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An ITS phylogeny of *Festuca* s.l. clarifies the generic circumscription of the broad-leaved complex (Poaceae, Pooideae, Poeae, Loliinae)

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Abstract. To investigate the evolutionary relationships among species of *Festuca* s.l. we generated a nuclear ribosomal DNA ITS phylogeny recovering 10 strongly supported clades or genera: *Drymochloa, Festuca, Leucopoa, Locajonoa, Lolium, Hesperochloa, Munnikopoa* **gen. nov.**, *Pseudobromus*, *Valdesochloa* **gen. nov.**, and *Xanthochloa*. We make the necessary 51 new combinations in *Drymochloa* (*D. muelleri, D. pseudeskia, D. scariosa*), *Festuca* (*F. albaredae, F. ambilobensis F. lima, F. membranacea* subsp. *fontqueriana*), *Hesperochloa* (*H. aloha, H. altaica, H. amplissima, H. argentina, H. bajacaliforniana, H. campestris, H. dasyclada, H. dichoclada, H. elmeri, H. extremiorientalis, H. hallii, H. hubsugulica, H. modesta, H. molokaiensis, H. nitidula, H. parvigluma, H. pulchella, H. pulchella* ssp. *jurana*, *H. quadridentata, H. sinensis, H. sororia, H. spectabilis, H. subulata, H. washingtonica*) *Leucopoa* (*L. komarovii*), *Locajonoa* (*L. patula*), *Lolium* (*L. simensis*), *Munnikopoa* (*M. scabra*), *Pseudobromus* (*P. brevisetus, P. killickii, P. longipes, P. mekiste*), *Valdesochloa* (*V. asperella, V. breviglumis, V. caldasii, V. chiriquensis, V. lugens, V. superba, V. venezuelana*), and *Xanthochloa* (*X. baetica, X. durandoi, X. paniculata, X. sclerophylla, X. spadicea*); and provide a preliminary key to the genera. Lectotypes are designated for the names *Festuca amplissima* Rupr., *F. costata* var. *breviseta* Nees, *F. dichoclada* Pilg., *F. longipes* Stapf, *F. modesta* Nees, *F. nitidula* Stapf ex Hook. f., *F. patula* Desf., *F. subulata* var. *japonica* Hack., *F. superba* Parodi ex Türpe, and *Micropyrum albaredae* Paunero; and a neotype is designated for *Triticum patens* Brot.

Keywords: Classification, *Drymochloa*, *Hesperochloa*, *Leucopoa, Locajonoa*, *Lolium*, molecular phylogenetics, *Munnikopoa*, *Pseudobromus*, *Valdesochloa, Xanthochloa.*

INTRODUCTION

Festuca L. is a large group of primarily cool temperate grasses with ca. 682 species (POWO 2024), placed in the tribe Poeae, subtribe Loliinae Dumort. The genus is characterized morphologically in having the annual

or perennial lifeform, leaf blades mostly flat, or folded (involute) and often filiform, panicles narrow or open, spikelets 4–13-flowered and primarily laterally flattened, lemmas membranous to thinly coriaceous, usually 5-veined, dorsally rounded, with apices that are acute, entire or obscurely bidentate, unawned or short to long-awned, upper glumes that are usually 3-veined, floret callus thickened and glabrous, rachilla dorsoventrally compressed, lodicules hyaline, lanceolate, laterally lobed, and eciliate, ovary glabrous or apically hairy, and caryopses with a linear to oblong hilum at least half as long as the grain (Clayton and Renvoize 1986; Clayton et al. 2016; Stančík and Peterson 2007). *Festuca* s.l. is divided into two major groups (Torrecilla and Catalán 2002; Minaya et al. 2017): the narrow leaf clade (NLC) of *Festuca* s.s., ca. 600 species (Soreng et al. 2017, 2022; Peterson et al. 2018; Sylvester et al. 2020), and the broad leaf group/grade/clade (BLC), ca. 82 species. The following genera have historically been attributed to the Loliinae: *Ctenopsis* De Not., *Dielsiochloa* Pilg., *Drymochloa* Holub,, *Hellerochloa* Rauchert, *Megalachne* Steud., *Micropyrum* (Gaudin) Link, *Narduroides* Rouy, *Leucopoa* Griseb., *Locajonoa* Soreng, *Lolium* L. (synonyms *Micropyropsis* Romero Zarco & Cabezudo, *Schedonorus* P.Beauv.), *Patzkea* G.H.Loos, *Podophorus* Phil., *Pseudobromus* K.Schum., *Psilurus* Trin., *Vulpia* C.C.Gmel., *Wangenheimia* Moench, and *Xanthochloa* (Krivot.) Tzvelev. The generic taxonomy of the broad-leaved species complex is still unsettled, but the grade is decidedly African, Eurasian, and Indomalayan in origin, with a few species of *Leucopoa* identified from the Americas (Inda et al. 2013; Gallaher et al. 2022). The subtribe Loliinae was estimated to have a mean crown date of 18.47 Ma by Gallaher et al. (2022) while an earlier study suggested the *Schedonorus–Lolium* complex was already distributed in the western Mediterranean region around the mid-Miocene (13–8 Ma) [Inda et al. 2013].

A good summary and historical perspective of the systematics of subtribe Loliinae based on morphology and molecular DNA markers (nuclear ITS and chloroplast *trn*L-F), is given in Catalán et al. (2007). Ribosomal DNA ITS sequences (ITS_1 & ITS_2 spacers) have been successfully used in phylogenetic analysis in many angiosperms (Baldwin et al. 1995) and the marker has been very informative at the species level within the grasses, especially the Pooideae (Hsiao et al. 1995, 1999; Charmet et al. 1997; Gaut et al. 2000; Torrecilla and Catalán 2002; Quintanar et al. 2007; Romaschenko et al. 2012; Barberá et al. 2019) and has been used as a barcode (Peterson et al. 2014).

Within the broad-leaved *Festuca* clade (BLC), Palisot de Beauvois (1812) split *Festuca* s.l., erecting *Schedonorus*, and later Darbyshire (1993) moved *F.* subg. *Schedonorus* (P. Beauv.) Peterm. to *Lolium* so the paniclulate inflorescence and the presence of a lower glume in *L. arundinaceum* (Schreb.) Darbysh. and relatives could be incorporated in *Lolium* as recognized by most taxonomists today. *Pseudobromus* K. Schum. [type = *Festuca africana* (Hack.) Clayton] was erected to recognize species with transverse leaf blade veinlets and spikelets with 1–4 fertile florets (Schumann 1895). *Festuca* subg. *Hesperochloa* Piper (1906) [later raised to generic level by Rydberg (1912) as *Hesperochloa* (Piper) Rydb.] was also segregated from *Festuca* to accommodate *F. confinis* Vasey = *F. kingii* (S.Watson) Cassidy with stout extravaginal scaly stolons, usually broad, flat leaf blades, and hairy ovaries. *Festuca* subg. *Leucopoa* (Griseb.) Tzvel. was described to include dioecious or monoecious species with flat or convolute leaf blades 4–7 mm wide, lemmas that are awnless, sometimes short-pilose, and ovaries that are somewhat pilose at the tip (*F. sibirica* Hack. ex Boiss. ≡ *Leucopoa sibirica* Griseb. ≡ *Leucopoa albida* (Turcz. ex Trin.) V.I.Krecz. & Bobrov [Grisebach 1852; Tzvelev 1971]. *Drymochloa* [type = *Drymochloa drymeja* (Mert. & W.D.J.Koch) Holub ≡ *Festuca drymeja* Mert. & W.D.J.Koch] was used to include about eight monoecious species that have auriculate leaf sheaths, flat leaf blades 5–15 mm wide, awnless lemmas, and ovaries with densely pilose apices (Tzvelev 1976; Holub 1984, 1998; Foggi et al. 2005).

Based on *Festuca karatavica* (Burge) B. Fedtsch. (type), a perennial with flat leaf blades 2–10 mm wide, hyaline to membranous glumes, strongly 5-veined lemmas, and glabrous ovaries, Tzvelev (2006) erected *Xanthochloa* with two species. Originally, Tzvelev (1971) had placed the former species in *Festuca* subg. *Xanthochloa* (Kivot.) Tzvelev. *Patzkea* was erected to accommodate *Festuca coerulescens* Desf., *F. durandoi* Clausen, *F. paniculata* (L.) Schinz & Thell. the type, *F. patula* Desf., and *F. spadicea* L. species with 1-veined glumes and tuberose basal sheaths (Loos 2010; Scholz 2010). To accommodate *Micropyropsis tuberosa* Romero Zarco & Cabezudo that has spiciform racemes (i.e., *Lolium perenne* L.) and spikelets with two glumes (i.e., *L. arundinaceum*) with other species placed in *Lolium,* Banfi et al. (2017) made the combination, *Lolium tuberosum* (Romero Zarco & Cabezudo) Banfi, Galasso, Foggi, Kopecký & Ardenghi. To accommodate *Festuca coerulescens* [≡ *Lojaconoa coerulescens* (Desf.) Gand. nom. inval.] and therefore changing the status of *Festuca* sect. *Lojaconoa* Catalán & Joch. Müll, Soreng et al. (2022) erected *Locajonoa*. *Locajonoa coeulescens* has a tuberose culm base, flat leaf blades that are convolute near the base, pubescent panicle branches with antrorse hairs, and 1-veined lower glumes (Devesa and Martinez Sagarra 2020).

The Mexican, Central, and South American broad-leaved *Festuca* species were recently studied morphologically and phylogenetically using entire plastomes and nuclear rDNA 45S, 5S), and repetitive DNA elements (Moreno-Aguilar et al. 2022). They found that species of *Festuca* sect. *Glabricarpae* E.B. Alexeev (type = *F. breviglumis* Swallen) and *F.* subg. *Asperifolia* [type = *F. lugens* (E. Fourn.) Hitchc. ex Hern.-Xol.] including *F. superba* Parodi ex Türpe aligned in Mexico-Central-South American I clade (MCSAI) and *F.* subg. *Erosiflorae* E.B.Alexeev (type = *F. quadridentata* Kunth) and *F.* sect. *Ruprechtia* E.B. Alexeev (type = *F. amplissima* Rupr.) including *F. argentina* (Speg.) Parodi aligned in MCSAII. They also found ligule shape and whether it was ciliate or not, to be very diagnostic in circumscribing the 22 primarily polyploid species in their study.

In another recent study a nuclear phylogenomic tree depicts *Festuca* species (excluding *F. sinensis* Keng ex E.B. Alexeev and *F. mekiste* Clayton as outliers) in either a fine-leaved clade (FLC) and a broad-leaved clade (BLC) [GPWG III 2024]. These two clades are both strongly supported in their plastome tree where FLC + *Castellia tuberculosa* (Moris) Bor is sister to the BLC that includes four species of *Lolium, Patzkea paniculata* (L.) G.H.Loos, *Festuca mekiste*, and *F. muellerii* Vickery (*F. sinensis* not in this analysis).

