1 mm long; stigmas c. 0.3–0.5 mm long. Capsule triseptate, ovoid to obovoid or ellipsoid, 2.3–3 mm long, shorter than or exceeding perianth, obtuse, not or shortly mucronate, golden or pale greenish brown. Seeds 0.35–0.4 × c. 0.2 mm, narrowly and obliquely ellipsoid, apiculate, pale brown, c. 16–22-striate, reticulate; appendages absent or reduced to pale apices. Fig. 142.

SE Australia and New Zealand, casual in Europe. 10: gbr. 50: NSW, SOA, TAS, VIC. 51: KER, NZN, NZS. 10: grb. Permanently or seasonally wet places in forest and open grassland, roadside drains, ditches, sea level to 600 m. Map 507.

50. NEW SOUTH WALES: C Tablelands, 16 km E of Taralga, *V.Klaphake 1116* (NSW, PRA); N Tablelands, junction of Duncans Ck Rd and Nundle – Barry Rd, Hanging Rock, *R.H.Goode 324* (BM, NSW, PRA). TASMANIA: Van Diemensland, *C.Stuart* (LD). **51.** NEW ZEALAND SOUTH: Dunedin, Jun 1874, *S.Berggren* (LD).

283. *Juncus bassianus* L.A.S.Johnson, in M.R.Banks & al., *Asp. Tasman. Bot. Trib. W. Curtis* 40 (1991)

T: Slopes of Mt Field East (c. 42°40'S, 146°40'E), Tasmania, 17 Jan 1962, *J.Vickery*; holo: NSW 60681; iso: HO. Map: L.A.S.Johnson, in M.R.Banks & al., *Asp. Tasman. Bot. Trib. W. Curtis* 41 (1991)

Perennials, 50–100 cm tall, densely caespitose; rhizome creeping, short. Stem leafless, (0.6–) 1.0–3.5 mm diam., hard, mid-green to bright green, not glaucous; ridges 30–50, mostly inconspicuous; epidermis cells on ridges ±radially enlarged; stomata superficial; subepidermal sclerenchyma strands present, forming radial lamellae; pith continuous, of astericiform cells. Cataphylls few; upper cataphylls 5–15 cm long, 5–13 mm wide, abaxially yellow-brown distally, deep castaneous, red-brown to dark red-brown towards base, ±not glossy or slightly so at base, adaxially coppery to golden brown; blade acicular c. 2–3 mm long. Lower bract 3–18 (–30) cm long, exceeding or shorter than inflorescence; sheath narrow. Inflorescence pseudolateral, 1.5–3 (–9) cm long; flowers numerous, most often of ±densely clustered pedunculate heads, or diffuse, or wholly subcontracted. Bracteoles ±oblong-ovate, to c. 1.5 mm long, scarious. Tepals ±lanceolate, stramineous-brown; outer tepals (1.9–) 2.4–3 mm long, longer than or equalling inner ones, carinate, narrowly bordered; inner tepals with broader membranous margins distally, subobtuse. Stamens 3;

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anthers c. 0.5 mm long; filaments c. 0.7 mm long; style c. 0.1 mm long; stigmas c. 0.5 mm long. Capsule triseptate, obovoid to ovoid, 2.4–2.6 mm long, exceeding perianth, obtuse to subacute, not or shortly mucronate, ±golden brown, shining. Seeds ovoid-ellipsoid, c. 0.5–0.6 × c. 0.2 mm, apiculate, pale brown, striate and reticulate; appendages absent. Fig. 138.

Victoria, Otway peninsula and Tasmania. 50: TAS, VIC. Moist open areas, disturbed places, and glades in forest country. Map 508.

50. VICTORIA: 5 km NE of Yuulong on Great Ocean Rd, *D.E.Albrecht 5114* (MEL, NSW, PRA); Stevenson Falls, Otway Forest, 9 Feb 1984, *Earl* (MEL); Yuulong to Crowes, Otway Peninsula, 30 Jan 1965, *L.A.S.Johnson* (NSW). TASMANIA: King William Saddle, 24 Jan 1962, *M.E.Phillips* (NSW); 9 km NE of Upper Blessington, *K.L.Wilson 6478* (HO, NSW, PRA); North West, Hellyer Gorge, 4 Jan 1937, *C.Davis* (NSW); North East, Lilydale Falls, 6 Jan 1982, *Robinson* (HO); West Coast, Zeehan to Renison Bell, 6 Jan 1965, *L.A.S.Johnson* (NSW); Warners Landing road at Kelly Basin turnoff, *K.D.Hill & al. 1493* (NSW, HO); Central Highlands, Near Lake Little, Cradle Mountain, *A.M.Buchanan 895* (HO); Midlands, Mersey River, at Liena, *A.Moscal 2370* (HO); South West, Florentine Valley, 10 km from Maydena, *R.Melville & al. 2349* (K, MEL, NSW).

284. *Juncus brevibracteus* L.A.S.Johnson, *Telopea* 5: 309 (1993)

T: New South Wales, Southern Tablelands, Snubba Range, 14 km direct NE of Tumbarumba, 17 May 1976, *L.A.S.Johnson 8274*; holo: NSW; iso: CANB, CHR, K, MEL, NY.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 278 (1993).

Perennials, 50–140 cm tall, rhizomatous. Rhizome creeping, stout, covered with deep brown scales. Stems in dense rows, terete, 2–4 mm diam., ±hard, mid-green; pith finely interrupted; ridges 42–110, dense, not distinct. Cataphylls few; upper cataphylls 8–19 cm long, lax, abaxially dark yellow-brown and dull distally, orange-brown or dark red-brown and ±glossy at base, adaxially coppery to dark yellow-brown, dull. Lower bract 4–16 cm long, shorter than inflorescence or exceeding it by less than $\frac{1}{3}$ of its length; sheath ±dilated. Inflorescence pseudolateral, 3–10 × 3–6 cm, diffuse or head-like; flowers numerous, loosely to densely clustered, usually in 1–5 main head-like agglomerations. Outer tepals 1.5–2.2 mm long, acute, longer than inner ones; inner tepals subobtusate; all stramineous-brown, often with darker bands; margins membranous, broad on inner tepals, narrow on outer ones. Stamens 3; anthers 0.4–0.7 mm long, longer than or equalling c. 0.5–0.6 mm filaments; style c. 0.1 mm long; stigmas to 1 mm long. Capsule triseptate, ovoid to ellipsoid, c. 1.8–2.4 mm long, exceeding perianth, usually ±obtuse, not or shortly mucronate, dark golden brown, often red-brown at apex. Seeds 0.4–0.6 × c. 0.2 mm, apiculate, c. 12–15-striate, densely reticulate; appendages ±absent. Fig. 138.

Endemic to SE Australia. 50: NSW, VIC. Sphagnum bogs and swampy creeks at high mountain to subalpine levels. Map 509.

50. NEW SOUTH WALES: Cave Ck, tributary of Goodradigbee R., 1260 m, *A.N.Rodd 447* (NSW); Wombat Ck, Rules Pt Rd, Kosciusko National Park, *K.L.Wilson & L.A.S.Johnson* (NSW248462). VICTORIA: East Gippsland, Upper Delegate River, near Bidwell, Jan 1953, *R.Melville & al. 2947* (K, NSW); Snowfields, Bluff Hut area, c. 16 km SW of Mt Speculation, Nov 1973, *A.C.Beaglehole 43515* (MEL, NSW).

285. *Juncus continuus* L.A.S.Johnson, in J.M.Black, *Fl. S. Australia*, 3rd edn, 1: 325 (1978)

T: Australia, New South Wales, Northbridge, Sailors Bay, 5 Dec 1959, *L.A.S.Johnson*; holo: NSW48976

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 276 (1993).

Perennials 40–145 cm tall; rhizome horizontal, short-noded. Stems densely crowded in groups or dense rows, terete, 1.2–3 mm diam., ±hard, yellow-green; ridges 35–80, ±distinct; dorsal epidermis cells slightly enlarged; subepidermal sclerenchyma strands present, forming radial lamellae; pith continuous, of astericiform cells. Cataphylls few, ±lax, abaxially yellow to yellow-brown and slightly glossy distally, dark yellow-brown and glossy at base, adaxially silvery stramineous. Lower bract 4–30 cm, exceeding inflorescence; sheath narrow. Inflorescence pseudolateral, 2–12 cm long, diffuse, initially sometimes reddish, later stramineous-brown; flowers numerous, solitary or loosely clustered. Bracteoles ovate, to c. 1 mm long, acute, scarious. Tepals ±lanceolate, stramineous-brown often with darker bands on each side of midrib, with broad membranous margins; outer tepals 1.5–2.2 mm long, longer

than or equalling inner ones, acute to acuminate; inner tepals subobtusate to acute, often \pm mucronate. Stamens 3; anthers 0.6–0.7 mm long; filaments c. 0.4 mm long; style c. 0.1 mm long; stigmas to 1 mm long. Capsule triseptate, subtrigonous, ellipsoid to ovoid, 2.3–2.8 mm long, exceeding perianth, obtuse, not or shortly mucronate, dark golden brown. Seeds narrowly oblong-ovoid, c. 0.35–0.45 \times c. 0.2 mm, brown to pale brown, apiculate, c. 16–20-striate, densely reticulate; appendages absent. Fig. 138.

An Australian endemic, widespread in central and eastern Australia. Introduced in New Zealand. Temporarily introduced in England. 10: gbr. 50: NSW, NTA, QLD, SOA, VIC. 51: nzn. Mostly on moist, sandy soil. Map 510.

50. NEW SOUTH WALES: South Coast, foothills of Clyde Mtn, 24 Dec 1961, *B.G.Briggs* (NSW, PRA); Central Coast, 16 km NE of Bilpin, Cabbage Tree Ck, Mountain Lagoon, 25 Mar 1965, *E.F.Constable 5737* (A, CHR, K, MEL, NSW, PRA). QUEENSLAND: Maranoa, c. 47 km NNW of Womblebank, *L.A.S.Johnson 8594* & *K.L.Wilson* (NSW, PRA).

286. *Juncus distegus* Edgar, *New Zealand J. Bot.* 2: 183 (1964)

T: New Zealand, Bunnythorpe, near Palmerston North, 6 Mar 1930, *V.D.Zotov*; holo: CHR1810; iso: NSW.

Illustration: E. Edgar, *New Zealand J. Bot.* 2: 184, fig. 5 (1964).

Map: E. Edgar, *New Zealand J. Bot.* 2: 194, fig. 29 (1964).

Perennials 25–75 cm tall, densely caespitose; rhizome \pm creeping, 2–4 mm in diam., short-noded. Stem leafless, terete, 0.75–1.5 mm thick, dull green or reddish, \pm smooth with 15–25 inconspicuous ridges; subepidermal sclerenchyma strands present; epidermis cells uniform; pith of perfectly astericiform cells, regularly interrupted with very small lacunae between longer compact parts. Cataphylls 3–4, tight; upper cataphylls 4–7 cm long, \pm dull, castaneous and glossy at base, adaxially \pm stramineous; lower cataphylls bright red-brown. Lower bract to c. 10 cm long, much exceeding inflorescence; sheath narrow. Inflorescence pseudolateral, of two c. 1 cm wide clusters; one cluster with short peduncle; other cluster with long and slender peduncle; each with a small side cluster; flowers usually 20–40, usually densely aggregated. Bracteoles \pm broadly ovate, acute to acuminate. Bracteoles ovate, to c. 1 mm long, \pm scarious. Tepals lanceolate, red-brown with light green centre at anthesis, becoming entirely red-brown to stramineous, 2.3–3 mm long; outer tepals slightly longer than inner ones, acuminate to acute, with central band prominent and margins broad, \pm membranous; inner tepals acute to subobtusate with margins distally very broad. Stamens 3–4 (–6); anthers c. 1.0–1.3 mm long; filaments c. 0.5 mm long; style c. 0.1 mm long; stigmas to c. 0.5 mm long. Capsule triseptate, oblong-ovoid, 2.5–3 mm long, often exceeding perianth, obtuse, shining castaneous-brown, often very dark at apex. Fig. 143.

New Zealand, North, South and Chatham Islands. 51: CTM, NZN, NZS. Damp ground, \pm dry grassy hillsides, sea level to 1000 m. Map 511.

51. NEW ZEALAND NORTH: Kaiaka, Mangonui Co., 25 Dec 1913, *H.Carse* (CANTY); Cooks Cove, Tolaga Bay, 2 Feb 1940, *V.D.Zotov* (CHR); Wairoa, Hawkes Bay, *G.O.K.Sainsbury* (CANTY1961); Palmerston North, Jul 1933, *D.Merry* (WELT); Whakataki, Castle Point County, 25 Mar 1945, *V.D.Zotov* (CHR). NEW ZEALAND SOUTH: Brazenose above Akaroa, 11 Apr 1948, *W.R.B.Oliver* (WELT); Peel Forest, Canterbury, Jan 1949, *V.J.Cook* (AK); Greymouth, *A.J.Healy 61/61* (CHR, NSW, PRA); Near Greenhills, Southland, Feb 1903, *L.Cockayne* (WELT); Lincoln, *E.Edgar G3469* (CHR, NSW).

287. *Juncus dolichanthus* L.A.S.Johnson, *Telopea* 5: 310 (1993)

T: New South Wales, North Western Plains, W of Cuttabri, 17 Nov 1974, *K.L.Wilson & al.* 749; holo: NSW; iso: BRI, CANB, CHR, K, MO, NY.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 284 (1993).

Perennials, 35–80 cm tall, rhizomatous. Rhizome horizontally creeping; stems densely crowded. Stem leafless, slender, terete, 1–2 mm diam., hard, grey-green; ridges 22–32, \pm distinct when dry; dorsal epidermis cells not enlarged; pith continuous or occasionally interrupted above, of astericiform cells. Cataphylls few, 5–8 cm long, \pm tight, abaxially golden brown and dull distally, to dark yellow-brown or rarely red-brown and slightly glossy at base, adaxially silvery. Lower bract 5–18 cm long, longer than to slightly shorter than

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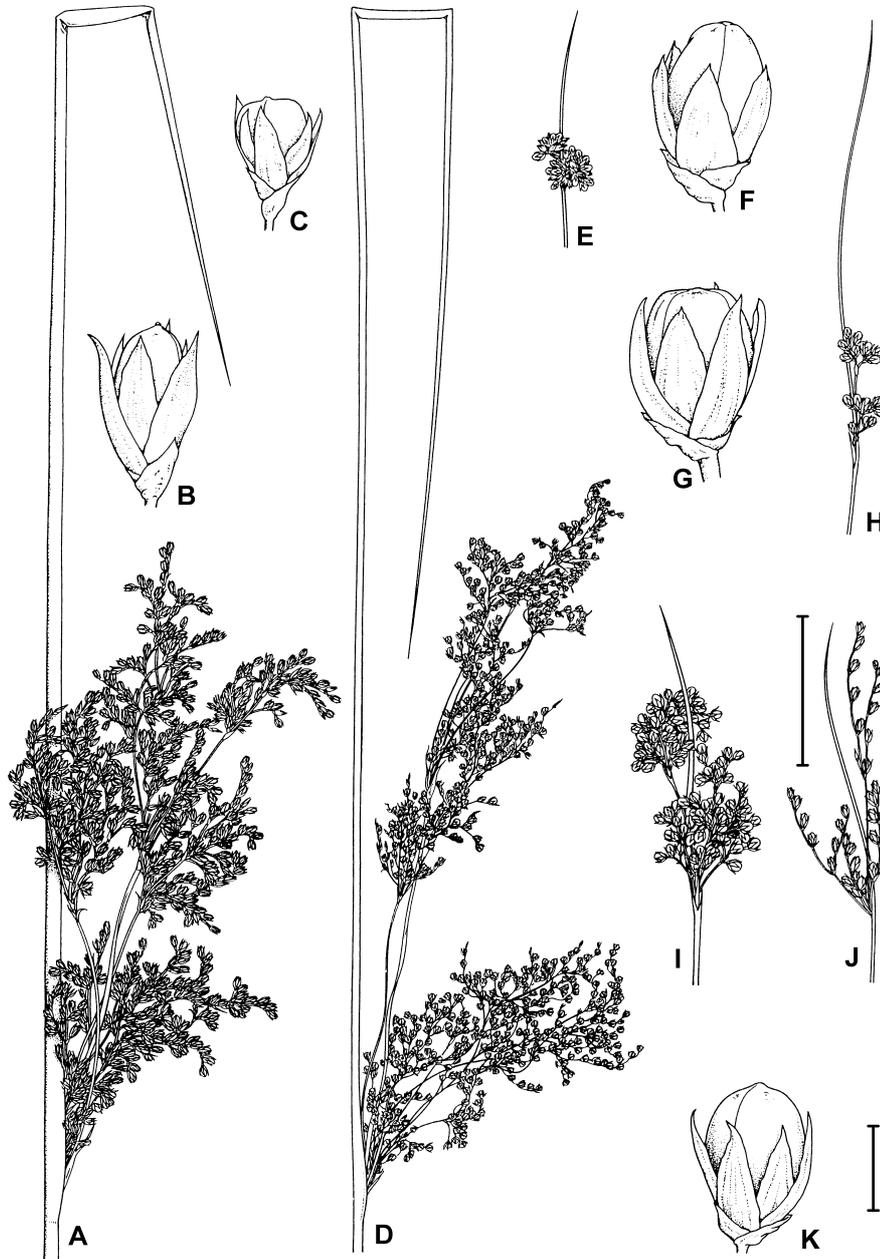


Figure 143. *Juncus flavidus*. **A**, inflorescence; **B**, perianth with capsule (**A**, **B**, E.J.McBarron 6047, NSW). *Juncus psammophilus*. **C**, perianth with capsule; **D**, inflorescence (**C**, **D**, K.L.Wilson 4436, NSW). *Juncus filicaulis*. **E**, inflorescence; **F**, perianth with capsule (**E**, **F**, M.Tindale 4032, NSW). *Juncus distegus*. **G**, perianth with capsule; **H**, inflorescence (**G**, **H**, L.B.Moore, CHR124754). *Juncus subsecundus*. **I**, clustered inflorescence; **J**, open inflorescence; **K**, perianth with capsule (**I**, B.G.Briggs, NSW56845; **J**, **K**, G.H.Cunningham 3328 & P.L.Milthorpe, NSW). Scale bars: **A**, **D**, **E**, **H**–**J** = 2 cm; **B**, **C**, **F**, **G**, **K** = 1 mm. Drawn by D.Mackay. Reproduced with permission of the authorities of Royal Botanic Gardens, Sydney.

inflorescence; sheath ±dilated. Inflorescence pseudolateral, 4–11 cm long, diffuse; flowers numerous, solitary. Bracteoles ovate, to c. 1 mm long, acute, scarious. Outer tepals lanceolate, 2.4–3.0 mm long, acute to acuminate, longer than or equalling inner ones, with central band prominent and often suffused reddish; inner tepals acute, often mucronate, all stramineous-brown, often tinged red-brown, with ±broad membranous margins. Stamens (3–) 6; anthers 0.6–1.0 mm long, equalling or usually longer than 0.3–0.5 mm filaments; style c. 0.1 mm long; stigmas to c. 1 mm long. Capsule triseptate, ellipsoid to ovoid, 2.5–3.0 mm long, shorter than to slightly exceeding perianth, obtuse, not or shortly mucronate, ±dark golden brown, shining. Seeds obliquely narrowly ovoid, 0.4–0.45 × c. 0.2 mm, apiculate, 16–20-striate, densely reticulate; appendages absent. Fig. 146.

Endemic to New South Wales, Australia. 50: NSW. Around watercourses with variable water levels. Map 512.

50. NEW SOUTH WALES: NW Plains, 24 km W of Wee Waa on Pilliga Rd, *K.L.Wilson 760*, *L.A.S.Johnson & S.W.L.Jacobs* (NSW, PRA).

288. *Juncus filicaulis* Buchenau, *Proc. Linn. Soc. New South Wales* 28: 913 (1904)

T: Australia, New South Wales, Cooma District, road from Nimitybelle [Nimmitabel] to Cooma, Dec 1896, *J.H.Maiden*; lecto: NSW6934, *designated here* by K.L.Wilson; iso: BRI.

Juncus pauciflorus var. *cheesemaniae* Buchenau, *Bot. Jahrb. Syst.* 12: 239 (1890); *Juncus polyanthemus* var. *cheesemaniae* (Buchenau) Buchenau, *Bot. Jahrb. Syst.* 21: 262 (1895). T: Auckland, Purewa, Nov 1878, *T.F.Cheeseman 14*; lecto: K, *fide* E.Edgar, *New Zealand J. Bot.* 2: 188 (1964); iso: AK.

Illustrations: E.Edgar, *New Zealand J. Bot.* 2: 187, fig. 8 (1964); K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 282 (1993).

Perennials, 20–55 cm tall, forming small dense tufts; rhizome creeping, very short-noded. Stem leafless, terete, 0.5–1.2 mm diam., hard, slender, grey-green to blue-green; ridges 10–20, broad, distinct; subepidermal sclerenchyma strands present; pith very finely interrupted, of astericiform cells. Cataphylls few; upper cataphylls 3–5 cm long, ±tight, abaxially dull stramineous-brown above, dark yellow-brown and slightly glossy at base, adaxially silvery to golden brown, slightly glossy. Lower bract 2.5–10 cm long, exceeding or rarely equalling inflorescence; sheath narrow to slightly dilated. Inflorescence pseudolateral, 0.5–1.5 (–3) cm long, usually head-like, sometimes diffuse; flowers numerous, densely clustered. Bracteoles ovate, to c. 1.3 mm long, scarious or often castaneous at base. Tepals lanceolate, 1.8–3 mm long, stramineous-brown, often red-tinged, with ±broad membranous margins; outer tepals acute, ±longer than or equalling inner ones; inner tepals sometimes subobtuse. Stamens 3 (–6); anthers 0.6–0.7 mm long; filaments c. 0.5 mm long; style c. 0.1 mm long; stigmas c. 0.3 mm long. Capsule triseptate, ellipsoid, 2–2.5 mm long, longer than or equalling perianth, obtuse, not or shortly mucronate, golden brown to red-brown near apex. Seeds ellipsoid, 0.4–0.45 × c. 0.2 mm, apiculate, c. 15–20-striate, densely reticulate, pale brown; appendages absent. Fig. 143.

Probably a SE Australia endemic, though perhaps also in WAU. Introduced in New Zealand. 50: NSW, TAS, VIC. 51: NZN, NZS. Wooded and open grassland. Map 513.

50. NEW SOUTH WALES: S Tablelands, The Glen – Tumbarumba, *E.J.McBarron 813* (NSW, PRA); S Tablelands, near Upper Tuross R., *M.D.Tindale 4032* (CANB, NSW, PRA). VICTORIA: East Gippsland, 1.5 km W of Wulgulmerang – Suggan Buggan Rd, *A.C.Beauglehole 33333*, *E.W.Finck & K.C.Rogers* (MEL, NSW, PRA). 51. NEW ZEALAND: Akaroa, 1840–43, *E.F.Raoul 221* (K).

289. *Juncus firmus* L.A.S.Johnson, *Telopea* 5: 311 (1993)

T: New South Wales, North Western Slopes, 41.5 km S of Tamworth on highway, 9 Sep 1985, *K.D.Hill & L.A.S.Johnson 1272*; holo: NSW; iso: CHR, K.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 278 (1993).