The Flora Europaea (Tuten 1980) included the following nine Loliinae genera: *Castellia* Tineo, *Ctenopsis*, *Festuca*, *Lolium*, *Micropyrum*, *Narduroides*, *Psilurus*, *Vulpia*, and *Wangenheimia*. Forty years later the Flora Iberica (Devesa et al. 2020) included the following 10 Loliinae genera: *Castellia*, *Ctenopsis*, *Festuca*, *Lolium*, *Micropyropsis*, *Micropyrum*, *Narduroides*, *Psilurus*, *Vulpia*, and *Wangenheimia*. There appears to be little change in the generic concepts used in the recent treatment of the grasses in Spain despite a plethora of molecular DNA sequence studies. In our current paper we present evidence in our DNA ITS-derived phylogeny to support only two of the above genera (*Festuca* s.s. and *Lolium*). In addition, we provide strong support to recognize the following nine genera within the BLC: *Drymochloa, Leucopoa, Locajonoa, Hesperochloa, Lolium, Munnikopoa* **gen. nov.**, *Pseudobromus*, *Valdesochloa* **gen. nov.**, and *Xanthochloa*.

There have been many DNA sequence-derived phylogenies of the Loliinae utilizing plastid markers, and these for the most part have been unable to adequately resolve generic boundaries within *Festuca* s.l. (Charmet et al. 1997; Gaut et al. 2000; Torrecilla and Catalán 2002; Torrecilla et al. 2004; Catalán et al. 2007; Quintanar et al. 2007; Inda et al. 2008, 2013; Moreno-Aguilar et al. 2022). Therefore, in our study we choose to rely solely on the nuclear ribosomal DNA ITS marker (most available and widespread genetic marker with high resolution) with an expanded data set of species to construct a phylogeny of *Festuca*, specifically focusing on the broad-leaved complex. We include the type species of all but one of the genera sometimes attributed to the BLC along with many of their putative relatives, and a broad sampling of species generally attributed to the NLC. Based on our new phylogeny we expand the number of genera in the BLC to nine genera (two new, one resurrected, and one subsumed) and include their associated taxonomic changes.

MATERIALS AND METHODS

Taxon sampling

We sampled 130 specimens, representing 109 species (79 species of broad-leaved *Festuca*) and 11 genera representing Loliinae. A list of taxa including authorities, voucher information, and GenBank numbers is provided in Appendix 1. DNA was extracted from silica-dried material collected by the authors or was obtained from herbarium specimens, principally housed at the United States National Herbarium (US). Additionally, we used 79 ITS sequences taken from GenBank.

It is necessary to include the types of genera and other higher taxa when conducting molecular studies and revising taxonomic classifications based on phylogenetic results so that the names of higher taxa can be correctly applied to lineages. The following species included in our analyses are the types of their respective genus*: Drymochloa drymeja, Festuca lugens* (≡ *Valdesochloa* **gen. nov.**), *Festuca ovina* L., *Festuca scabra* Vahl (*Munnikopoa* **gen. nov.**), *Hesperochloa kingii, Leucopoa sibirica, Locajonoa coerulescens, Lolium perenne, Patzkea paniculata*, and *Pseudobromus silvaticus*.

The study was designed to characterize relationships among species of *Festuca* s.l. with an emphasis on species that have been included in the BLC. We included five outgroup species: *Avenella flexuosa* (L.) Drejer (subtr. Airinae Fr.), *Helictochloa bromoides* (Gouan) Romero Zarco (subtr. Helictochloinae Röser & Tkach), *Peyritschia erectifolia* (Hitchc.) P.M. Peterson, Soreng, Romasch. & Barberá (subtr. Aveninae J. Presl), *Phalaris arundinacea* L. (subtr. Phalaridinae Fr.), and *Poa billardierei* St.-Yves (subtr. Poinae Dumort.) [Soreng et al. 2022].

Phylogenetic methods

All procedures related to sequencing the ITS region were performed in the Laboratory of Analytical Biol-

ogy at the Smithsonian Institution. Detailed methods for DNA extraction, amplification, and sequencing are given in Romaschenko et al. (2012) and Peterson et al. (2010a, 2010b, 2012, 2014, 2015a, 2015b, 2016). Geneious Prime v.2020.1.4 (Kearse et al. 2012) was utilized for contig assembly of bidirectional sequences and Muscle (Edgar 2004) to align consensus sequences and adjust the final alignment. The Bayesian trees were constructed with MrBayes v3.2.7 (Huelsenbeck and Ronquist 2001; Ronquist et al. 2012). All compatible branches were saved.

Bayesian analysis was performed under default settings. The search was initiated with random starting trees and was run for ten million generations with every 1000th iteration being sampled. Upon completion of the search, the variance of split sequences was less than 0.01 and the potential scale reduction factor was close or equal to 1.0 indicating convergence of the chains (Huelsenbeck and Ronquist 2001). The effective sample size (ESS) value was greater than 100, and 25% of the sampled values were discarded. Posterior probabilities (PP) of ≥0.95 indicate a credible interval of probability, so we consider this as strong support.

The parsimony bootstrap analyses (Felsenstein 1985) were performed using program IQ-Tree 2.3.5 implementing ultrafast bootstrap approximation (with 10000 bootstrap replicates) to assess branch supports (Minh et al. 2013; Hoang et al. 2018). Bootstrap (BS) values of 95–100% were interpreted as strong support.

The analysis was initially run with 264 *Festuca* s.l. species (185 spp. in the NLC, see Table 1). Our unpublished tree (not presented here) included 185 species aligning within the *Festuca* s.s. clade. These are presented in Table 1 where we also indicate what genera they have been historically attributed to. Upon finding a well-supported NLC in this preliminary analysis we then narrowed that dataset to an informative subset of samples, while retaining all samples aligning outside the NLC that had unique sequences and removing duplicates of the same taxon for the final analysis.

RESULTS

Phylogeny

Thirty-eight percent (49/130) of the sequences in our study are newly reported in GenBank, and 60.8% (79) are previously published sequences (Appendix 1). The ITS dataset included 130 sequences with 754 nucleotide sites, of which 366 sites were constant (48.5411% of all sites) and 273 sites were parsimony informative. The Best-fit model according to Bayesian Information Criterion (BIC; IQ-Tree program) was SYM+I+I+R3.

The Bayesian tree from the ITS region (Fig. 1) is well resolved and we recovered 10 strongly supported clades (PP = 0.96–1.00), BS = 99–100) we refer to as: *Drymochloa, Festuca, Leucopoa, Locajonoa, Lolium, Hesperochloa, Munnikopoa* gen. nov., *Pseudobromus*, *Valdesochloa* gen. nov., and *Xanthochloa*; and a single unsupported accession of *Leucopoa calabrica* (Huter, Porta & Rigo ex Hack.) H. Scholz & Foggi (≡ *Festuca calabrica* Huter, Porta & Rigo ex Hack.). *Leucopoa calabrica* is sister via a long branch to *Hesperochloa*, aligning in a grade between *Locajonoa* and *Hesperochloa.*

In our overall unpublished tree we included 185 species of *Festuca* s.s. (Table 1) and these form a clade sister to the BLC (Fig. 1). Within, *Festuca* s.s. there are some species that were formerly attributed to: *Ctenopsis*, *Dielsiochloa*, *Micropyrum*, *Narduroides*, *Psilurus*, *Vulpia*, or *Wangenheimia*.

DISCUSSION

Delimitation of generic ranks within *Festuca* have historically been problematic and our results based on a phylogeny derived from the nuclear ribosomal DNA ITS marker, are a work in progress, requiring validation by incorporation of a larger sample and additional DNA markers. We strive to recognize a genus as a clade of species sharing a common ancestor, with the exception of genera that are a result of repeated hybridizations (see treatment of *Polypogon* Desf. in Peterson et al. 2025). As taxonomists, we always have a subjective choice to recognize a large clade of related species, i.e., *Festuca* s.l., or many clades composed of smaller monophyletic units. We choose the latter, and as such, propose a classification separating *Festuca* s.l. into 10 genera: *Drymochloa, Festuca s.s., Leucopoa, Locajonoa, Lolium, Hesperochloa, Munnikopoa* gen. nov., *Pseudobromus*, *Valdesochloa* gen. nov., and *Xanthochloa*. By following this phylogenetic principle of classification *Vulpia* can never be used since, based on molecular DNA studies, all species formerly attributed to this genus in modern accounts align within NL *Festuca* s.s. (Torrecilla et al. 2004). *Lolium* is almost universally accepted with or without *Schedonorus* included in historic and recent taxonomic treatments (Tutin 1980; Devesa et al. 2020). Some more recent floristic treatments accept some of the broad-leaved segregate genera, such as, *Drymochloa, Leucopoa*, *Patzkea* (= *Xanthochloa* in our study), and *Schedonorus*, but still retain the use of *Vulpia* (Euro+Med 2006+; Tzvelev and Probatova 2019). *Pseudobromus* s.s. (BL species) is also accepted by some (Clayton 1970).

Torrecilla and Catalán (2002) outlined three broad-leaved *Festuca* clades in their ITS strict consensus tree:

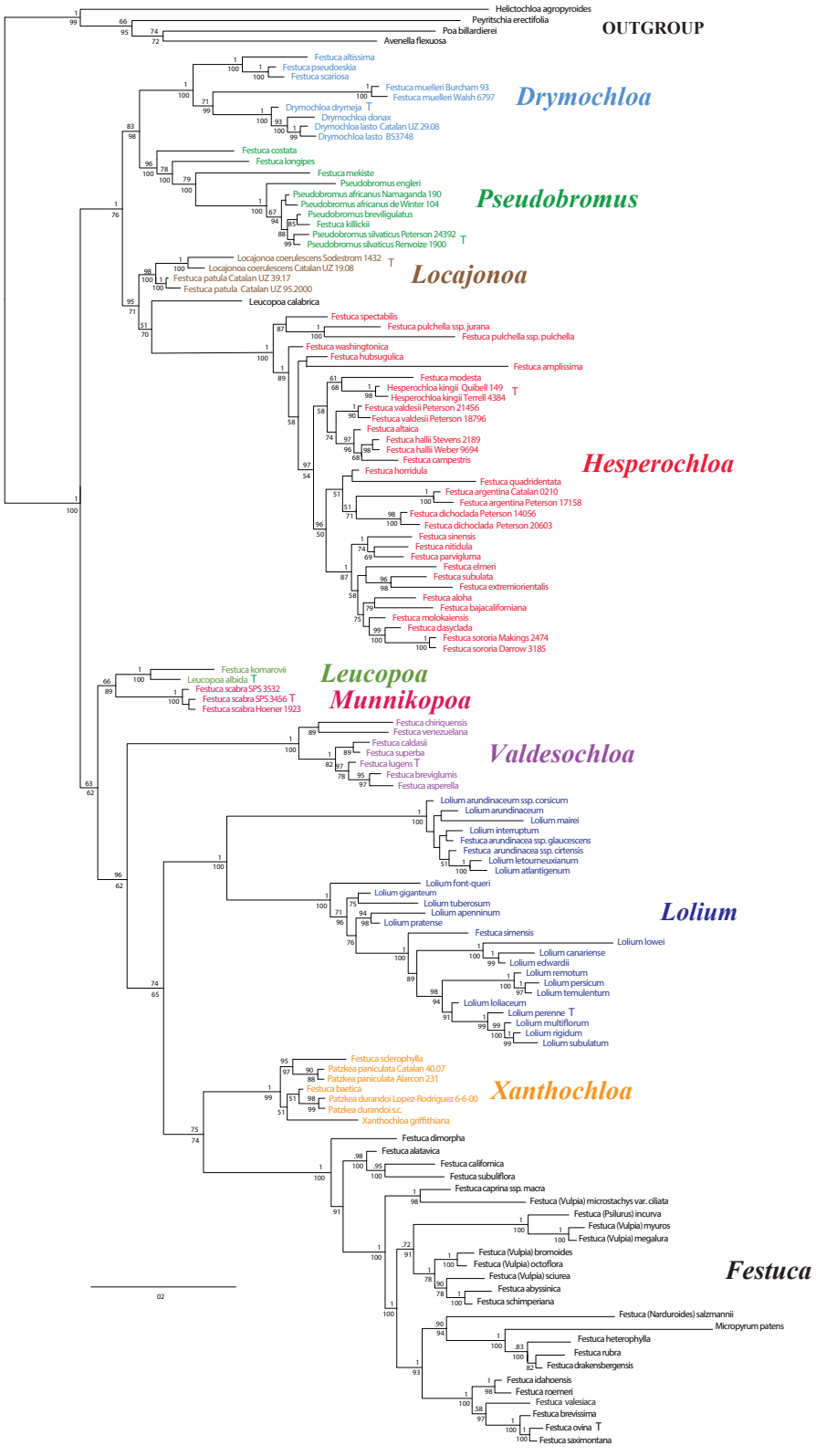

Figure 1. Bayesian tree inferred from ITS sequences of the broad-leaved species of *Festuca* s.l. Numbers (0.50–1) above the branches indicate posterior probabilities and numbers (50–100) below the branches indicate bootstrap. T = type of the genus. Scale bar = 0.2% substitutions per site.

Table 1. List of species in our overall unpublished tree in *Festuca* s.s. (narrow-leaved) clade. Species that have been attributed to other genera are labeled with superscript number as follows: [1]*Ctenopsis*, [2]*Dielsiochloa*, [3]*Micropyrum*, [4]*Narduroides*, [5]*Psilurus*, [6]*Vulpia*, and [7]*Wangenheimia*. GenBank numbers are listed for some species. Other samples with unpublished ITS sequences include collector and number; all are housed at the United States National Herbarium (US).

Festuca abyssinica Hochst. ex A.Rich. — Peterson 24019 (US), Peterson 24037 (US), Peterson 24039 (US), Peterson 24125 (US), Peterson 24347 (US); *F. actae* Connor — AY524829; *F. agustinii* Linding. — EF584918, AY099005; *F. alatavica* (Hack. ex St.-Yves) Roshev. — Soreng PI3500041 (US); [3]*F. albaredae* (Paunero) P.M.Peterson, Romasch. & Soreng — AF478495; [6]*F. alopecuros* Schousb. — AF478491, KF977183; *F. alpina* Suter — AF303415, KF917222; *F. amethystina* L. — Czywcz 293 (US), Freiberg in 1951 (US); *F. ampla* Hack. — EF584920, EF584921; *F. andicola* Kunth — EF584922; *F. aragonensis* — AF519975; *F. arenaria* Osbeck — KX166307; *F. arenaria* Osbeck — KX166348; *F. arietina* Klokov — KP796238; *F. arietina* Klokov — KP796239; *F. arizonica* Vasey — Peterson 7828 (US), Peterson 7857 (US); *F. asperula* Vickery — KY368831, J598992, KY368831; *F. auriculata* Drobow — MG215841, MG216480; *F. baffinensis* Polunin — Holmen 20 (US), EF584925, GQ324476; *F. benthamiana* Vickery — KY368824; *F. borbonica* Spreng. — KY368840; *F. borderi* (Hack.) K. Richt. — AF303403, KF917227; *F. bosniaca* Kummer & Sendtn. — KY368815, KY368815; *F. brachyphylla* Schult. & Schult. f. — Talbot 2005 (US); *F. brachyphylla* subsp. *breviculmis* Fred. — Alexander 4544 (US), Maguire 26102 (US); *F. brevipila* R. Tracey — AF147151, AF147165; *F. brevis* (Boiss. & Kotschy) Asch., Schweinf. & Muschl. — AF478489, KF917252; *F. brevissima* Jurtzev — Soreng 6170 (US), Talbot CHO012-16 (US); [6]*F. bromoides* L. — Banks 57 (US), Thomas 10016 (US), KF917207, Peterson 24123 (US); *F. burnatii* St.-Yves — AY099007; *F. californica* subsp. *parishii* (Piper) Darbysh. — Parish 2490 (US); *F. californica* Vasey — Raven 10758 (US), Hoover 4940 (US); *F. calligera* (Piper) Rydb. — Hitchcock 13224 (US), Darrow 2947 (US); *F. camusiana* St.-Yves — KY368841; *F. capillifolia* Dufour ex Roem. & Schult. — AF303419, KF977184; *F. caprina* Nees — Sylvester 3713 (US), KY368825; *F. caprina* var. *irrasa* Stapf — Sylvester 3542 (US), Sylvester 3547 (US); *F. caprina* var. *macra* Stapf — Sylvester 3406 (US), Sylvester 3619 (US); *F. carpatica* F. Dietr. — AY099006; *F. casapaltensis* Ball — KY368832; *F. chimborazensis* E.B.Alexeev — KF917238; *F. chodatiana* (St.-Yves) E.B.Alexeev — KY368842, Peterson 24348 (US), Peterson 24396 (US); [6]*F. ciliata* Gouan — AF478486; *F. circummediterranea* Patzke — HM453195; *F. claytonii* E.B.Alexeev — KY368843; *F. clementei* Boiss. — AF478482; *F. cochabambana* E.B.Alexeev — EF584931; *F. compressifolia* J. Presl — KY368833; *F. contracta* Kirk — KY368819; *F. coxii* (Petrie) Hack. — AY524825; *F. cuzcoensis* Stančík & P.M.Peterson — EF584932; *F. dalmatica* (Hack.) Richt. — AJ508378, AY254371; *F. deflexa* Connor — AY524838; [1]*F. delicatula* (Lag.) P.M.Peterson, Soreng & Romasch. — AY118096; *F. dimorpha* Guss. — AF519982; *F. drakensbergensis* Sylvester, Soreng & M. Sylvester — Sylvester 3360 (US), Sylvester 3595 (US); *F. edlundiae* S.G. Aiken, L.L. Consaul & Lefk. — EF584936, MG216580; *F. elata* Keng ex E.B.Alexeev — EF584937; *F. elegans* Boiss. — AF303406; *F. eskia* Ramond ex DC. — AF303412, KF917340; *F. fasciculata* Forssk. — AF303402, JQ972948; *F. filiformis* Pourr. — Watherby 7037 (US), AJ240160; *F. fimbriata* Nees — KY368834; *F. flacca* Hack. ex E.B.Alexeev — EF584938; [2]*F. floribunda* (Pilg.) P.M.Peterson, Soreng & Romasch. — JF697719; *F. fragilis* (Luces) B.Briceno — KF917247, KF917248; *F. francoi* Fern.Prieto, C.Aguilar, E.Dias & M.I.Gut. — EF584939; *F. frederikseniae* E.B.Alexeev — MG216612, MG216276; *F. frigida* Grossh. — AF478481; *F. gautieri* (Hack.) K.Richt. — AF303414; [6]*F. geniculata* (L.) Lag. & Rodr. — AF478490, JQ972947; *F. gilbertiana* E.B.Alexeev & S.M.Phillips — KY368844; *F. glacialis* Mi gev. — AF303428; *F. glauca* Vill. — Harrison in 5/6/1919 (US), anonymous in 1909 (US); *F. glumosa* Hack. ex E.B.Alexeev — EF584940; *F. gracillima* Hook. f. — KY368820; *F. guestphalica* Boenn. ex Rchb. — EF584941; *F. halleri* All. — EF584942; *F. hephaestophila* (Nees) Nees — EF584943; *F. heterophylla* Lam. — Holmgren in 30/6/1938 (US), AJ240159; *F. hieronymi* Hack. — KY368835; *F. hintoniana* E.B.Alexeev — EF584945; *F. humilior* Nees & Meyen — KU883499; *F. hyperborea* Holmen ex Fred. — EF584946, MG215765; *F. hystrix* Boiss. — AF543513; *F. iberica* (Hack.) K.Richt. — AY118087; *F. idahoensis* Elmer — Penland 1318 (US), Piemeisel 10 (US), Baker 9563 (US); [5]*F. incurva* (Gouan) Gutermann — JQ972945; *F. indigesta* Boiss. — AF303426; *F. intercedens* (Hack.) Ludi ex Bech. — EF584948; *F. javorkae* Májovský — AY254372; *F. jubata* Lowe — EF584949; *F. juncifolia* Chaub. — AF478478; *F. kashmiriana* Stapf — Stewart 17835 (US); *F. kirelowii* Steud. — KY999965, KY999968; *F. kryloviana* Reverd. — KY999967, KY999969; [1]*F. lachenalii* (C.C.Gmel.) Spenn. — AF478494; *F. laevigata* Gaudin — EF584950; *F. laxa* Host — KY368816; *F. lemanii* Bastard — AF147135, AF147136; [7]*F. lima* (L.) P.M.Peterson, Romasch. & Soreng — AF478498, JQ972949; *F. lenensis* Drobow — Talbot 2005 (US), Talbot 2005 (US); *F. ligulata* Swallen — Peterson 18878 (US), Peterson 10050 (US); *F. longiauriculata* Fuente, Ortunez & Ferrero Lom. — AF478479; *F. longivaginata* Tovar — EF584951; *F. luciarum* Connor — AY524828; *F. macrophylla* Hochst. ex A.Rich. — KY368845; *F. madida* Connor — AY524833; *F. magellanica* Lam. — KY368829; *F. maritima* L. — AF478492; *F. matthewsii* (Hack.) Cheeseman — AY524836; *F. matthewsii* subsp. *aquilonia* Connor — AY524835; *F. matthewsii* subsp. *latifundii* Connor — AY524837; *F. matthewsii* subsp. *pisamontis* Connor — AY524831; *F. mediterranea* (Hack.) Prain — AJ508376, AJ508375; [4]*F. megalura* Nutt. — Peterson 13791 (US), Peterson 13921(US); *F. melanopsis* Foggi, Gr.Rossi & M.A.Signorini — EF584952; [6]*F. membranacea* (L.) Druce — AY118090, KF917301; [6]*F. membranacea* subsp. *fontqueriana* (Melderis & Stace) P.M.Peterson, Romasch. & Soreng — AF478488, KF917260; [6]*F. microstachys* Nutt. — Crampton 1875 (US); [6]*F. microstachys* var. *ciliata* A.Gray ex Beal — Raven 18208 (US), Sharsmith 3528 (US); *F. minutiflora* Rydb. — Spreadborough 21034 (US), MG216207, MG216712; *F. multinodis* Petrie & Hackel — AY524827; [6]*F. muralis* Kunth — AF478484, AY118091; [6]*F. myuros* L. — Atwood Ex86B01 (US), Peterson 18750 (US), AJ240162; *F. nardifolia* Griseb. — EF584954; *F. nemoralis* T rpe — KY368821; *F. nevadensis* (Hack.) K.Richt. — AF478477; *F. nitida* Kit. ex Schult. — KY368826, KY368826; *F. norica* (Hack.) K. Richt. — EF584955; *F. novae*-zelandiae (Hack.) Cockayne — AY524832; *F. occidentalis* Hook. — Calder 12451 (US), EF397235, EF584956; [6]*F. octoflora* var. *glauca* (Nutt.) Fernald — Stevens 242 (US); [4]*F. octoflora* var. *hirtella* (Piper) Hitchc. — Barkley 3133 (US); [6]*F. octoflora* Walter — Freeman 54128 (US), Demaree 30495 (US); *F. orthophylla* Pilg. — EF584957; *F. ovina* L. — Stevens 1200 (US), Taylor 1044 (US); *F. pallens* Host — AY254373; *F. pampeana* Speg. — KY368822; *F. panciciana* (Hack.) K. Richt. — JQ972951; *F. paradoxa* Desv. — Leoschke 2326 (US); *F. parodiana* (St.-Yves) Nicora — EF584959; *F. perrieri* A. Camus — KY368846; *F. peruviana* Infantes — KY368836; *F. petraea* Guthnick — EF584961, EF584962; *F. picturata* G. Pils — KY368827; *F. pilgeri* St.-Yves — KY368847; *F. plebeia* R. Br. — KJ598994; *F. plicata* Hack. — AF478483, KF917335; *F. polesica* Zapal. — AF171130; *F. pringlei* St.-Yves — KY368837; *F. prolifera* var. *lasiolepis* Fernald — MG216314, MG216559; *F. pseudodalmatica* Krajina ex Domin —