Perennials, 55–110 (–135) cm tall, rhizomatous; rhizome very short-noded; stems densely crowded. Stem leafless, terete, 2–5 mm diam., ±hard, blue-green, subglaucous; ridges 45–80, dense, not distinct; dorsal epidermis cells not enlarged; pith continuous or rarely slightly interrupted below, of astericiform cells. Cataphylls few, 9–27 cm long, ±lax, abaxially dull, stramineous-brown to dark yellow-brown distally, dark red-brown or black and slightly glossy at

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base, adaxially silvery to dark golden brown, slightly glossy. Lower bract 12–25 cm long, exceeding inflorescence; sheath ±dilated. Inflorescence pseudolateral, (4–) 9–17 cm long, diffuse; flowers numerous, loosely to densely clustered or solitary. Bracteoles ovate, to c. 1 mm long. Tepals ±lanceolate, stramineous-brown; outer tepals 1.5–2.1 mm long, acute to acuminate, longer than or equalling inner ones, with margins membranous to stramineous, distinct; inner tepals acute to subobtuse and mucronate, broadly bordered. Stamens 3; anthers 0.4–0.7 mm long; filaments 0.4–0.5 mm long; style 0.1–0.2 mm long; stigmas to c. 0.5 mm long. Capsule ±triseptate, ellipsoid to oblong-obovoid, 2.2–2.6 mm long, exceeding perianth, acutish to obtuse, not or shortly mucronate, golden brown, shining. Seeds 0.3–0.5 mm long, ellipsoid, 0.4–0.5 × 0.20–0.25 mm, 12–16-striate, densely reticulate, apiculate; appendages absent. Fig. 138.

An endemic of eastern Australia. 50: NSW, QLD. On basic soils in seasonally wet places, mostly at low altitudes. Map 514.

50. QUEENSLAND: Darling Downs, Jimba, plains of the Condamine, Nov 1843, *F.W.L. Leichhardt* (MEL). NEW SOUTH WALES: North Coast, c. 3 km E of Curricabark, *L.A.S. Johnson, R.G. Coveny & S.W.L. Jacobs 7627* (AD, BRI, CANB, CHR, HO, K, MEL, NSW); Northern Tablelands, S side of Crawney Pass, *K.L. Wilson 855, L.A.S. Johnson & S.W.L. Jacobs* (NSW); Central Tablelands, The Lagoon, S of Bathurst, *E.F. Constable 4765b* (CBG, CHR, K, MEL, NSW); Central Tablelands, 5 km E of Sofala on Razorback Rd., *L.A.S. Johnson 8100* (NSW, PRA); Central Western Slopes, Head of Coulsons Ck, c. 32 km N of Merriwa, *B.G. Briggs & L.A.S. Johnson 3454* (NSW); c. 16 km N of Merriwa, *L.A.S. Johnson 7571 & S.W.L. Jacobs* (NSW).

290. *Juncus flavidus* L.A.S. Johnson, in J.M. Black, *Fl. S. Australia*, 3rd edn, 1: 325 (1978)

T: Oil Tree Lagoon W of Balldale, 10 Mar 1959, *L.A.S. Johnson & E.F. Constable*; holo: NSW48566

Illustration: K.L. Wilson, in G.J. Harden (ed.), *Fl. New South Wales* 4: 281 (1993).

Perennials, 30–120 cm tall; rhizome short- to long-noded. Stem ±tufted, terete, 1.2–3.5 mm in diam., ±hard, yellow-green, ±smooth; ridges 38–90, low, indistinct; dorsal epidermis cells not enlarged; subepidermal sclerenchyma strands present, forming radial lamellae and every second one connected to a small vascular bundle; pith of perfectly astericiform cells, mostly much interrupted. Cataphylls 3–4; upper cataphylls 5–10 cm long, lax, abaxially dull yellow distally, dark golden brown at base, ±glossy only at the very base, adaxially silvery to golden brown. Lower bract 5–30 cm long, longer than inflorescence; sheath narrow. Inflorescence 3–17 cm long, diffuse; flowers numerous, loosely to densely clustered or solitary. Bracteoles 1–1.5 mm long, ±unequal, ovate, acute, partly membranous. Tepals lanceolate, acuminate to subulate, stramineous-brown, occasionally red-tinged with ±broad membranous or yellowish margin gradually narrowing towards the apex; outer tepals 2.2–3.5 mm long, slightly longer than inner. Stamens 3 (–6); anthers 0.8–1.1 mm long; filaments 0.4–0.5 mm long; style c. 0.1–0.2 mm long; stigmas 0.5–1.0 mm long. Capsule triseptate, ellipsoid, 2.0–2.8 mm long, shorter than (occasionally to exceeding) tepals, obtuse, not or shortly mucronate, golden brown. Seeds narrowly ovoid, c. 0.4 × 0.2 mm, apiculate, pale brown, indistinctly 12–15-striate, densely finely reticulate; appendages absent. Fig. 143.

Endemic to the southern part of Australia; introduced in New Zealand. Temporarily introduced in England. 10: gbr. 50: NSW, QLD, SOA, TAS, VIC, WAU. 51: ker, nzn. Temporarily wet sites, along streams, muddy patches, roadsides drains. Map 515.

50. NEW SOUTH WALES: S Far West Plains, between Balranald and Yanga Lake, *L.A.S. Johnson 7984 & K.L. Wilson* (NSW, PRA); SW Slopes, Thurgoona, near Albury, *E.J. McBarron 6011* (CANB, NSW, PRA, QRS); Tocumwal, 1.4 km S along Aratula Rd, *R.G. Coveny 12897, W. Bishop & J. Dalby* (CHR, K, MEL, NSW). SOUTH AUSTRALIA: Thomas Lagoon, 5 Dec 1949, *B.M.B. Millington* (LD). VICTORIA: Melbourne, Tooroong, 8 Nov 1936, *J. Mauritzon* (LD).

291. *Juncus gregiflorus* L.A.S. Johnson, *Contr. New South Wales Natl Herb.* 3: 243 (1963)

T: New South Wales, Mongarlowe River at Northanger, 24. Dec 1961, *B.G. Briggs*; holo: NSW56850; iso: CHR129300.

Illustrations: K.L. Wilson, in G.J. Harden (ed.), *Fl. New South Wales* 4: 280 (1993); L.A.S. Johnson & K.L. Wilson, *Telopea* 9: 400, fig. 1 (2001).

Perennials, 55–160 (–200) cm tall; rhizome c. 5 mm thick, short-noded, forming dense stands. Stem terete, 1–3 (–3.5) mm diam., ±soft, yellow-green to mid-green; ridges 30–65 (–75),

inconspicuous, low; dorsal cells not enlarged; subepidermal sclerenchyma strands present and some connected by short radial lamellae to intermediate-sized vascular bundles; pith of perfectly astericiform cells, interrupted with large lacunae or occasionally continuous above. Cataphylls 3–4; upper cataphylls 4–12 cm long, lax, abaxially yellow-brown and dull distally, dark red-brown and glossy at base, adaxially golden brown with slightly silvery shine. Inflorescence 1–5 cm long, diffuse or rarely head-like; flowers numerous, densely or occasionally loosely clustered in 2–10 pedunculate clusters. Lower bract 5–19 cm long, exceeding inflorescence. Bracteoles ovate, c. 1 mm long, acute, stramineous to membranous. Outer tepals 1.5–2 (–2.5) mm long, slightly longer than inner ones, acute to acuminate, all stramineous-brown with narrow membranous margins. Stamens 3; anthers 0.4–0.5 mm long; filaments 0.5–0.7 mm long; style 0.1–0.2 mm long; stigmas c. 0.5–1.0 mm long. Capsule triseptate, ellipsoid to obovoid, 1.5–2 (–2.3) mm long, equalling or slightly exceeding perianth, obtuse, not or shortly mucronate, golden brown or rarely dark golden brown. Seeds obliquely obovoid, 0.4–0.5 × 0.2 mm, c. 14–18-striate, reticulate, yellow-brown; appendages absent. Fig. 142.

Southern Australia, New Zealand. Temporarily introduced in England. 10: gbr. 50: NSW, TAS, VIC, WAU. 51: CTM, KER, NZN, NZS. 10: grb. Stream margins, swampy places, damp pastures. Map 516.

50. NEW SOUTH WALES: Central Coast, Belmore Falls, 6 km SSW of Robertson, *L.A.S. Johnson 9214* (NSW, PRA). VICTORIA: Melbourne, 5.5 km SW of Marysville, *D.E. Albrecht 1601* (NSW); Otway Range, Aire Valley Rd, *D.E. Albrecht 4692* (NSW, PRA). **51.** NEW ZEALAND NORTH: Hokianga, Nov 1874, *S. Berggren* (LD); Auckland, Nov 1874, *S. Berggren* (LD); Rotorua, Jan 1875, *S. Berggren* (LD). NEW ZEALAND SOUTH: Bluff, Jun 1874, *S. Berggren* (LD).

292. *Juncus edgariae* L.A.S. Johnson & K.L. Wilson, *Teloepa* 9: 399 (2001)

T: New Zealand, South Island, S of Waimakariri R. mouth, 25 May 1960, *E. Edgar 8*; holo: NSW; iso: CHR.

Illustrations: E. Edgar, *New Zealand J. Bot.* 4: 184, fig. 4, 18 (1966), as *J. gregiflorus*; E. Edgar, in L.B. Moore & E. Edgar, *Fl. New Zealand* 2: 60, fig. 13 (1970) as *J. gregiflorus*; L.A.S. Johnson & K.L. Wilson, *Teloepa* 9: 400, fig. 1 (2001).

Perennials, c. 50–120 cm tall; rhizome ±horizontal, stout; stems densely tufted, ±hard (difficult to compress), shining, yellowish green, (0.6–) 1.3–2.5 (–3.0) mm in diam.; pith dense, of astericiform cells, irregularly interrupted with small ±circular to ellipsoid lacunae; ridges 22–65, ±distinct when dry; subepidermal sclerenchyma strands present; epidermis cells ±uniform in size. Cataphylls usually 3–4, with inner ones to 18 cm long, c. 1 cm wide, lax, abaxially yellow-brown to ±brown distally, dull or slightly glossy, dark glossy (reddish) brown at base, adaxially silvery golden (pale) brown. Lower bract erect, (6–) 10–18 (–21) cm long, much exceeding inflorescence; sheath not inflated, ±narrow. Inflorescence 2–6 cm long, diffuse, with densely clustered flowers; flowers 3–20 per subglobose cluster and (1–) 3–12 (–20) clusters per inflorescence. Tepals subequal, stramineous to greenish stramineous-brown, sometimes tinged red-brown; outer tepals slightly longer, acute, (1.7–) 2.1–2.5 (–2.6) mm long, with margins narrow; inner tepals acute to subobtuse, with broad membranous margins. Stamens 3; anthers c. 0.4–0.6 mm long; filaments c. 0.5–0.7 mm long; style 0.1–0.3 mm long; stigmas c. 0.5–1.0 mm long. Capsule ±trilocular to imperfectly so, narrowly oblong-ovoid to ellipsoid, c. 2 mm long, obtuse, minutely mucronate, golden brown to pale castaneous-brown, equalling or slightly shorter than perianth. Seeds pale brown, obliquely ellipsoid, apiculate, 0.4–0.5 (–0.6) × c. 0.2–0.25 mm, c. 12–16-striate, reticulate; appendages absent. Fig. 142.

Known from New Zealand, Stewart Is., Chatham Is. and Kermadec Is., temporary introduction reported from England. In the literature often referred to as *J. gregiflorus*. 10: grb. 51: CTM, KER, NZN, NZS. Damp, usually disturbed open sites, pastures, margins of swamps, from sea level to c. 1000 m. Map 517.