AY254374; *F. pseudovina* Hack. ex Wiesb. — Stevens 2580 (US), AY254375; *F. pumila* Chaix — KY368817, KY368817; *F. purpurascens* Banks & Sol. ex Hook. f. — EF584964; *F. pyrenaica* Reut. — AF303423; *F. pyrogea* Speg. — KY368830; [6]*F. quadriflora* Honck. — AF303413, Hermann 4137 (US), Silveus 102 (US); *F. queriana* Litard. — AF532957; *F. richardsonii* Hook. — Talbot 139-59 (US); *F. rigescens* (J. Presl) Kunth — Peterson 12993 (US), Peterson 13067 (US), deMichel 2855 (US); *F. rivularis* Boiss. — AF478475, EF584967; *F. roemeri* (Pavlick) E.B. Alexeev — Hitchcock 23518 (US), Swallen 5985 (US); *F. roemeri* var. *klamathensis* B.L.Wilson — Wilson 6938 (US); *F. rothmaleri* (Litard.) Markgr.-Dann. — AF478476; *F. rubra* L. — Peterson 18424 (US), Dore 1947 (US); *F. rubra* subsp. *arctica* (Hack.) Govor. — JN999220; *F. rubra* subsp. *arenaria* (Osbeck) F.Aresch. — Porsild 364 (US); *F. rubra* subsp. *arenicola* E.B.Alexeev — Muenscher 8967 (US); *F. rubra* subsp. *commutata* Gaudin — Chase 12264 (US), Wilson 7963 (US), Glerisch 2152 (US); *F. rubra* subsp. *fallax* (Thuill.) Nyman — AF147148; *F. rubra* subsp. *littoralis* (G. Mey.) Auquier — AF147150; *F. rubra* subsp. *vallicola* (Rydb.) Pavlick — Suksdorf 7539 (US); *F. rupicaprina* Beck — AF171145; *F. rupicola* Heuff. — AJ508379, AY254376; [4]*F. salzmannii* (Boiss.) Boiss. ex Coss. — AF478497, JQ972946; *F. saximontana* Rydb. — Peterson 18349 (US), Peterson 18525 (US); *F. saximontana* subsp. *purpusina* (St.-Yves) Tzvelev — Keck 4698 (US), Thompson 7529 (US); *F. scabriculmis* K.Richt. — EF584970; *F. schimperiana* A.Rich. — Peterson 24362 (US); [6]*F. sicula* C. Presl — AY118089, KF917356; *F. stricta* Host — AY254377, EF584972; *F. subantarctica* Parodi — EF584973; *F. subuliflora* Scribn. — Thompson 11569 (US), Baker 156 (US); *F. subverticillata* (Pers.) E.B.Alexeev — Peterson 15784 (US); *F. tatrae* (Czakó) Degen — HM453196; *F. thurberi* Vasey — Gillespie 6306 (US), Peterson 7816 (US); *F. tolucensis* Kunth — EF584976; *F. trachyphylla* (Hack.) R.P.Murray — Wilson 8193 (US), Cochrane 13228 (US); *F. ulochaeta* Nees — KU883501; *F. ultramafica* Connor — AY524826; *F. vaginalis* (Benth.) Lægaard — AY254379, EF584977; *F. valesiaca* Schleich. ex Gaudin — Soreng 7896 (US), Soreng 7926 (US); *F. ventanicola* Speg. — KY368823; *F. versuta* Beal — Albers 43Ph000 (US), Silveus 2721 (US); *F. violacea* Gaudin — EF584979; *F. viridula* Vasey — Thompson 15009 (US), MG215968; *F. vivipara* (L.) Sm. — Holmen 118 (US); *F. viviparoidea* Krajina ex Pavlick — EF584980, MG215979; [6]*F. vulpioides* Steud. — KY368828; *F. wagneri* (Degen, Thaisz & Flatt) Soó — AY254378; *F. woronowii* Hack. — KY368818; *F. yalaensis* Joch. Müll. & Catalán — GQ849279.

1) contains three species all placed in *Xanthochloa* in our analysis; 2) contains five species placed in *Drymochloa* in our analysis with addition of *F. pseudoeskia* Boiss. and *F. scariosa* Lag., and these five *Drymochloa* species are sister to two species we place in *Locajonoa* with addition of *F. patula* (= *F. triflora*), and sister to all in this clade is *Hesperochloa kingii*; and 3) contains 10 species of *Lolium* s.l. (including *Schedonorus*), all of these were confirmed in our study.

Of the BL species in our study, only *Xanthochloa* did not include the type, *X. karatavica*. However, we feel confident that our sample of the Afghanistan *Xanthochloa griffithiana*, is morphologically and genetically similar to the Turkestan *X. karatavica* since Tzvelev (2006) indicated they were "very close," and that there is "no basis to keep these two species within *Festuca*." Sennikov and Tojibaev (2021) also recognized the morphological similarity of *X. karatavica* and *X. griffithiana* by relegating the latter species as a synonym of the former but choosing to place it in *Lolium* as *L. karatavicum* (Bunge) Sennikov. In addition, Bor (1960) and IPNI (2025) place *Festuca subspicata* var. *griffithiana* St.-Yves (≡ *X. griffthiana*) as a synonym of *Leucopoa karatavica* (Bunge) V.I.Krecz. & Bobrov and *Festuca karatavica* (Bunge) B.Fedtsch., respectively.

Moreno-Aguilar et al. (2022) identified a set of diagnostic morphological characters within seven subgenera in the Loliinae. Their nuclear rDNA 5S-dervied phylogeny included a Mexico-Central-South American I clade (MCSAI) with six species all found in our *Valdesochloa* gen. nov. clade, whereas members of their MCSCII are scattered in their tree or attributed to *Leucopoa* (*F. kingii* and *F. spectabilis* Jan ex Bertol.) and in our tree all are found in our *Hesperochloa* clade. Five of our species of *Valdesochloa*, gen nov. are aligned in MCSA I in their plastome tree (Moreno-Aguilar et al. 2022). Additionally, in their nuclear rDNA 5S-derived phylogeny, there are well supported clades for *Lolium, Patzkea* (= *Xanthochloa* as treated below), and *Pseudobromus*; and *Drymochloa lasto* (Boiss.) Holub is sister to *Locajanoa patula* (Moreno-Aguilar et al. 2022).

Even though *Leucopoa calabrica* does not appear within the *Locajonoa* clade (see Fig. 1), by virtue of its proximity near *Locajonoa*, there is a good possibility it would align within *Locajonoa* with the inclusion of additional species in our analysis. It is possible that long-branch-attraction pulled it away from the *Locajonoa* clade where it is weakly supported as sister to *Hesperochloa*. Other species placed in *Leucopoa* in Euro+Med Plantbase (Müller and Foggi 2011) are: *Leuc. carpatica* (F.Dietr.) H.Scholz [aligns within *Festuca* s.s. in our unpublished preliminary ITS-derived tree in a clade with *Leuc. dimorpha* (Guss.) H.Scholz & Foggi ≡ *Festuca dimorpha* Guss., see Fig. 1 for the later taxon], *Luec. caucasica* (Boiss.) V.I. Krecz. & Bobrov, *Leuc. laxa* (Host) H.Scholz & Foggi (aligns in *Festuca* s.s. in our prilimnary unpublished ITS-derived tree), *Leuc. pulchella* (Schrad.) H.Scholz & Foggi ≡ *Hesperochoa pulchella,* comb. nov., *Leuc. sclerophylla* (Boiss. ex Bisch.) V.I. Krecz. & Bobrov ≡ *Xanthochloa sclerophylla*, comb. nov., *Leuc. spectabilis* (Jan ex Bertol.) H.Scholz & Foggi ≡ *Hesperostipa spectabilis*, comb. nov.. and *Leuc. stygia* (H. Scholz & Strid) H.Scholz & Foggi.

Tzvelev and Probatova (2019) in the grasses of Russia recognized five genera in the Loliinae: *Drymochloa, Festuca, Lolium, Schedonorus*, and *Vulpia*. Their subge-

neric classification of *Festuca* includes two subgenera *Festuca* s.s. and *F.* subg. *Hesperochloa*, each with three sections. The latter subgenus containing two species we place in *Hesperochloa* (*F. altaica* Trin. and *F. hubsugulica* Krivot.), one species we place in *Leucopoa* [*L. albida* (Turcz. ex Trin.) V.I.Krecz. & Bobrov], and one species we include in *Xanthochloa* (*F. sclerophylla*).

Our placement of *Festuca muelleri* Vickery within the *Drymochloa* clade is incongruent with GPWG III (2024) nuclear tree where it is sister to *Patzkea paniculata* (≡ *Xanthochloa paniculata*, comb. nov., see below). Their study additionally includes *Drymochloa drymeja* (type) which pairs with *Locajonoa coerulescens*. We feel reasonably confident that *Festuca muelleri* should be placed in *Drymochloa* since we include two accessions of this species that form a clade within *Drymochloa,* and we are confident in our determination since we generated the sequence of *Burcham 93* (from US) and it pairs with *Walsh 6797* (*KJ598993) determined as *F. muellerii* in the Australasian Virtual Herbarium (AVH 2025). Perhaps the large number of samples included in our study of species from the BLC improved the functionality of the algorithm used in the Bayesian analysis.

There are quite a few species with narrow, filiform or conduplicate leaf blades (≤ 2 mm wide) that are placed in our *Hesperochloa* clade and at least two species, *F. molokaiensis* Soreng, P.M. Peterson & Catalán and *F. sinensis* with this trait have been included in NLC based on plastome-derived phylogenies (Moreno-Aguilar et al. 2022; GPWG 2024). These species could be NL/BL hybrids, and, in addition, they could have multiple copies of ITS but we only sampled those that align within the BL clade. *Festuca bajacalifornia*na is another species with narrow leaf blades and morphologically, it is similar to *F. ovina*. However, there is no plastome data available for this species, but we suspect it might align in the NLC.

TAXONOMY

We make the necessary new combinations in *Drymochloa, Festuca*, *Hesperochloa, Leucopoa, Locajonoa, Lolium, Pseudobromus*, and *Xanthochloa* that are supported by our ITS-derived phylogeny, describe two new genera, *Munnikopoa* and *Valdesochloa* with more new combinations, and provide a key to the genera. An asterisk (*) indicates the species were included in our ITS phylogeny.

Drymochloa Holub, Folia Geobot. Phytotax. 19(1): 96. 1984.

Type: *Drymochloa sylvatica* (Pollich) Holub, Folia Geobot. Phytotax. 19(1): 99. 1984.

Description

Perennials tufted, sometimes with butt sheaths persistent and investing base of culm with fibrous dead sheaths (*D. drymeja*), basal innovations extravaginal, sometimes intravaginal; rhizomes wanting, if present, short (*F. pseudoeskia*). *Culms* 20–150 cm tall, erect. *Leaf sheaths* open for most of their length, glabrous, smooth or scabrous, sometimes antrorsely scabrous (*F. muelleri*); *ligules* 1.5–6 mm long, membranous, eciliate, often lacerate; *blades* 2–15 mm wide (1–2 mm wide in *F. pseudoeskia* and *F. scariosa*), flat, sometimes conduplicate (in *F. pseudoeskia* and *F. scariosa*), scabrous or smooth. *Inflorescence* usually an open panicle, ovate, elliptic or pyramidal, 10–50 cm long, axis scaberulous or smooth. *Spikelets* 5–15 mm long (12–15 mm long in *F. muelleri*, all other spp. 5–8 mm), 2–6-flowered, elliptic or oblong, laterally compressed; *rachilla* glabrous or sometimes scaberulous (*F. muelleri*); *floret callus* glabrous, rarely pubescent (*F. muellerii*); *glumes* shorter than the spikelet, the lower 0.6–0.9 as long as the upper, chartaceous, sometimes hyaline (*F. pseudoeskia*) or sometimes membranous (*D. sylvatica*); *lower glumes* 2–8 mm long, lanceolate, 1-veined, sometimes 3–5-veined (*F. muelleri*); *upper glumes* 3–6.2 mm long, lanceolate, 1-,3, or 5-veined; *lemmas* 3.5–10 mm long, ovate, lanceolate, sometimes oblong (*F. scariosa*), chartaceous, sometimes scarious (*F. scariosa*), 5-veined, sometimes 3-veined (*D. sylvatica*), scaberulous or scabrous, apex entire, rarely mucronate (*F. scariosa*); *paleas* 2-veined, keels scaberulous. *Flowers* perfect; *lodicules* 2; *anthers* 2–5 mm long, 3; *ovary* pubescent on apex, sometimes glabrous (*F. muelleri*). *Caryopses* hairy at apex, sometimes glabrous (*D. donax*).

Species

Drymochloa asthenica (Hook. f.) Holub, **D. donax* (Lowe) H.Scholz & Foggi **D. drymeja* (Mert. & W.D.J.Koch) Holub, *D. drymeja* subsp. *exaltata* (C.Presl) Foggi & M.A.Signorini, *D. grandis* (Coss. & Durieu) Holub, **D. lasto* (Boiss.) Holub, *D. sinomutica* (X. Chen & S.M.Phillips) Tzvelev, *D. sylvatica* (= **Festuca altissima* All.), and three more (see below).

Distribution

Europe, Asia, Africa, Macronesia, Australasia (*F. muelleri*).

Drymochloa muelleri (Vickery) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca muelleri* Vickery, Contr. New South Wales Natl. Herb. 1: 9. 1939.

Type: Australia, New South Wales, Victoria, Mt. Buller, Mar 1853, *F.J.H. von Mueller s.n.* (holotype: K000913271[image!]; isotype: MEL223497 [image!]).

Drymochloa pseudoeskia (Boiss.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca pseudoeskia* Boiss., Elench. Pl. Nov. 91. 1838.

Type: Spain, in summit glareosis in Sierra Nevada, alt. 9000-10000 ft, Aug 1837, *P.E. Boissier 195* (lectotype, designated by Burdet et al., Candollea 36: 568. 1981: G-Boissier 00165735 [image1]; isolectotypes: BM001067171 [image!], CWU0051272 [image!], E00381967 [image!], G00165734 [image!], G00165736-43 [images!], K000912898 [image!], LE00009843 [image!], LE00009844 [image!], TUB008867 [image!], US-1006889!).

Drymochloa scariosa (Lag. ex Willk.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Poa scariosa* Lag., Gen. Sp. Pl. 3. 1816.

Type: Spain, Caidiz, puerto de las Palomas, Pico Coros, 30STF8874, 1331 m, 29 Apr 2002, *V. de la Fuente García s.n.* (neotype, designated by V. Fuente García et al., Taxon 52(3): 609. 2003: MAF-162539).

(=) *Festuca granatensis* Boiss., Elench. Pl. Nov.: 93. 1838.

Type: Spain, in omnibus montibus Regn. Granat. 4000–9500 ft, Jul 1837, *P.E. Boissier 198* (lectotype designated by Burdet et al., Candollea 36: 566. 1981: G00165721 [image!]; isolectotypes: BM001067172 [image!], GOET006291 [image!], HAL0107007 [image!], JE00006373 [image!], LE00009784 [image!], LE00009785 [image!], LE00009786 [image!], MICH1108669 [image!], MPU027854 [image!], MPU027855 [image!], W0033067 [image!]).

(≡) *Festuca scariosa* (Lag.) Asch. & Graebn., Syn. Mitteleur. Fl. 2(1): 502. 1900.

Festuca albaredae (Paunero) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Micropyrum albaredae* Paunero, Trab. & Com. Simpos. v. Fl. Eur. 1967: 326. 1969.

Type: Spain, Province of Cáceres, Alía, near the Guadarranque River, 25 May 1949, *E. Paunero s.n.* (MA144296-2 [image!] lectotype designated here; isolectotype: MA144296 [image!]).

(≡) *Triticum patens* Brot., Fl. Lusit. 1: 120. 1804.

Type: Spain, Province of Cáceres, Alía, near the Guadarranque River, 25 May 1949, *E. Paunero s.n.*; MA144296-2 [image!] neotype designated here; isoneotype: MA144296 [image!]).

(≡) *Micropyrum patens* (Brot.) Rothm. ex Pilg., Bot. Jahrb. Syst. 74(4): 567. 1949.

Notes

Unfortunately, the collections that Felix de Avellar Brotero (Brot.) used for his "Flora Lusitanica" are lost (Ana Isabel D. Correia, Curator of vascular plants, LISU, pers. comm.). *Festuca patens* Steud. [Syn. Pl. Glumac. 1(6): 428. 1854] already exits so we have chosen the next available synonym, *F. albaredae*, and we use the type of the latter name to neotypify *Triticum patens*. *Micropyrum albaredae* (= *Festuca albaredae*) was listed as a synonym of *Micropyrum patens* in Flora Europaea (Stace 1980), Euro+Med PlantBase (Valdés and Scholz 2009), and Flora Iberica (López and Devesa 2020).

Festuca ambilobensis **(**A.Camus) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Pseudobromus ambilobensis* A. Camus, Bull. Soc. Bot. France 102: 120. 1955.

Type: Madagascar, Domaine central de Madagascar (N): massif de Marivorahona, au SW de Manambato, haute Mahavavy du N, distr. d'Ambilobe, 2000–2244 m, Mar 1951, *H. Humbert & R. Capuron 25809* (holotype: P-00446512 [image!]; isotype: P-00446513 [image!]).

Notes

Pseudobromus ambilobensis is sister to *Festuca pilgeri* St.-Yves in the nuclear DNA tree, and both species clearly lie in the *Festuca* NLC (GPWG 2024). This species has narrow leaf blades similar to the majority of species attributed to the NLC (Camus 1955).

Festuca lima (L.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Cynosurus lima* L., Sp. Pl.: 72. 1753.

(≡) *Eleusine lima* (L.) Lam., Tabl. Encycl. 1: 203. 1791 [1792].

Type: Spain, *P. Löfling #74a* (lectotype, designated by Hernández Cardona, Anales Jard. Bot. Madrid_37: 86. 1980, central specimen on the sheet: LINN-HL91-4 [image!]).

(≡) *Wangenheimia lima* (L.) Trin., Fund. Agrost.: 132. 1820.

(≡) *Poa lima* (L.) Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1(4): 392. 1830.

Notes

In our overall unpublished tree that included 185 narrow-leaved species of *Festuca*, *Wangenheimia lima* (GenBank JQ972949) aligns in a grade between *Festuca capillifolia* Dufour ex Roem. & Schult. and *F. magellanica* Lam. *Wangenheimia lima* was also found in the the *Festuca* NLC by GPWG (2024).

Festuca membranacea subsp. ***fontqueriana*** (Melderis & Stace) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Vulpia* f*ontqueriana* Melderis & Stace, Collect. Bot. (Barcelona) 7: 782. 1968.

Type: Spain, Prov. Cáldiz, the Marismas near Sanlúcar, in bare dry sand under sparse *Pinus pinea* L. trees, elevation less than 50 ft, 30 Apr 1961, *C.A. Stace 411* (holotype: BM001067184 [image!]; isotype: RSA0000508 [image!]).

Notes

In our overall unpublished tree that included 185 narrow-leaved species of *Festuca*, two accessions of *Vulpia fontqueriana* are embedded but not paired in a clade with two specimens of *F. membranacea* (L.) Druce. These four accessions are then sister in a strongly supported clade to two accessions of *F. alopecuros* Schousb.