10. GREAT BRITAIN: Wyboston, Eaton, 11 Jul 1948, *Dony* (K). **51.** CHATHAM IS.: Chatham Islands, Apr 1967, *Burke* (WELTU). KERMADEC IS.: Raoul Is., Blue Lake, *W.R. Sykes 1222K* (CHR). NEW ZEALAND NORTH: Northland, Awanui, *L.A.S. Johnson 7499* (CHR, NSW, PRA); Manukau Co., ESE of Clevedon, *A.E. Orchard* (AK, K, NSW); Bunnythorpe, 6 Mar 1930, *V.D. Zotov s.n.* (CHR, NSW). NEW ZEALAND SOUTH: Lincoln, *E. Edgar 18* (CHR, NSW); Onehunga, *A. Sinclair 803* (NSW, PRA); Lake Wanaka, Glenhu Bay, 11 Feb 1966, *B.G. Briggs* (CHR, NSW).

JUNCACEAE (*Juncus*)

Juncus edgariae is similar to *J. gregiflorus* of Australia and *J. durus* of New Guinea. It differs from both in having a more conspicuous stem striation and narrower capsule shape. While *J. edgariae* has pith lacunae small, usually circular to ellipsoid, *J. durus* is characterized by elongated, large lacunae, and *J. gregiflorus* has pith reduced to septa-like plates.

293. *Juncus pauciflorus* R.Br., *Prodr.* 1: 259 (1810)

T: Van Diemen's Land [Tasmania] and Port Jackson [label meant as a description of the distribution], *R.Brown [Bennett 5787]*; syn: BM; Van Diemen's Land, *R.Brown [Bennett 5788]*; syn: BM.

Juncus gunnii Hook.f., *Fl. Tasm.* 2: 67 (1858); *Juncus pauciflorus* var. *gunnii* (Hook.f.) Buchenau, *Bot. Jahrb. Syst.* 12: 239 (1890). T: Tasmania, *R.Gunn 973/1837*; lecto: K, designated here by K.L.Wilson; iso: UPS.

Illustrations: E.Edgar, *New Zealand J. Bot.* 2: 181, fig. 3 (1964); K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 283 (1993).

Perennials, 20–70 (–100) cm tall, ±caespitose; rhizome short-noded, slender. Stems densely tufted, leafless, slender, terete, 0.5–1.7 (–2.5) mm in diam., soft, often ±decumbent from base, mid-green, shining; ridges 17–40, broad, not very distinct; subepidermal sclerenchyma strands present, some connected to small vascular bundles; epidermis cells uniform; pith continuous, of perfectly astericiform cells. Cataphylls few, 1.5–7 cm long, with awn-like rudiment of blade, tight, abaxially reddish brown distally, dark red-brown or black and glossy at base, adaxially silvery to golden brown. Lower bract 6–15 (–32) cm long, exceeding inflorescence; lower bract sheath slightly dilated. Inflorescence 2–5 (–10) cm long, diffuse with ±curved branches; flowers numerous, solitary. Bracteoles triangular-ovate, to c. 1 mm long, scarious to brownish-scarious. Tepals equal to subequal, linear-lanceolate, acute, stramineous-brown, often tinged red-brown, with narrow membranous margins; outer tepals 2.0–3.0 mm long, carinate, longer than or equalling inner ones; inner tepals also carinate. Stamens (4–) 6; anthers c. 0.4–0.9 mm long; filaments c. 0.4–0.6 mm long; style c. 0.1 mm long; stigmas c. 0.3 mm long. Capsule unilocular, triseptate, ellipsoid to obovoid, 2–2.5 (–3.3) mm long, exceeding perianth, slightly trigonous, acutish to obtuse, not or shortly mucronate, golden brown, often red-brown near apex. Seeds ovoid, c. 0.5 × c. 0.3 mm, pale brown, apiculate, c. 15–20-striate, densely reticulate; appendages absent. 2n = 40, *fide* B.G.Briggs, unpublished [voucher: NSW90683]. Fig. 146.

Australia, New Zealand. Introduced in South Africa. 27: cpp. 50: QLD, SOA, TAS, VIC, WAU. 51: NZN, NZS. Various moist, often shady places. Map 518.

27. CAPE PROVINCES: Eastern Cape, Amatole Mtns, N of Elandsberg, *P.B.Phillipson 812* (S). 50. NEW SOUTH WALES: South Coast, Kiah (Towamba) R., NE of Kiah, *S.W.L.Jacobs 2926* (NSW, PRA). TASMANIA: Warners Landing Rd at Kelly Basin turnoff, *K.D.Hill 1494*, *L.A.S.Johnson & D.F.Blaxell* (NSW, PRA); West Coast, Balfour, *A.Moscal 4796* (HO, NSW, PRA). 51. NEW ZEALAND NORTH: Taheke, Nov 1874, *S.Berggren* (LD); Otaua, Hokianga, Nov 1874, *S.Berggren* (LD).

294. *Juncus ingens* N.A.Wakef., *Vict. Nat.* 73: 211 (1957)

T: Australia, Victoria, 1 mile [1.6 km] W of Rosedale, swamp between Princess Highway and Latrobe River, 22 Jan 1957, *N.A.Wakefield 4835*; holotype: MEL; iso: K, NSW.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 284 (1993).

Perennials, 140–460 cm tall, dioecious, densely caespitose; rhizome short-noded. Stem leafless, terete, 4–9 mm diam., hard below, softer above, mid-green; ridges 100–200, dense, indistinct; dorsal epidermis cells not enlarged; pith interrupted, sometimes continuous above, of astericiform cells. Cataphylls few, lax, abaxially dull pale to dark yellow-brown distally, deep castaneous-brown to dark red-brown or black and glossy at base, adaxially golden brown to silvery stramineous. Inflorescence 7–30 mm long, diffuse; flowers numerous, solitary or loosely clustered. Lower bract 20–60 cm long, exceeding inflorescence. Tepals subequal, lanceolate, stramineous-brown, occasionally red-tinged, with ±broad membranous or yellowish margins; outer tepals 1.5–2.5 mm long, longer than or occasionally equalling inner ones; inner tepals often subacute, with distally broader scarious margin. Stamens 6; anthers 0.6–0.8 mm long; filaments c. 0.3 mm long; female flowers with 6 staminodes; style c. 0.1–0.2 mm long; stigmas to 1.5 mm long. Capsule triseptate, ellipsoid to obovoid, c. 1.8–2.2 mm, usually exceeding or less often equalling perianth, obtuse, not or shortly

mucronate, dark golden brown. Seeds ovoid, c. 0.5–0.6 × 0.30–0.35 mm, minutely apiculate, faintly striate, densely reticulate, pale brown; appendages absent. Fig. 146.

Endemic to SE Australia. 50: NSW, VIC. Margins of semi-permanent water bodies, floodplains, lagoons. Map 519.

50. NEW SOUTH WALES: SW Slopes, Albury, Doctor's Point, *E.J.McBarron 6044* [female] (NSW, PRA); SW Plains, Gulpa Ck, E of Mathoura, *S.W.L.Jacobs 3257* [female] (NSW, PRA); Bartam, *R.A.Williamson 10* [male] (NSW). VICTORIA: Bonegilla, Kiewa River flats, *K.Harley 5836bis* (NSW); East Gippsland, Brodribb R., *N.A.Wakefield 5881* (MEL, NSW); Barnawatha North, Murray R., *K.Harley 5835* (NSW).

295. *Juncus laeviusculus* L.A.S.Johnson, in M.R.Banks & al., *Asp. Tasman. Bot. Trib. W. Curtis* 38 (1991)

T: New South Wales, Dawsons Springs, Mt Kaputar National Park, 30°17' S, 150°10' E, 1350 m, 17 Nov 1976, *R.G.Coveny & Roy 8697*; holo: NSW; iso: CHR.

Perennials, 35–165 (–210) cm tall, rhizomatous; rhizome stout, creeping; stems in dense rows. Stem leafless, terete, almost smooth, 1.5–5 mm diam., ±hard; ridges 25–90, indistinct; epidermis cells almost uniform; subepidermal sclerenchyma strands present, forming radial lamellae; pith of astericiform cells, continuous or interrupted at least in part of the stem. Cataphylls few, lax, abaxially yellow-brown to red-brown or blackish at base, adaxially golden brown to coppery. Lower bract 3–16 cm long, shorter than or exceeding inflorescence; sheath narrow. Inflorescence pseudolateral, 2.5–10 cm long, diffuse; flowers numerous, small, solitary or loosely clustered. Bracteoles ovate, c. 1 mm long, scarious to stramineous. Tepals lanceolate, acute, stramineous-brown, occasionally with darker tinge, with very narrow to broad membranous margins; outer tepals 1.4–2.5 mm long, longer than or equalling inner ones. Stamens 3. Capsule triseptate, obovoid to ellipsoid, 2–2.2 mm long, exceeding or equalling tepals, obtuse, not or shortly mucronate, golden brown. Seeds ±ellipsoid, c. 0.5–0.6 × c. 0.2–0.3 mm, apiculate, 15–20-striate, densely reticulate, pale brown; appendages absent.

Coastal areas of New South Wales. Moist forest on soils of moderate or high fertility. Two subspecies are recognized.

Cortical air-spaces in stem well developed; small isolated sclerenchyma strands numerous; pith usually interrupted

295a. subsp. **laeviusculus**

Cortical air-spaces in stem absent or few; small isolated sclerenchyma strands absent or few; pith continuous or slightly interrupted

295b. subsp. **illawarrensis**

295a. *Juncus laeviusculus* L.A.S.Johnson subsp. **laeviusculus**

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 277 (1993).

Stem with 25–90 ridges, well developed cortical air-spaces and numerous small sclerenchyma strands. Pith interrupted or rarely continuous. Cataphylls 3–13 cm long, lax, abaxially dull and ±dark yellow-brown distally, dark red-brown to blackish and dull at base. Lower bract usually longer than or equalling inflorescence. Tepals acute; outer tepals 1.7–2.1 mm long. Anthers 0.6–0.7 mm long; filaments c. 0.5 mm long; style c. 0.1 mm long; stigmas c. 0.5 mm long. Fig. 138.

Australia: Northern and Central Tablelands, New South Wales. 50: NSW. Map 520.

50. NEW SOUTH WALES: Northern Tablelands, Mt Sparrowby, 12 miles ENE of Deepwater, *E.F.Constable 7054* (NSW); Swamp Trail, Butterleaf State Forest, *D.Binns 1441* (NSW, PRA); Mt Lindesay, Mt Kaputar National Park, 38 km ENE of Narrabri, *R.G.Coveny & Roy 9860* (NSW); Point Lookout, 45 miles ENE of Armidale, 31 Jan 1941, *C.Davis* (NSW); 5 km N of Careys Peak, Barrington Tops, *J.Pickard 1907* (NSW); Central Tablelands, Running Stream, Mt. Vincent road, 0.5 km from Running Stream post office, *L.A.S.Johnson & S.W.L.Jacobs 7583* (NSW); Mt Horrible, NE of Bathurst, *Ingram 401* (NSW); Waterfall Gully, Mt Wilson, *L.A.S.Johnson & S.W.L.Jacobs 7585* (NSW); Mt Werong, *R.H.Cambage 3170* (NSW).

295b. *Juncus laeviusculus* subsp. **illawarrensis** L.A.S.Johnson, in M.R.Banks & al., *Asp. Tasman. Bot. Trib. W. Curtis* 40 (1991)

T: Meryla Pass, about 5 miles east of Bundanoon, 1200 ft, New South Wales, 7 Feb 1960, *B.G.Briggs*; holo: NSW49101.

JUNCACEAE (*Juncus*)

Stem with 35–80 coarse ridges, no or few air-spaces and few small sclerenchyma strands. Pith continuous or slightly interrupted. Cataphylls 9–21 cm long, abaxially dull dark yellow-brown distally, dark red-brown and ±glossy at base, adaxially ±golden brown. Basal bract usually shorter than or equalling inflorescence. Tepals acute or outer ones acuminate, occasionally with dark tinges. Anthers c. 0.4–0.5 mm long; filaments 0.5–0.7 mm long; style c. 0.1–0.2 mm long; stigmas c. 0.5 mm long.