Hesperochloa (Piper) Rydb., Bull. Torrey Bot. Club 39: 106. 1912.

Type: *Hesperochloa kingii* (S. Watson) Rydb., Bull. Torrey Bot. Club 39(3): 106. 1912.

Description

Perennials tufted, butt sheaths often persistent and investing base of culm; with compacted often fibrous dead sheaths, basal innovation intravaginal or extravaginal, sometimes with short rhizomes, rarely elongated (some individuals of *F. parviflora*). *Culms* 15–150 mm long, erect, sometimes geniculately ascending (*F. bajacalifornia, F. hubsugulica, F. nitidula*). *Leaf sheaths* usually open for most of their length, rarely closed 0.5–0.75 (*F. pulchella*), usually glabrous, sometimes puberulent; *ligules* usually less than 1 mm long, membranous, truncate or with *ligules* 1.5–12 mm long (*F. dichoclada, F. modesta, F. molakaiensis, F. spectabilis*), membranous, obtuse to acute; *blades* 0.4–12 (–23) mm wide, flat, conduplicate, sometimes convolute (*F. elmeri, F. quadridentata*), glabrous or hairy. *Inflorescence* an open or contracted (*F. aloha, F. argentina, H. kingii, F. molokaiensis, F. washingtonica*) panicle 4–45 cm long. *Spikelets* 5–16 mm long, (2–) 3–7 (–10)-flowered, oblong, lanceolate, elliptic, ovate, sometimes cuneate (*F. elmeri, F. subulata*) or obovate (*F. parvigluma*), laterally compressed; often with *rachilla* internodes up to 1.5 mm long, these usually scaberulous; *floret callus* usually obtuse, glabrous, rarely pubescent (*F. argentina*); *glumes* shorter than the spikelet, the lower, the lower 0.5 to as long as the upper, chartaceous, membranous, or hyaline; *lower glumes* 1–7.5 mm long, lanceolate, sometimes ovate (*F. parvigluma*), 1-veined; *upper glumes* 2–9 mm long, lanceolate, sometimes ovate (*F. parvigluma*) 3-veined, sometimes 1-veined (*F. subulata*); *lemmas* 5–11 mm long, lanceolate, oblong or ovate, 5-veined, chartaceous or sometimes membranous, unawned, entire or awned, the awns 1–20 mm long, sometimes mucronate (*F. aloha, F. quadridentata*); *paleas* 2-veined, scabrous, keels scabrous, sometimes the keels ciliolate (*F. argentina*). *Flowers* perfect, sometimes dioecious (*F. hubsugulica, H. kingii*) or monoecious (*F. altaica*); *lodicules* 2; *anthers* 0.5–5 mm long, 3; *ovary* pubescent on apex or glabrous. *Caryopses* glabrous or hairy at apex (*F. parvigluma, F. subulata*).

Species

**Hesperochloa kingii* and 23 more, including one subspecies (see below).

Distribution

North America, Central America, South America, Pacific (Hawaii), Europe, and temperate Asia.

****Hesperochloa aloha*** (Catalán, Soreng & P.M.Peterson) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca aloha* Catalán, Soreng & P.M.Peterson, J. Bot. Res. Inst. Texas 3(1): 51–54, f. 1, A–J. 2009.

Type: U.S.A., Hawaii, Kauai, Hanalei District, Kalalau Rim, Kalalau side below and W of the first Kalalau lookout, 790 m, 13 Mar 1992, *K.R. Wood & S. Perlman 1701* (holotype PTBG-17679!; isotype US-3252239!).

***Hesperochloa altaica** (Trin.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca altaica* Trin., Fl. Altaic. 1: 109–110. 1829.

Type: Russia, Siberia, in summa alpe ad fontem fl. Acjulac rarissima, 1826, *Ledebour & Meyer s.n.* (lectotype designated by Tzvelev, Zlaki SSSR 388. 1976: LE01010145-2 [image!]).

(=) *Festuca scabrella* Torr. in Hooker, Fl. Bor.-Amer. 2: 252, pl. 233. 1840.
Type: *T. Drummond 187*; s.d.; USA: Rocky Mountains (lectotype K000913247 [image!], GH (photo US), NY-97944, US-556126! fragm. ex herb. Torrey).

***Hesperochloa amplissima** (Rupr.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca amplissima* Rupr., Bull. Acad. Roy. Sci. Bruxelles 9(2): 236. 1842.

Type: Mexico, Veracruz: Vaquería de Jacal, Pic d'Orizaba, 10000 ft, Jun–Oct 1840, *H. Galeotti 5766* (lectotype, designated by Gonzalez-Ledesma et al., Biotam. 12: 52. 2001 (first step); lectotype, designated here (second step): BR00000686415 [image!]; isolectotypes BR000000686352 [image!], BR00000686351 [image!], BR00000686382 [image!], BR00000686451 [image!], LE00000725 [image!], US-2875372! fragm. ex W, W0031816 [image!]).

Notes

The lectotype includes an annotation label by E. Alexeev dated IV 1980 indicating the specimen is a lectotype.

***Hesperochloa argentina** (Speg.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Poa argentina* Speg. Revista Fac. Agron. Vet. La Plata 3(30–31): 584–585. 1897.

Type: Argentina, Santa Cruz, Hab. ad margim orientalem Lago Argentino, 1884, *C. Tonini s.n.* (holotype LP001626 [image!]; isotypes BAA00000487 [image!], US-81670!).

(≡) *Festuca argentina* (Speg.) Parodi, Physis (Buenos Aires) 11: 498. 1935.

***Hesperochloa bajacaliforniana** (Gonz.-Led. & S.D.Koch) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca bajacaliforniana* Gonz.-Led. & S.D.Koch, Novon 4(1): 28–29, f. 3. 1994.

Type: Mexico, Baja California, Sierra de San Pedro Martir, N slope of Cerro "2828', near 31.02N 115.27W, 2800 m, 14 Sep 1968, *R. Moran 15619* (holotype ENCB; isotypes LL00208541 [image!], MSC0085291 [image!], SD00000046 [image!], US-2886915!).

***Hesperochloa campestris** (Rydb.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca campestris* Rydb., Mem. New York Bot. Gard. 1: 57. 1900. **nom. nov.**

Type: Washington: Spokane Co.: collected on prairies, 18 Jun 1884, *W.N. Suksdorf 118* (holotype US00132498!).

Festuca scabrella var. *major* Vasey, Contr. U.S. Natl. Herb. 1(8): 278–279. 1893.

***Hesperochloa dasyclada** (Hack. ex Beal) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca dasyclada* Hack. ex Beal, Grass. N. Amer. (ed. 2) 2: 602. 1896.

Type: U.S.A, Utah, 1875, *C.C. Parry 93* (lectotype, designated by Darbyshire & Pavlick, Phytologia 82(2): 76. 1997: US-556197!; isolectotypes GH00023726 [image!], ISC-v-0000534 [image!], MO8979333–5 [images!], NY00381051 [image!]).

(≡) *Argillochloa dasyclada* (Hack. ex Beal) W.A.Weber, Phytologia 55(1): 1. 1984.

***Hesperochloa dichoclada** (Pilg.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca dichoclada* Pilg., Bot. Jahrb. Syst. 37: 514. 1906.

Type: Peru, Ancash, in declivibus montium Cordillera Blanca supra Caraz, 3300–3600 m, 9 Jun 1903, *A. Weberbauer 3230* (B-10-0002570 [image!] lectotype designated here; isolectotypes B-10-0002571 [image!], BAA00000856 [image!], MOL00007849 [image!], US-2875396! fragm. ex B).

***Hesperochloa elmeri** (Scribn. & Merr.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca elmeri* Scribn. & Merr., Bull. Torrey Bot. Club 29(7): 468. 1902, *nom. cons.* against *Festuca howelii* Hack. ex Beal.

Type: U.S.A., California, Santa Clara Co., Stanford University, Apr 1901, *A.D.E. Elmer 2101* (holotype US-556198!; isotype MICH1108668 [image!]).

***Hesperochloa extremiorientalis** (Ohwi) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca extremiorientalis* Ohwi, Bot. Mag. (Tokyo) 45: 194. 1931.

Type: Korea, Kankyo-Hokudo, Kwaysanryon, 24 Jul 1930, *J. Ohwi 2500* (holotype Herb. Univ. Imp. Kyotoensis; isotype US-1647258! ex herb. J. Ohwi).

(=) *Festuca subulata* var. *japonica* Hack., Bull. Herb. Boissier 7(9): 713. 1899.

Type: Japan, Nikko, *J. Matsumura 173* **(**W1916-0004585 [image!] ex Herbarium E. Hackel, lectotype designated here; isolectotype US-0101561! ex Herb. Hack.).

(≡) *Festuca subulata* subsp. *japonica* (Hack.) T.Koyama & Kawano, Canad. J. Bot. 42: 875. 1964.

***Hesperochloa hallii** (Vasey) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Melica hallii* Vasey, Bot. Gaz. 6(12): 296–297. 1881. Type: USA, Colorado, Rocky Mts., Lat. 39º, 1862, *Hall & Harbour 621* -- no. *Hall 7* (lectotype? [Pavlick annotation May 1981]: US00134197!; isolectotype MO2151730, US00134198!, US00134199!).

(≡) *Festuca hallii* (Vasey) Piper, Contr. U.S. Natl. Herb.10: 31. 1906.

***Hesperochloa hubsugulica** (Krivot.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca hubsugulica* Krivot., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17: 77. 1955.

Type: Mongolia, locus Hubsugul, vallis Arassaj., 13 Jul 1902, *V. Komarov s.n.* (holotype LE?).

(=) *Festuca popovii* E.B.Alexeev, Byull. Moskovsk. Obshch. Isp. Prir. Otd. Biol. 83(5): 94. 1978.

Type: Russia, Buryatiya, Lacus Baical, fretum Czivyrkuiski, insula (Lochmatyi Kaltygoi) in saxis ripae septentrionalis, 54°01′ N, 103°06′ E, 25 Jun 1954, *M.G. Popov, G.A. Peschkova & P.A. Novokschonov s.n.* (holotype: NSK0000434 [image!]).

(≡) *Festuca insularis* Popov, *nom. illeg. hom.*, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Kazahsk. SSR 18: 4. 1957.

***Hesperochloa modesta** (Nees) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca modesta* Nees, Syn. Pl. Glumac. 1: 316. 1855 [1854].

Type: Nepal, *J.F. Royle 161* (lectotype LIV1952.121.10825ii (2 of 3) [image!]; isolectotypes LIV1952.121.10825i [image!], LIV1952.121.10825iii [image!]).

(≡) *Drymochloa modesta* (Nees) Holub, Preslia 70(2): 104. 1998.

***Hesperochloa molokaiensis** (Soreng, P.M.Peterson & Catalán) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca molokaiensis* Soreng, P.M. Peterson & Catalán, J. Bot. Res. Inst. Texas 3(1): 54-55, f. 1K. 2009.