Australia: eastern edge of southern part of Central Tablelands, northern part of Southern Tablelands, and adjoining parts of the coast ranges, New South Wales. 50: NSW. Map 521.

50. NEW SOUTH WALES: Central Coast, Macquarie Falls, west of Albion Park, *L.A.S.Johnson & al.* 7601 (NSW); Illawarra escarpment, 3 km N of Broughton village, *V.Klaphake* 1005 (NSW); Carrington Falls, E of Moss Vale, *E.F.Constable* 6266 (NSW); Jamberoo Pass, 5.6 km WSW of Jamberoo, *R.G.Coveny* 7343 (CHR, K, NSW); Central Tablelands, Burrawang Railway Station, at edge of Wingecarribee Swamp, *L.A.S.Johnson* 8014 (NSW, PRA); 2 km SW of Wildes Meadow, *L.A.S.Johnson* 8356 (CHR, K, NSW); Bundanoon to Glow Worm Glen, 18 Nov 1952, *M.D.Tindale* (NSW); Southern Tablelands, Sassafras, *L.A.S.Johnson* 8034 (NSW); Endrick River Bridge, c. 7 km E of Nerriga on Nerriga – Nowra road, 27 Oct 1957, *E.F.Constable* (NSW).

296. *Juncus mollis* L.A.S.Johnson, *Telopea* 5: 311 (1993)

T: New South Wales, Central Coast, 1 mile W of Warnervale, 12 Apr 1964, *L.A.S.Johnson*; holo: NSW; iso: BRI, CHR, K.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 279 (1993).

Perennials, 100–175 cm tall; rhizome stout, creeping, short-noded; stems in dense groups. Stem leafless, terete, 2–4 mm diam., soft, mid-green; ridges 38–70, not distinct, slightly prominent; dorsal cells not enlarged; pith very interrupted, of astericiform cells. Cataphylls few, 14–27 cm long, tight, abaxially yellow-brown and ±dull distally, deep pink-brown to blackish and slightly glossy or not so at base, adaxially silvery to coppery. Lower bract 15–30 cm long, exceeding inflorescence; sheath narrow to slightly dilated. Inflorescence 7–15 cm long, diffuse; flowers numerous, solitary to loosely clustered. Bracteoles ovate, to c. 0.7 mm long, scarious. Outer tepals 1.7–2.2 mm long, longer than or equalling inner ones, all acute or outer ones acuminate, stramineous-brown with broad membranous margins. Stamens 3 (–6); anthers 0.4–0.7 mm long, usually equalling or longer than 0.4–0.5 mm filaments; style c. 0.1 mm long; stigmas to c. 0.5 mm long. Capsule triseptate, ovoid to obovoid, 1.9–2.3 mm long, exceeding perianth, obtuse, not or shortly mucronate, light to dark golden brown. Seeds 0.4–0.6 × 0.2–0.25 mm, apiculate, pale brown, striate and reticulate; appendages absent. Fig. 141.

Endemic to southeastern Australia. 50: NSW. Seasonally dry areas in swamp-forests, especially *Melaleuca* swamps, rarely in clearings in such forests. Map 522.

50. NEW SOUTH WALES: North Coast, 2 km W of Wauchope, *L.A.S.Johnson* 8305 (CHR, K, NSW); Rhondda to Barnsley, *L.A.S.Johnson s.n.* (BRI, K, NSW48997, PRA); South Coast, 7 km by road SE of Bodalla, *R.G.Coveny* 7317 (CHR, K, MEL, NSW); Central Coast, 8 km SE of Gosford, *B.G.Briggs s.n.* (NSW75068, PRA).

297. *Juncus ochrocoleus* L.A.S.Johnson, *Telopea* 5: 312 (1993)

T: New South Wales, North Western Slopes, 1 km SW of Binnaway, 26 Feb 1973, *L.A.S.Johnson & A.Johnson* 7578; holo: NSW; iso: K, MEL.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 282 (1993).

Perennials, 40–110 cm tall, rhizomatous; rhizome stout, creeping, very short-noded; stems densely crowded. Stem leafless, terete, 1.5–3 mm diam., ±hard, yellow-green; ridges 20–52, not very distinct; dorsal epidermis cells not enlarged; pith finely interrupted, of astericiform cells. Cataphylls few, 7–15 cm long, ±lax, abaxially pale yellow to pale golden brown, adaxially silvery to golden brown. Lower bract 7–26 cm long, exceeding to occasionally shorter than inflorescence; sheath narrow, slightly constricted below inflorescence. Inflorescence 6–15 cm long, diffuse; flowers numerous, solitary. Bracteoles ovate, to c. 0.7 mm long, scarious to stramineous. Outer tepals 1.5–2.1 mm long, acute to acuminate, longer than or equalling inner ones, all acute or outer ones acuminate, stramineous-brown; inner tepals with broad outer ±narrow membranous margins. Stamens (3–) 4–6; anthers 0.5–0.8 mm long,

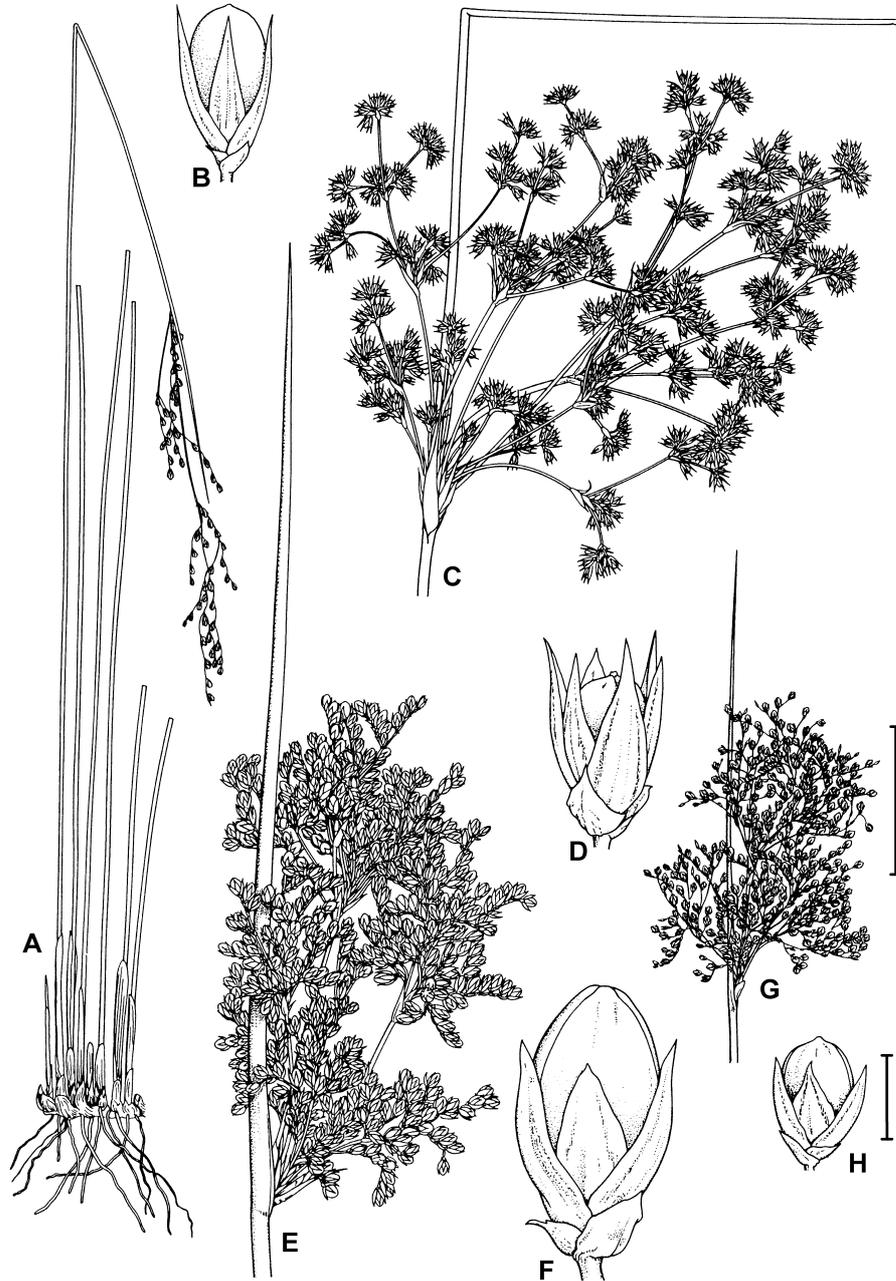


Figure 144. *Juncus remotiflorus*. **A**, habit; **B**, perianth with capsule (**A**, **B**, E.F.Constable, NSW46213). *Juncus vaginatus*. **C**, inflorescence; **D**, perianth with capsule (**C**, **D**, J.L.Boorman 6827, NSW). *Juncus pallidus*. **E**, perianth with capsule; **F**, inflorescence (**E**, **F**, A.E.Orchard & A.C.Beaglehole 30438, NSW). *Juncus ochrocoleus*. **G**, inflorescence; **H**, perianth with capsule (**G**, **H**, L.A.S.Johnson, NSW53833). Scale bars: **A** = 2 cm; **B**, **D**, **F**, **H** = 1 mm; **C**, **E**, **G** = 2 cm. Drawn by D.Mackay. Reproduced with permission of the authorities of Royal Botanic Gardens, Sydney.

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equalling or longer than filaments c. 0.3–0.4 mm long; style 0.1 mm long; stigmas 0.3–0.5 mm long. Capsule triseptate, ellipsoid, 2.0–2.5 mm long, exceeding perianth, obtuse, not or shortly mucronate, golden brown, shining. Seeds ovoid, 0.3–0.4 × c. 0.2 mm, apiculate, pale brown, c. 14–18-striate, densely reticulate; appendages absent. Fig. 144.

Endemic to eastern Australia; temporarily introduced in Great Britain. 10: grb. 50: NSW, QLD. Seasonally wet places, mostly on sandy soils. Map 523.

50. QUEENSLAND: Burnett, 13 km N of Eidsvold, *L.A.S.Johnson & B.G.Briggs 7135* (NSW); Darling Downs, Owens Scrub Road, 6 km NW of Leyburn towards Yandilla, *K.L.Wilson 4227* (BRI, NSW). NEW SOUTH WALES: Central Coast, Howes Valley, near Howes Valley P.O., Nov 1965, *L.A.S.Johnson* (NSW); Northern Tablelands, 8.1 km by road NE of Tenterfield towards Clifton on Bruxner Highway, *R.G.Coveny & P.D.Hind 6667* (BRI, CANB, CHR, K, L, NSW); Central Western Slopes, Gundibri, 20 miles W of Aberdeen, Hunter Valley, *Story 6978* (NSW); Central Western Slopes, Hannahs Bridge, *L.A.S.Johnson s.n.* (NSW, PRA); North Western Plains, SW outskirts of Narrabri, Dec 1961, *E.F.Constable* (NSW); NW Slopes, 29 km NE of Coonabarabran, *B.G.Briggs s.n.* (NSW, PRA).

298. *Juncus pallidus* R.Br., *Prodr.* 1: 258 (1810)

T: [Australia] M [Ora Meridionalis], King George's Sound, *R.Brown*; syn: BM, K, NSW.

Juncus macrostigma Colenso, *Trans. & Proc. New Zealand Inst.* 17: 253 (1885). T: Side of watercourses, Seventy-mile Bush, between Norsewood and Matamau, County of Waipawa, 1882, *W.C.Colenso*; lecto: WELT11238, *vide* L.B.Moore & E.Edgar, *Fl. New Zealand* 2: 61 (1975); iso: AK2919, K.

Illustrations: E.Edgar, *New Zealand J. Bot.* 2: 181, fig. 1 (1964); K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 283 (1993).

Perennials, 75–170 cm tall; rhizome creeping, very short-noded, 5–10 mm in diam. Stems densely tufted, leafless, terete, 2.5–5.5 (–8) mm diam., hard, smooth, mid-green; ridges 45–90, inconspicuous; subepidermal sclerenchyma strands present, with some connected to small vascular bundles; epidermis cells uniform; pith continuous, of perfectly astericiform cells. Cataphylls 3–4, lax; upper cataphylls 12–25 cm long, with long thin mucro, abaxially pale yellow to very dark yellow-brown distally, to dark red-brown and ±glossy at base, adaxially silvery to golden brown. Lower bract 6–35 cm long, exceeding or rarely equalling inflorescence, with narrow to slightly dilated sheath. Inflorescence pseudolateral, diffuse, 6–18 cm long; flowers numerous, bracteolate, loosely to densely clustered or solitary. Bracteoles ovate, c. 1 mm long, obtuse, scarious to pale stramineous. Tepals 2.5–3.5 mm long, equal or outer ones longer, lanceolate, acuminate or inner ones acute, stramineous-brown, with narrow membranous or pale yellow margins. Stamens 6; anthers 0.7–1.2 mm long; filaments 0.4–0.8 mm long; style very short; stigmas c. 1–2 mm long. Capsule triseptate, ellipsoid to obovoid, 2.8–3.5 mm long, usually conspicuously exceeding or rarely equalling perianth, rounded trigonous, acute to obtuse, not or shortly mucronate, golden brown. Seeds obliquely ellipsoid-obovoid, c. 0.5 × 0.25 mm, apiculate, conspicuously c. 16–22-striate, reticulate, pale brown; appendages absent. Fig. 144.

Native in Australia and New Zealand, temporarily introduced in Europe, probably a casual introduction elsewhere. 10: grb. 50: NSW, TAS, VIC, SOA, WAU. 51: CTM, NZN, NZS. Oligotrophic, wet sandy soils; in situations with suppressed competition. Map 524.

50. SOUTH AUSTRALIA: Mount Compass, 28 Dec 1937, *Arnold* (LD). NEW SOUTH WALES: South Coast, Wallaga Lake, 7.5 km NNW of Bermagui, *R.G.Coveny 6194, P.D.Hind & R.Hancock* (CHR, K, NSW, PRA); Central Coast, Padstow, Upper Salt Pan Ck, 9 Mar 1993, *C.Gibson & R.Miller s.n.* (NSW, PRA). VICTORIA: Frankstone, 3 Nov 1936, *J.Mauritzon* (LD).

299. *Juncus phaeanthus* L.A.S.Johnson, *Teloepa* 5: 313 (1993)

T: New South Wales, Southern Tablelands, Diggers Creek, Kosciusko Plateau, 4950 ft, 17 May 1976, *L.A.S.Johnson 8280*; holo: NSW; iso: CANB, K.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 283 (1993).

Perennials, 35–120 cm tall, rhizomatous. Rhizome creeping, short-noded; stems in ±irregular ±dense rows. Stem leafless, terete, 2–3 mm diam., ±hard, mid-green to bright green; ridges 35–60, prominent; dorsal epidermis cells not enlarged; pith of astericiform cells, continuous

or occasionally partly with small lacunae. Cataphylls few, usually 2–3 (–4); upper cataphylls 5–15 cm long, ±lax, abaxially dull yellow distally, dull dark orange-brown at base, adaxially silvery to golden brown. Lower bract 4–20 cm long, exceeding inflorescence; sheath narrow. Inflorescence 2–10 cm long, conspicuously reddish, usually in a single many-flowered lobate congested head, when diffuse then in 2–6 dense many-flowered glomerules, with some subsessile and others on c. 1 mm thick rigid peduncles. Bracteoles ovate, c. 1 mm long, castaneous-brownish to scarious. Tepals lanceolate, acute; central band stramineous-brown with red-brown sides; outer tepals 2–3 mm long, longer than inner ones, with narrow membranous margins; inner tepals with ±broad membranous margins. Stamens 3 (–5); anthers 0.4–0.6 mm long, equalling or shorter than c. 0.5–0.7 mm filaments; style c. 0.1–0.2 mm long; stigmas to c. 0.7 mm long. Capsule triseptate, ellipsoid, c. 2.2–3.0 mm long, exceeding or equalling perianth, acutish to obtuse, not or shortly mucronate, ±dark red-brown or occasionally dark golden brown. Seeds narrowly ovoid, 0.4–0.5 × 0.2–0.25 mm, 16–20-striate, densely reticulate, distinctly apiculate; apices often pale, to 0.1 mm long; appendages absent. Fig. 146.

Endemic to SE Australia. 50: NSW, VIC. Various wet places, mostly above 1200 m. Map 525.

50. NEW SOUTH WALES: Northern Tablelands, 1 km W of Oakey Creek, between Wollomombi and Jeogla, c. 65 km ESE of Armidale, *B.G.Briggs & L.A.S.Johnson 3234* (NSW); Central Tablelands, Boyd River Fire Trail, c. 3 km W of Kanagra Walls road towards Morong Ck crossing, *K.L.Wilson 1705* (NSW); Konangaroo Main Rge, Roly Whalans Swamp, *L.A.S.Johnson* (NSW, PRA); Southern Tablelands, Kosciusko National Park, Rennex Gap, *J.Thompson 3094* (NSW, PRA). VICTORIA: Eastern Highlands, NE of Lambs Gap, E of Maroka Hut, Maroka Rge, c. 10 km E of Mt Wellington, *A.C.Beauglehole 43485* (MEL, NSW); Snowfields, Dinner Plain, 11 km SE of Mt Hotham, *K.L.Wilson 2083* (CHR, K, L, MEL, NSW); East Gippsland, Back Creek, near Bendoc, *N.A.Wakefield 3065* (NSW).

Distinct in having prominent stem striations and reddish colour of the inflorescence. It differs from *Juncus vaginatus* in softer stems (often twisted) and larger clusters in the inflorescence.

300. *Juncus polyanthemus* Buchenau, *Bot. Jahrb. Syst.* 20: 261 (1895)

T: Queensland, Rockhampton, *W.Armstrong*; lecto: MEL, designated here by K.L.Wilson.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 279 (1993).

Perennials, 75–145 cm tall; rhizome creeping, short-noded; stems in dense groups. Stem leafless, terete, 2–4.5 mm diam., ±soft to firm, grey-green, glaucous; ridges 40–100, indistinct; dorsal cells not enlarged; pith interrupted but often continuous above, of astericiform cells. Cataphylls few, usually 3–4, to c. 30 cm long, ±lax, abaxially dull pale stramineous-brown to golden brown distally, dark castaneous-brown and glossy at base, adaxially stramineous-silvery to golden brown or coppery. Lower bract 10–32 cm long, exceeding inflorescence; sheath narrow or slightly dilated. Inflorescence 3–10 cm long, diffuse; flowers numerous, solitary or occasionally loosely clustered. Bracteoles ovate, to c. 0.7 mm long, scarious. Tepals lanceolate, stramineous-brown with broad membranous margins; outer tepals 1.7–2.3 mm long, longer than or equalling inner ones, acute with ±inrolled apex (and thus subulate); inner tepals obtuse or almost auriculate, sometimes mucronate, later ±subacute. Stamens 3 (–6); anthers c. 0.6–0.8 mm long; filaments c. 0.5 mm long; style 0.1 mm long; stigmas to c. 0.5 mm long. Capsule triseptate, ellipsoid, 1.8–2.5 mm long, exceeding or ±equalling perianth, obtuse, not or shortly mucronate, golden brown. Seeds ellipsoid-ovoid, c. 0.4–0.5 × c. 0.2 mm, apiculate, 16–20-striate, densely reticulate, pale brown; appendages absent. Fig. 141.

East Australia, New Caledonia. An isolated record from Western Australia. 50: NSW, QLD, WAU. 60: NWC. Coastal swamps, wet pastures. Map 526.

50. NEW SOUTH WALES: North Coast, 6.5 km N of Paterson near Mindaribba, 1 Nov 1968, *L.A.S.Johnson s.n.* (NSW, PRA); Central Coast, 0.8 km N of Dora Ck, *R.G.Coveny 6473 & J.Powell* (NSW); Central Coast, 1 km W of Doonside, *V.Klaphake 1198* (NSW). QUEENSLAND: Darling Downs, 4 km E of Maidenwell, *L.A.S.Johnson 8565 & K.L.Wilson* (NSW); Port Curtis, c. 14 km SE of Rockhampton, 5 May 1981, *L.A.S.Johnson 8654* (BRI, NSW, PRA). 60. NEW CALEDONIA: Vallée de Thy, Mt. Koghi, *A.S.McKee 3209* (NSW).

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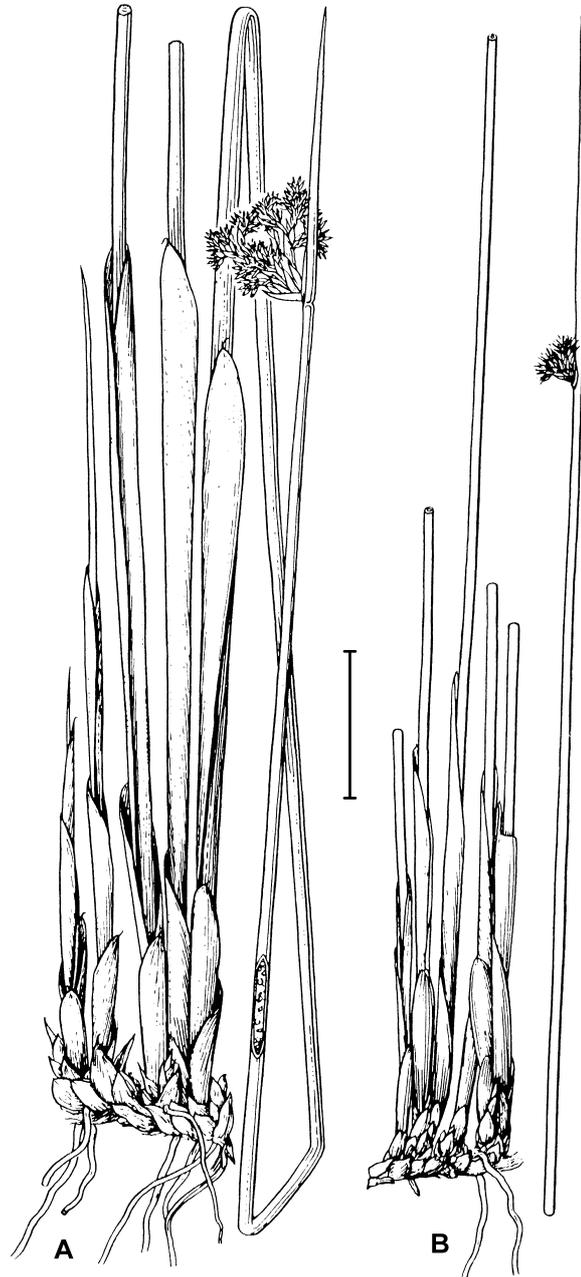


Figure 145. *Juncus procerus*. **A**, habit (**A**, E.Asplund 17758, S). *Juncus balticus* subsp. *andicola*. **B**, habit. (**B**, E.Asplund 8455, S). Scale bar: **A**, **B** = 5 cm. Drawn by K.Tind. Reproduced with permission from H.Balslev, *Fl. Neotrop. Monogr.* 68: 89, fig. 44 (1996), © 1996, The New York Botanical Garden.

301. *Juncus procerus* E.Mey., *Linnaea* 3: 367 (1828)

T: Chile, *A. Chamisso s.n.*; syn: LE, W.