Type: U.S.A., Hawaii, Molokai, Kupaia Gulch, on steep slopes in mesic forest, 800 m, 3 Apr 2007, *H.L. Oppenheimer, S. Perlman & N. Tangalin H40704* (holotype: BISH-728771!).

***Hesperochloa nitidula** (Stapf ex Hook. f.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca nitidula* Stapf ex Hook. f., Fl. Brit. India 7(22): 350. 1897.

Type: China, Valley of (Tibet), 15,000 ft, *R. Strachey & J.E. Winterbottom 1* (BR6863241 [image!] lectotype designated here; isolectotype BM000885638 [image!]). Basionym.

Notes

Annotated by E.B. Alexeev in Feb 1980 as an isoneotype.

***Hesperochloa parvigluma** (Steud.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca parvigluma* Steud., Syn. Pl. Glumac. 1: 305. 1855.

Type: ex Hrbo. Mus. Lugd. Batav. Japonia, *Bürger s.n.* (isotype: S-G-6683 [image!]).

Notes

Bürger is the collector as annotated by E.B. Alexeev in Dec 1981, as an isotype.

Hesperochloa pulchella (Schrad.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca pulchella* Schrad., Fl. Germ. (Schrad.) i. 336. t. 5. 1806.

Type: Germany, Salisburgensibus, *Miclichhofer s.n.* (isotype: LE00009850 [image!]).

(≡) *Leucopoa pulchella* (Schrad.) H.Scholz & Foggi, Willdenowia 35(2): 243 (2005).

Hesperochloa pulchella subsp. ***jurana*** (Gren.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca pulchella* var. *jurana* Gren., Mém. Soc. Émul. Doubs Ser. 3, 10: 925. 1869.

Type: Hab. Cimes du Jura, le Reculet, au vallon d'Ardran, le Colombier. Basionym.

(≡) *Leucopoa pulchella* subsp. *jurana* (Gren.) H.Scholz & Foggi, Willdenowia 35(2): 243 (2005).

Hesperochloa quadridentata (Kunth) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca quadridentata* Kunth, Nov. Gen. Sp. (quarto ed.) 1: 154. 1815 [1816].

Type: Ecuador, Chimborazo, Guamote, 2860 m, *F.W.H.A. von Humboldt & A.F.A. Bonpland 3221* (holotype P00669427 [image!]; isotypes BAA00002067 [image!], BAA00002068 [image!], P00625328 [image!]).

Hesperochloa sinensis (Keng ex E.B.Alexeev) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca sinensis* Keng ex E.B.Alexeev, Byull. Moskovsk. Obshch. Isp. Prir. Otd. Biol. 93(1): 112.1988.

Type: China (Gansu, Sichuan).

Hesperochloa sororia (Piper) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca sororia* Piper, Contr. U.S. Natl. Herb. 1(5): 197. 1913.

Type: U.S.A., Arizona, Rincon Mts, 2286 m, Sep 1891, *G.C. Nealley 177* (holotype US-45866!; isotypes GH00023751 [image!], MO992959 [image!], NY00381071-3 [image], PH00014092 [image!], US-919881!).

(≡) *Festuca subulata* var. *sororia* (Piper) St.-Yves, Candollea 2: 285. 1925.

Hesperochloa spectabilis (Jan ex Bertol.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca spectabilis* Jan ex Bertol., Fl. Ital. 1: 612. 1834.

Type: Italy, M. Baldo, *G. Jan 68.40* (isotypes BM001067178 [image!], K00912861 [image!], W18890256285 [image!]).

Hesperochloa subulata (Trin.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca subulata* Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 2(2): 173. 1832.

Type: U.S.A., Alaska, Ile de Sitcha, *Mertens s.n.* (holotype: LE?).

(=) *Festuca jonesii* Vasey, Contr. U.S. Natl. Herb. 1(8): 278. 1893.

Type: U.S.A., Utah, City Creek Canyon, 7300 ft, 17 Jul 1880, *M.E. Jones 1868* (holotype US-556194!; isotypes BM000578796 [image!], BR6863678 [image!], CAS000123974 [image!], CM0208 [image!], GH00023728 [image!], MICH1108672 [image!], PH00014073 [image!], RSA0006519 [image!]).

(≡) *Festuca subulata* var. *jonesii* (Vasey) St.-Yves, Candollea 2: 284. 1925.

Hesperochloa washingtonica (E.B.Alexeev) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca washingtonica* E.B.Alexeev, Byull. Moskovsk. Obshch. Isp. Prir. Otd. Biol. 87(2): 115. 1982.

Type: U.S.A., Washington, Chelan County, Wenatchee National Forest, Cashmere Ranger District, Peavine Canyon, T22N R19E S27, 47.369825°, -120.444165°, 3 Jun 1960, *J.G. Smith 133* (holotype LE00009875 [image!]; isotype WTU-V-36 [image!]).

Leucopoa Griseb., Fl. Ross. [Ledebour] 4(13): 383. 1852.

Type: *Leucopoa albida* (Turcz. ex Trin.) V.I.Krecz. & Bobrov., Fl. SSSR 2: 495. 1934.

(≡) *Leucopoa sibirica* Griseb., *nom. illeg. superfl.*

(≡) *Festuca sibirica* Hack. ex Boiss., Fl. Orient. [Boiss.] 5: 626. 1884.

Description

Perennials tufted, butt sheaths, pubescent (*F. komarovii*) or glabrous (*L. albida*), persistent and investing base of culm with fibrous dead sheaths), basal innovations intravaginal or extravaginal (sometimes in *L. albida*). *Culms* 20–45 cm tall, erect. *Leaf sheaths* open for most of their length, smooth or scaberulous; *ligules* 0.4–0.7 mm long, membranous, eciliate or ciliate (*F. komarovii*); *blades* (1.5–) 2–4 mm wide, flat, conduplicate (*L. albida*) or pruinose (*F. komarovii*), glabrous, margins smooth or scabrous. *Inflorescence* a contracted (*L. albida*) or open (*F. komarovii*) panicle 3–10 cm long, the branches smooth or scabrous. *Spikelets* 6–12 mm long, 2–7-flowered, oblong (*L. albida*) or obovate (*F. komarovii*), laterally compressed; *rachilla* glabrous or sometimes scabrous (*L. albida*); *floret callus* glabrous; *glumes* shorter than the spikelet, the lower 0.75–0.9 as long as the upper, hyaline (*L. albida*) or membranous (*F. komarovii*); *lower glumes* 3.5–5 mm long, lanceolate, 1-veined; *upper glumes* 4–6 mm long, lanceolate or ovate, 1–3-veined; *lemmas* 5.8–9 mm long, elliptic (*L. albida*) or oblong (*F. komarovii*), 5-veined, chartaceous (*F. komarovii*) or membranous (*L. albida*), smooth or papillose (*F. komarovii*) apex entire; *paleas* 2-veined, keels scaberulous. *Flowers* dioecious; *lodicules* 2; *anthers* 3–4.5 mm long, 3; *ovary* pubescent on apex. *Caryopses* hairy at apex.

Species

**Leucopoa albida*, *L. olgae* (Regel) Krecz. & Bobrov, and one more (see below).

Distribution

Temperate and tropical Asia.

****Leucopoa komarovii*** (Krivot.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca komarovii* Krivot., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17: 80. 1955.

Type: Russia. Prov. Irkutsk, Distr. Tunca, Montes Sajanenses, trajectus Char-Daban, 2 Jun 1902, *V. Komarov s.n.* (holotype LE01011328 [image!]).

Locajonoa Soreng, J. Syst. Evol. 60(3): 480. 2022, replaced name for *Festuca* sect. *Lojaconoa* Catalán & Joch. Müll., Taxon 55(1): 141. 2006, non *Lojaconoa* Bobrov (1967).

Type: *Locajonoa coerulescens* (Desf.) Soreng., J. Syst. Evol. 60(3): 481. 2022.

(≡) *Festuca coerulescens* Desf., Fl. Atlant. 1: 87. 1798.

(≡) *Patzkea coerulescens* (Desf.) H.Scholz., Willdenowia 40(2): 200. 2010.

Description

Perennials tufted, butt sheaths thickened or not (*F. patula*) and forming a tuberose base (anatomically with many sclerenchymatous cells), persistent and investing base of culm with fibrous dead sheaths (*F. coerulescens*), basal innovations intravaginal. *Culms* 60–130 cm tall, erect, nodes and internodes glabrous and smooth. *Leaf sheaths* glabrous; *ligules* 0.5–4.6 mm long (0.5–1 mm long in *F. coerulescens* and 1.5–4.6 mm in *F. patula*), membranous, apex truncate or obtuse; *blades* 2–7 mm wide, flat, scabrous, glabrous. *Inflorescence* an open panicle 5–30 cm long (5–10 cm long in *F. coerulescens* and 10–30 cm in *F. patula*), axis pubescent (*F. coerulescens*) or smooth. *Spikelets* 10–13 mm long, 3–6-flowered, elliptic, laterally compressed; *glumes* shorter than the spikelet, the lower ¾ as long as the upper, hyaline (*F. coerulescens*) or chartaceous, apices acuminate; *lower glumes* 4.5–5.5 mm long, lanceolate, 1-veined; upper glumes 5.5–6.5 mm long, oblong, 3-veined; *lemmas* 6–8.5 mm long (6–7 mm long in *F. coerulescens* and 7.8–8.5 mm in *F. patula*), lanceolate, 5-veined, chartaceous, puberulous (*F. coerulescens*) or scabrous (*F. patula*), apex attenuate, sometimes mucronate (*F. coerulescens*); *paleas* 2-veined. *Flowers* perfect; *lodicules* 2; *anthers* 3.5–4 mm long, 3; *ovary* apex densely strigose with stiff hairs. *Caryopses* hairy at apex.

Species

**Locajonoa coerulescens* (Desf.) Soreng and one more (see below).

Distribution

Europe and northern Africa.

Locajonoa patula (Desf.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca patula* Desf., Fl. Atlant. 1: 86–87. 1798.
Type: Habitat prope Bone et La Calle (Illustration in Fl. Atlant. 1: plate 20. 1798, lectotype designated here).

(=) *Festuca triflora* Desf., Fl. Atlant. 1: 87, t. 20. 1798, *nom. illeg. hom.*

(≡) *Patzkea patula* (Desf.) H.Scholz, Willdenowia 40(2): 200. 2010.

Lolium L., Sp. Pl. 1: 83. 1753.

Type: *Lolium perenne* L., Sp. Pl. 1: 83. 1753.

(≡) *Festuca perennis* (L.) Columbus & J.P.Sm., Aliso 28: 65. 2010.