Juncus valdiviae Steud., *Syn. Pl. Glumac.* 2: 296 (1855). T: Chile, Valdivia, *R.A. Philippi* 43; holo: P; iso: G, GOET, K, MO, O, P, S.

Juncus pallidus var. *triandrus* Cheeseman, *Man. N. Zeal. Fl.*, 2nd edn, 293 (1925). T: New Zealand, Auckland, St. John's College, Dec. 1883, *T.F. Cheeseman*; lecto: AK2995, *fide* E. Edgar, *New Zealand J. Bot.* 2: 182 (1964); iso: CHR293209.

Illustrations: F. Buchenau, *Junc. S. Amer.*, tab. 3 (1879); M. Barros, *Darwiniana* 10: 387, fig. 35 (1953); E. Edgar, *New Zealand J. Bot.* 2: 181, fig. 2 (1964); K. L. Wilson, in G. J. Harden (ed.), *Fl. New South Wales* 4: 279 (1993); H. Balslev, *Fl. Neotrop. Monogr.* 68: 89, fig. 44, B (1996).

Map: H. Balslev, *Fl. Neotrop. Monogr.* 68: 93, fig. 46 (1996) [Neotropical region].

Perennials, 60–165 cm tall, densely caespitose; rhizome creeping, very short-noded, 4–8 mm diam. Stem leafless, terete, (1–) 4–10 mm diam., ±soft, mid-green; ridges 65–160, ±indistinct; dorsal cells ±not enlarged; subepidermal sclerenchyma strands present, forming radial lamellae; pith of astericiform cells, interrupted with large lacunae. Cataphylls 2–4, lax; upper cataphylls to 20 cm long, with awn-like blade to 3 mm long, abaxially dull pale brown distally, dark red-brown to black and slightly glossy at base, adaxially pale golden brown to coppery, ±glossy. Lower bract (5–) 9–19 cm long, exceeding or rarely shorter than inflorescence, usually slightly dilated and abruptly constricted below the inflorescence. Inflorescence pseudolateral, 4–13 cm long, diffuse or subcongested; flowers numerous, loosely to densely clustered. Bracteoles broadly ovate, c. 1–1.3 mm long, scarious-stramineous. Tepals lanceolate; outer tepals 2–3 mm long, longer than or equalling inner ones, acute, stramineous-brown, membranous margins absent in S American but developed in Australian material; inner tepals subacute or obtuse and mucronate. Stamens 3; anthers 0.5–0.7 mm long, equalling c. 0.5–0.6 mm filaments; style c. 0.2 mm long; stigmas c. 0.5 mm long. Capsule triseptate, ellipsoid, 2–2.5 mm long, slightly shorter than or equalling perianth, obtuse, not or shortly mucronate, golden brown, often darker at apex. Seeds 0.4–0.5 × c. 0.2 mm, obliquely oblong, finely reticulate, yellow-brown. Fig. 141 [Australian], 145 [South American].

SE and W Australia, New Zealand, S Chile, S Argentina, temporarily introduced in Europe. 10: gbr. 50: NSW, SOA, TAS, VIC, WAU. 51: NZN, NZS. 83: ECU. 85: AGS, CLC, CLS, JNF. Various moist habitats. Map 527.

50. NEW SOUTH WALES: Central Tablelands, Morong Ck, S of Boyd Crossing, *V. Klaphake* 984 (NSW, PRA). VICTORIA: East Gippsland, 6 km from Princess Highway on Corringale Beach Rd., *K.L. Wilson* 2169 (MEL, NSW, PRA). **83.** ECUADOR: Azuay, Totoraco-cha-Mazan valley, *P.M. Ramsay & Merrow* 704 (QCA); Azuay, 3 km N of Tarqui, 2700 m, *H. Balslev* 1218 (AAU, CAS, NY, QCA); Canar, Tipococho, 3200 m, *C.W. Penland & R.H. Summers* 1026 (F, GH); Canar, near Azoguez, *J.N. Rose* 22779 (GH, NY, US); Loja, Zamora-Huiaco E of Loja, 2600–2800 m, *M. Acosta-Solis* 20530 (US); Loja, Yangana – Zumba rd, km 15–20, on N slope of Cordillera de Sabanilla, 2550 m, *H. Balslev* 1273 (AAU, NY, QCA). **85.** JUAN FERNÁNDEZ IS: Masatierra, Pto Ingles, Condu Central, 2–300 m, *C. Skottsberg* 312 (GB, LD).

There are some differences between the S American and Australasian material; further study is needed.

302. *Juncus psammophilus* L.A.S. Johnson, *Telopea* 5: 314 (1993)

T: New South Wales, North Western Plains, Werah Creek, Wee Waa to Cuttabri, 19 Dec 1966, *L.A.S. Johnson s.n.*; holo: NSW94671; iso: BRI, CANB, CHR, K.

Illustration: K. L. Wilson, in G. J. Harden (ed.), *Fl. New South Wales* 4: 281 (1993).

Perennials, 75–155 cm tall, dioecious; rhizome very short-noded; stems densely tufted. Stem leafless, terete, 1.5–3 mm diam., ±soft, yellow-green; ridges 35–60, not very distinct; dorsal cells not enlarged; stomata sunken; pith continuous above, often interrupted below, of astericiform cells. Cataphylls usually 3; upper cataphylls 12–28 cm long, lax, abaxially dull dark stramineous, dark yellow-brown or occasionally dark red-brown and glossy at base, adaxially golden brown, ±glossy. Lower bract 8–32 cm long, exceeding inflorescence; sheath slightly dilated. Inflorescence 5–10 cm long, diffuse; flowers numerous, solitary. Bracteoles narrowly ovate, to c. 0.7 mm long, scarious-stramineous. Outer tepals 1.5–2.5 mm long, longer than or equalling inner ones, all acute to acuminate, stramineous-brown or

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occasionally red-tinged, with broad membranous to yellowish margins. Stamens 6; anthers 0.6–0.9 mm long, much longer than 0.2–0.4 mm filaments; female flowers with 6 staminodes; style c. 0.1 mm long; stigmas to c. 0.3 mm long. Capsule triseptate, ellipsoid to obovoid, c. 1.7–2.2 mm long, shorter than or slightly exceeding perianth, obtuse, not or shortly mucronate, golden brown, shining. Seeds ellipsoid-ovoid, 0.4–0.5 mm long, striate and reticulate; appendages absent. Fig. 143.

Endemic to inland E Australia. 50: NSW, QLD, VIC. More or less sandy margins of creeks. Map 528.

50. QUEENSLAND: Darling Downs, SSW of Kogan towards Tara, *R.G.Coveny & P.D.Hind 6788* (BRI, CHR, K, NSW). NEW SOUTH WALES: Northern Tablelands, near Tent Hill on Torrington Rd., *K.L.Wilson & al. 816* (NSW); North Western Slopes, Etoo Creek, 2.5 km W of Gibbican Forest Road along Number 1 Break, Baradine State Forest, *K.L.Wilson & J.T.Waterhouse 2454* (NSW); Central Western slopes, Bogan River crossing, W of Tomingley on Tullamore road, *L.A.S.Johnson 8466* (CHR, K, NSW); Greenthorpe – Mogongong Rd., W of Brundah silo, *K.L.Wilson 4431* (NSW, PRA). VICTORIA: Midlands, Bagshot North, at tributary of Reedy Creek, *K.L.Wilson & L.A.S.Johnson 1035* (CHR, MEL, NSW).

303. *Juncus radula* Buchenau, *Krit. Verz. Juncac.* 92 (1880)

Juncus radula var. *typicus* Buchenau, in H.G.A.Engler, *Planzenr.* (iv.36) 25: 140 (1906), *nom. inval.* T: Australia, Victoria, Sandhügel am Murray-Flusse, *H.Wawra 493*; holo: W, *n.v.*

Juncus radula var. *laevior* Buchenau, *Bot. Jahrb. Syst.* 12: 241 (1890). T: Western Australia, *J.Drummond 322*; lecto: K, *designated here* by K.L.Wilson; iso: BM, P. [The other, residual, syntype belongs to *J. subsecundus*]. Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 284 (1993).

Perennials, 30–95 (–105) cm tall; rhizome horizontal, very short-noded; stems densely crowded. Stem leafless, terete, finely scabrous at least in upper half, ±soft, grey-green, glaucous; ridges 12–28, very prominent; subepidermal sclerenchyma strands present; pith continuous, of astericiform cells. Cataphylls 2–4; upper cataphylls 4–5 (–6) cm long, ±lax to almost tight, with small awn-like blade on uppermost, abaxially dull yellow-brown to stramineous distally, ±dull deep brown to red-brown at base, adaxially silvery stramineous. Lower bract 9–28 (–40) cm long, exceeding inflorescence; sheath narrow. Inflorescence 4–12 cm long, diffuse; flowers numerous, solitary or loosely clustered; branches scabrous. Bracteoles ovate, c. 1 mm long, stramineous or membranous. Tepals lanceolate, often scabrous on midrib, stramineous-brown, occasionally tinged red-brown, with broad membranous margins; outer tepals (1.9–) 2.5–4.5 mm long, acute, longer than or equalling inner ones; inner tepals ±acute to ±mucronate. Stamens (3–) 6, much shorter than perianth; anthers 0.5–0.6 mm long; filaments c. 0.6 mm long; style c. 0.1 mm long; stigmas c. 0.3–0.5 mm long. Style very short; stigmas long. Capsule triseptate, ellipsoid to oblong or ovoid, 3.0–3.5 mm long, shorter than to slightly exceeding perianth, subacute to obtuse, not or shortly mucronate, golden brown. Seeds ovoid, 0.3–0.35 × c. 0.2 mm, apiculate, 13–18-striate, densely reticulate; appendages absent. Fig. 146.

S to E Australia. 50: NSW, QLD, SOA, VIC, WA. Various seasonally wet places in woodland and open grassland. Map 529.

50. NEW SOUTH WALES: SW Plains, Lake Urana, 6.4 km SW of Urana, *E.J.McBarron 5989* (NSW, PRA); SW Slopes, Lestor State Forest, 17 Oct 1993, *G.Burrows* (NSW). VICTORIA: Wimmera, Corack Roadside Reserve, *A.C.Beauglehole 82923* (AD, HO, MEL, NSW, PRA); Hard Hills, 6 km NE of St. Arnaud, *A.C.Beauglehole 65504 & al.* (MEL, NSW); Boort Flora Reserve, Murray Valley Study Area, *A.C.Beauglehole 82924* (MEL, NSW).

304. *Juncus remotiflorus* L.A.S.Johnson, *Telopea* 5: 315 (1993)

T: New South Wales, Central Western Slopes, western slopes of Hervey Range, W of Bumberry Creek, 22 Feb 1975, *L.A.S.Johnson & K.L.Wilson 8003*; holo: NSW; iso: K.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 282 (1993).

Perennials, 20–90 cm tall, slender; rhizome short-noded, creeping, to c. 3–4 mm in diam.; stems in dense rows or groups. Stem leafless, terete, 1–2 (–3) mm diam., very soft, often flattened and splitting when dry, grey-green to blue-green; ridges 25–60, not very distinct; dorsal cells not enlarged; pith conspicuously interrupted, often reduced to thin septa-like



Figure 146. *Juncus phaeanthus*. A, inflorescence; B, perianth with capsule (A, B, D.J.Wimbush 2016, NSW). *Juncus pauciflorus*. C, inflorescence; D, perianth with capsule (C, D, R.G.Coveny 7361 & al., NSW). *Juncus radula*. E, inflorescence; F, detail of scabrid inflorescence branch; G, perianth with capsule (E–G, K.L.Wilson 6063a, NSW). *Juncus dolichanthus*. H, inflorescence; I, perianth with capsule (H, I, K.L.Wilson 760 & al., NSW). *Juncus ingens*. J, inflorescence; K, perianth with capsule (J, K, A.C.Beaglehole 49809, NSW). *Juncus nupela*. L, inflorescence; M, flower (L, M, J.F.Veldkamp 6369, NSW). Scale bars: A, C, E, H, J, L = 2 cm; B, D, G, I, K, M = 1 mm; F = 0.5 mm. Drawn by D.Mackay. Reproduced with permission of the authorities of Royal Botanic Gardens, Sydney.

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plates, of astericiform cells. Cataphylls c. 2–4; upper cataphylls 3–13 cm long, ±tight, abaxially dull, stramineous to yellow distally, dark yellow-brown and ±dull at base, adaxially silvery to golden brown. Lower bract 3–20 cm long, shorter than to twice as long as inflorescence; sheath narrow. Inflorescence 7–19 cm long, diffuse; flowers numerous, solitary, widely separated. Bracteoles ±ovate, minute, c. 0.6–0.9 mm long, ±stramineous. Tepals lanceolate, acute to acuminate, stramineous-brown, often red-tinged, with ±broad membranous margins; outer tepals 2.5–3.5 mm long, longer than or equalling inner ones, with prominent central band. Stamens 3–6; anthers 0.5–0.9 mm long, equalling or longer than c. 0.5 mm filaments; style c. 0.1–0.2 mm long; stigmas to c. 1 mm long. Capsule triseptate, narrowly ovoid, c. 2.5–3.0 mm long, shorter than or equalling tepals, abruptly narrowing into obtuse apex, not or shortly mucronate, golden brown, shining. Seeds ellipsoid-ovoid, c. 0.3–0.4 × c. 0.2 mm, 16–20-striate, densely reticulate, pale brown; appendages absent. Fig. 144.

Endemic to SE Australia. 50: NSW, QLD, VIC. Various temporarily wet places, especially minor watercourses. Map 530.

50. QUEENSLAND: Darling Downs, 1.2 km SW of Dalveen railway station on Cottonvale road, *K.D.Hill & L.A.S.Johnson 1255* (BRI, MO, NSW). NEW SOUTH WALES: North Coast, Millfield on the Cessnock-Wollombi road, *R.G.Coveny & J.Powell 6491* (BRI, CANB, CHR, NE, NSW, NT, NY); Central Coast, 3.2 km SW of Casula, *R.G.Coveny 4349* (CHR, K, NSW); Fairfield Heights, Fairfield, *E.J.McBarron 8524* (NSW, PRA, US); South Coast, 5.6 km S of Nowra, *R.G.Coveny & al. 6175* (CANB, CHR, K, L, LE, MEL, NSW, PERTH, RSA); South Western Slopes, Six Mile Reserve, Holbrook, *E.J.McBarron 690* (NSW). VICTORIA: Grampians, below W foot of Mt Stapylton, *K.L.Wilson & L.A.S.Johnson 1090* (HO, MEL, NSW); Midlands, 16 km S of St. Arnaud Post Office, *A.C.Beaglehole 50192* (NSW, PRA); Riverina, Killawarra State Forest, 20 km NW of Wangaratta, *A.C.Beaglehole 64180* (MEL, NSW); East Gippsland, Rifle Range area, Orbost, *A.C.Beaglehole 34556* (MEL, NSW).

305. *Juncus sarophorus* L.A.S.Johnson, *Contr. New South Wales Natl Herb.* 3: 242 (1963)

T: Dalyston, 5 m [8 km] W of Wonthaggi, Victoria, 4 Feb 1959, *L.A.S.Johnson s.n.*; holo: NSW49844; iso: CHR. Illustrations: E.Edgar, *New Zealand J. Bot.* 2: 187, fig. 10 (1964); K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 281 (1993).

Perennials, 70–185 (–200) cm tall, densely caespitose; rhizome very short-noded, stout, 5–10 mm diam. Stem leafless, terete, 1.3–3.2 mm diam., hard, grey-green to blue-green, subglaucous; ridges 20–40, conspicuous; subepidermal sclerenchyma strands present; pith arachnoid, interrupted, rarely partly continuous, of astericiform cells. Cataphylls 2–3; upper cataphylls often to 25 cm, ±lax, abaxially dark yellow-brown and dull distally, dark red-brown or blackish and ±glossy at base, adaxially golden brown to coppery, slightly glossy. Lower bract 15–30 cm long, exceeding inflorescence; sheath ±narrow. Inflorescence pseudolateral, 6–15 cm long, diffuse, fan-shaped; flowers numerous, loosely clustered to solitary. Bracteoles ovate, to c. 1 mm long, scarious to stramineous. Tepals lanceolate, initially green, becoming stramineous-brown, occasionally red-brown along midrib, with broad membranous margins; outer tepals 1.5–2.5 mm long, conspicuously longer than inner ones, acuminate; inner tepals acute. Stamens 3 (–6); anthers 0.3–0.5 mm long; filaments 0.6–0.7 mm long; style 0.1–0.2 mm long; stigmas c. 0.5 mm long. Capsule triseptate, narrowly ovoid to ellipsoid, 1.5–2.5 mm long, slightly shorter than to exceeding perianth, obtuse, not or shortly mucronate, golden or pale brown. Seeds c. 0.5 mm long, ellipsoid, apiculate, c. 16–21-striate, densely reticulate, pale brown; appendages absent. Fig. 142.

SE Australia, New Zealand; casual in Europe. 10: gbr. 50: NSW, SOA, TAS, VIC. 51: ATP, CTM, NZN, NZS. Margins of swamps, along road drains. Map 531.

50. NEW SOUTH WALES: Central Tablelands, Blue Mtns National Park, Lanigans Swamp on Ruby Ck, *K.L.Wilson 9876* (NSW, PRA); Southern Tablelands, Tantawanglo Mtn, *J.W.Vickery s.n.* (CHR, NSW, PRA).

306. *Juncus semisolidus* L.A.S.Johnson, *Teloepa* 5: 316 (1993)

T: Victoria, Riverina, 2 km S of Wunghu on Shepparton road, 15 Feb 1975, *K.L.Wilson & L.A.S.Johnson 1020*; holo: NSW; iso: CHR, K, MEL.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 278 (1993).

Perennials, 105–200 cm tall, rhizomatous. Stem leafless, terete, 3.5–8.5 mm diam., ±hard, mid-green, or grey-green, subglaucous; ridges 60–120, not very distinct; dorsal cells not enlarged; pith continuous and interrupted in parts of the same stem, of astericiform cells. Cataphylls few; upper cataphylls 10–36 cm long, usually long-acuminate, lax, abaxially dull and deep yellow-brown distally, dark red-brown or black, ±not glossy at base, adaxially silvery to golden brown. Lower bract 16–45 cm long, exceeding or occasionally equalling inflorescence; sheath narrow. Inflorescence 10–25 cm long, diffuse; flowers numerous, loosely to densely clustered. Bracteoles ovate, to c. 1 mm long, membranous to stramineous. Tepals lanceolate, acute or outer ones acuminate, stramineous-brown with broad membranous margins; outer tepals (1.7–) 2–3 mm long, longer than or equalling inner ones, with prominent central band; inner tepals obtuse to ±acute. Stamens 3 (–4); anthers 0.5–0.9 mm long, equalling or longer than c. 0.4–0.5 mm filaments; style c. 0.1–0.2 mm long; stigmas to c. 1 mm long. Capsule triseptate, narrowly ellipsoid, c. 2.5–3.0 mm long, equalling or slightly exceeding perianth, obtuse, not or shortly mucronate, golden brown, shining. Seeds ±ovoid, 0.3–0.4 × c. 0.2 mm, apiculate, c. 15–20-striate, densely reticulate; appendages absent. Fig. 141.

Endemic to SE Australia. 50: NSW, VIC. Wet habitats mostly on clay soils. Map 532.

50. NEW SOUTH WALES: South Western Slopes, c. 5 km S of Jindera on Albury road, *K.L.Wilson & L.A.S.Johnson 1000* (NSW, CHR); South Western Plains, 38 km WNW of Strathmerton, Apr 1984, *Pressey* (NSW); SW Slopes, Walla Walla, *E.J.McBarron 5815* (NSW, PRA); SW Slopes, Gerogery Rd., c. 9.5 km S of Culcairn, *E.J.McBarron 6049* (NSW, PRA). VICTORIA: Midlands, Tarnagulla, *L.A.S.Johnson 7744* (NSW).

307. *Juncus subglaucus* L.A.S.Johnson, *Telopea* 5: 317 (1993)

T: New South Wales, North Western Slopes, Ulinda Railway Station, c. 9 miles [15 km] SE of Binnaway, 7 Apr 1970, *L.A.S.Johnson & J.Pickard*; holo: NSW105133; iso: BRI, CHR, K, MO, NY.

Illustration: K.L.Wilson, in G.J.Harden (ed.), *Fl. New South Wales* 4: 280 (1993).

Perennials, 50–125 cm tall; rhizome stout, creeping, short-noded; stems in dense groups or rows. Stem leafless, terete, 1.5–2.5 mm diam., ±hard, mid-green to grey-green, subglaucous; ridges 35–55, distinct; pith interrupted, of astericiform cells. Cataphylls few, usually 3–4; upper cataphylls 7–17 cm long, ±lax, abaxially dull dark yellow-brown distally, red-brown or occasionally blackish and ±glossy at base, adaxially silvery to pale golden brown. Lower bract 10–22 cm long, exceeding inflorescence; sheath narrow. Inflorescence 4–10 (–15) cm long, diffuse; flowers numerous, loosely to densely clustered. Bracteoles ovate, to c. 1 mm long, scarious. Outer tepals 1.8–2.5 mm long, longer than or equalling inner ones, all acute to acuminate, stramineous-brown with broad membranous margins. Stamens 3; anthers (0.3–) 0.4–0.8 mm long; filaments c. 0.5–0.6 mm long; style c. 0.1 mm long; stigmas to c. 0.5 mm long. Capsule triseptate, obovoid to ellipsoid, c. 1.8–2.5 mm long, exceeding or rarely equalling perianth, acutish to obtuse, not or shortly mucronate, golden brown, shining. Seeds ovoid, 0.3–0.4 (–0.5) × c. 0.2 mm, apiculate, c. 15–20-striate, densely reticulate, pale brown; appendages absent. Fig. 141.

Endemic to E Australia. 50: NSW, QLD. Margins of watercourses and other permanently or seasonally wet places. Map 533.

50. QUEENSLAND: Leichhardt, c. 3 km N of Robinson Ck, N of Taroom, *L.A.S.Johnson 728 & D.F.Blaxell* (NSW, PRA); Darling Downs, ESE of Inglewood, near Bracker Ck, Apr 1962, *L.A.S.Johnson* (NSW). NEW SOUTH WALES: North Coast, Singleton – Broke road, E of Nine Mile Ck, Jan 1962, *L.A.S.Johnson* (NSW); Northern Tablelands, 8 km from Tent Hill on Torrington Rd., *K.L.Wilson & al. 814* (NSW); Central Tablelands, Turon Lookout, Hill End, May 1975, *L.A.S.Johnson 8108* (NSW); Central Western Slopes, Bruinbun, Macquarie River, 13 km SSE of Hill End, *L.A.S.Johnson 8118* (K, NSW); Liverpool Rge, Coulsons Ck, *L.A.S.Johnson 7272 & S.W.L.Jacobs* (NSW, PRA); Eumungerie, 11 Dec 1961, *E.F.Constable* (NSW, PRA); North Western Plains, near Boppy Mountain on road to Girilambone, *Moore 7575* (CANB, NSW); South Western Plains, Conargo – Jerilderie road, over Forest Ck, *McIntyre & Newnham 492* (NSW).

From *J. aridicola* it differs in having harder stems, generally fewer and coarser stem striations, and not having flexuose branches in the inflorescence. From *J. usitatus* it can be distinguished by its subglaucous, harder stems and denser inflorescence.