Description

Annuals or *perennials,* usually tufted, sometimes with short rhizomes. *Culms* 10–200 cm tall, erect, geniculately ascending, or decumbent (rarely cormose: L. tuberosum). *Leaf sheaths* usually open for most of their length, glabrous or scabrous, auricles falcate or not falcate; *ligules* 0.1–4 mm long, membranous, eciliate; *blades* (1–) 2–15 mm wide, glabrous or scabrous. *Inflorescence* 4–30 cm long, a spike with sessile-inserted spikelets oriented radially to the main axis or a panicle. *Spikelets* 6–20 (–25) mm long, (2–) 3–12 (–15)-flowered, oblong, laterally compressed; *rachilla* glabrous or scaberulous; *floret callus* glabrous; *glumes* shorter than the spikelet, as long, or longer than the spikelet, 3–9-veined, lanceolate or oblong, membranous, chartaceous, or coriaceous, apices acute or obtuse; *lower glumes* 2–7 mm long or absent; *upper glumes* 3–28 mm long; *lemmas* 4–10 mm long, lanceolate, oblong, ovate or elliptic, membranous, chartaceous, coriaceous, sometimes indurate, 3–5 (–7)-veined, apex entire or awned, the awns up to 20 mm long; *paleas* 2-veined, keels scabrous. *Flowers* perfect; *lodicules* 2; *anthers* 1.3–4.6 mm long, 3; *ovary* glabrous. *Caryopses* 3–6 mm long, elliptic, glabrous.

Species

**Lolium apenninum* (De Not.) Ardenghi & Foggi, **L. arundinaceum* (Schreb.) Darbysh., **L. canariense* Steud., **L. font-queri* (St.-Yves) Banfi, Galasso, Foggi, Kopecký & Ardenghi, **L. edwardii* H. Scholz, Stierst. & Gaisb. **L. giganteum* (L.) Darbysh., **L. interruptum* (Desf.) Banfi, Galasso, Foggi, Kopecký & Ardenghi, **L. letourneuxianum* (St.-Yves) Banfi, Galasso, Foggi, Kopecký & Ardenghi, **L. loliaceum* (Bory & Chaub.) Hand.-Mazz., **L. lowei* Menezes, **L. mairei* (St.-Yves) Banfi, Galasso, Foggi, Kopecký & Ardenghi, **L. multiflorum* Lam., **L. perenne* L., **L. persicum* Boiss. & Hohen., **L. pratense* (Huds.) Darbysh., **L. remotum*, Schrank, **L. rigidum* Gaudin, **L. subulatum* Vis., **L. temulentum* L., **L. tuberosum* (Romero Zarco & Cabezudo) Banfi, Galasso, Foggi, Kopecký & Ardenghi.

Distribution

Europe, Asia, northern Africa (native); introduced in western hemisphere and Antartica.

Lolium simensis (Hochst. ex A.Rich.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca simensis* Hochst. ex A.Rich., Tent. Fl. Abyss. 2: 433. 1851 [1850].

Type: Ethiopia, Crescit in montibus simensibus, 1842, *G.W. Schimper 684* (isotypes: K000345291 [image!], MO-1742077 [image!]).

Munnikopoa Soreng, P.M.Peterson & Romasch., **gen. nov.**

Type. *Munnikopoa scabra* (Vahl) P.M.Peterson, Romasch. & Soreng,

(≡) *Festuca scabra* Vahl., Symb. Bot. 2: 21. 1791.

Description

Perennials tufted, with retrorsely strigose butt sheaths that are thickened and forming a tuberose base, persistent and investing base of culm with fibrous dead sheaths, basal innovations with short or elongated rhizomes. *Culms* 20–100 cm tall, erect. *Leaf sheaths* open for most of their length with retrorse velvet, silvery hairs, especially on lower portion; *ligules* 1.5–7 mm long, membranous, eciliate; *blades* 5–10 mm wide, flat, convolute. *Inflorescence* a contracted panicle 5–30 cm long, 1–3 cm wide, sometimes spike-like and interrupted below. *Spikelets* 7–15 mm long, 3–7-flowered, elliptic or oblong, laterally compressed; *rachilla* smooth, glabrous; *floret callus* smooth; *glumes* shorter than the spikelet, the lower 0.7–0.8 as long as the upper, chartaceous; *lower glumes* about 5 mm long, lanceolate, 1-veined, apex acute; *upper glumes* about 6 mm long,

lanceolate, 3-veined, apex acuminate; *lemmas* about 6 mm long, lanceolate, 5-veined, chartaceous, asperulous, apex entire, mucronate or short awned, the awns up to 1.2 mm long; *paleas* 2-veined, keels scaberulous. *Flowers* dioecious; *lodicules* 2; *anthers* 1.5–2 mm long, 3; *ovary* pubescent on apex.

Etymology

The name is derived from the Afrikaans common name, "Munnik fescue", which translates as monk fescue; and the species overall aspect resembles a *Poa*.

Distribution

Southern Africa.

****Munnikopoa scabra*** (Vahl) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca scabra* Vahl, Symb. Bot. 2: 21. 1791.

Type: South Africa, Cape of Good Hope, *Blow s.n.* (holotype: C10001144 [image!]).

Pseudobromus K.Schum., Pflanzenw. Ost-Afrikas C: 108. 1895.

Type: *Pseudobromus silvaticus* K.Schum., Pflanzenw. Ost-Afrikas C: 108. 1895.

Description

Perennials tufted, sometimes with butt sheaths persistent and investing the base of culm with fibrous dead sheaths (*F. costata* var. *breviseta*), with short, knotty rhizomes (*P. engleri, P. africana*), elongated rhizomes (*F. longipes*, *F. mekiste*) or without rhizomes. *Culms* 30–200 cm tall, erect. *Leaf sheaths* glabrous, smooth, sometimes open for most of their length (*F. longipes*), sometimes with falcate auricles (*F. mekiste*); *ligules* 0.5–8 mm long, membranous, eciliate; *blades* 2–20 mm wide, flat, sometimes convolute (*F. killickii*), usually with cross venation (transverse veinlets) and flaccid, glabrous or scaberulous. *Inflorescence* 10–50 cm long, ovate, open, usually with spreading or ascending, flexuous primary branches, sometimes corymbose (F. longipes) or pyramidal (*F. killickii*). *Spikelets* 7–20 mm long, 1–6-flowered, lanceolate, oblong, sometimes elliptic, laterally compressed; *rachilla* glabrous; *floret callus* usually pubescent and obtuse; *glumes* shorter than the spikelet, the lower 0.7–0.9 as long as the upper, membranous or chartaceous; *lower glumes* 2–6.5 mm long, lanceolate, 1-veined, sometimes 3-veined (*F. longipes*); *upper glumes* 3–8 mm long, lanceolate, 3-veined, sometimes 5-veined (*P. breviligulatus*) or 1–3-veined (*F. killickii*); *lemmas* 5–10 mm long, elliptic or lanceolate, 5-veined or 3–5-veined, membranous or coriaceous, sometimes chartaceous (*F. killickii*), subapically awned, the awns 9–20 mm long, flexuous with a 2-fid, dentate apex or apex mucronate (*F. killickii, F. longipes*), sometimes with an entire apex (*F. longipes*); *paleas* 2-veined, keels scaberulous. *Flowers* perfect, sometimes dioecious (*F. killickii*); *lodicules* 2; *anthers* 3.5 mm long (*F. costata* var. *breviseta*), 3; *ovary* pubescent on apex or sometimes glabrous (*F. mekiste*). *Caryopses* hairy at apex or glabrous.

Species

**Pseudobromus africanus* (Hack.) Stapf, **P. breviligulatus* Stapf ex A.Camus [Madagasgar, see Schatz et al. 2024], **P. engleri* (Pilg.) Clayton (= *Pseudobromus brassii* C.E. Hubb.), *P. humbertianus* A.Camus [Madagasgar, see Schatz et al. 2024], **P. silvaticus* K.Schum., *P. tenuifolius* A.Camus, and four more (see below).

Distribution

Africa and Madagascar.

****Pseudobromus brevisetus*** (Nees) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca costata* Nees var. *breviseta* Nees, Fl. Afr. Austral. Ill. 447. 1841.

Type: South Africa, Windvogelberg, in den Kränzen und an felsigen und steinigen Oerten auf dem Berg, 4000–5000 Fuss [Windvogelberg, in the wreaths and rocky and stony places on the mountain, 4000–5000 feet], Nov, *J.F. Drege s.n.* (W18890252203 [image!], lectotype designated here).

****Pseudobromus killickii*** (Kenn.-O'Byrne) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca killickii* Kenn.-O'Byrne, Kew Bull. 16: 461. 1963.

Type: South Africa, Natal, Bergville, Cathedral Peak Forestry Station, 9000 ft, 17 Dec 1957, *D.J.B. Killick 2282* (holotype K000345248 [image!]; isotypes PRE0024502-0 [image!], SRGH0106267-0 [image!]).

****Pseudobromus longipes*** (Stapf) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca longipes* Stapf, Fl. Cap. 7: 721–722. 1900.

Type: South Africa, Coast Region, on stony slopes near Grahamstown, *L. MacOwan 1323* (K000743002 [image!], lectotype designated here.

Pseudobromus mekiste (Clayton) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca mekiste* Clayton, Kew Bull. 23: 293. 1969.

Type: Kenya, eastern slopes of Mount Elgon, in forest, fairly frequent, 9000 ft, 1 Dec 1962, *A. Bogdan 5390* (holotype K000345282 [image!]).

Valdesochloa P.M.Peterson, Romasch. & Soreng, **gen. nov.**

Type. *Valdesochloa lugens* (E.Fourn.) P.M.Peterson, Romasch. & Soreng

Description

Perennials tufted or geniculately ascending, innovations extravaginal or intravaginal, rhizomes short, if present. *Culms* 50–200 cm tall, erect to slightly geniculate at base, nodes glabrous, internodes glabrous or scaberulous. *Leaf sheaths* scaberulous; *ligules* 0.5–5.5 (–7) mm long, those of vegetative shoots usually less than 1.4 mm long, membranous; *blades* 3–7 mm wide, flat to convolute, scaberulous. *Inflorescence* a panicle 9–35 cm long, 5–15 cm wide, open, elliptic to ovate, erect to nodding. *Spikelets* 11–20 mm long, 3–7 (–8)-flowered, ovate to oblong, laterally compressed; *rachilla internodes* smooth or scaberulous; *glumes* shorter than the spikelet, the lower glume 0.5–0.6 as long as the upper glume, chartaceous or membranous; *floret callus* glabrous; *lower glumes* 2–7 (–8) mm long, subulate, 1-veined; *upper glumes* 4–10 mm long, lanceolate 1- or 3-veined; *lemmas* 8–16 mm long (7–9 mm long in *F. asperella* and *F. caldasii*; 9–11 mm long in *F. superba,* and *F. venezuelana*; 12–15.5 mm in *F. breviglumis* and *F. lugens*; 11–16 mm in *F. chiriquensis*), 3- or 5-veined, membranous, scaberulous, glabrous or puberulent, apex mucronate (0.4–0.8 mm long in *F. breviglumis* and *F. superba*) or 1-awned, the awns 1–15 mm long (1–5 mm long in *F. chiriquensis* and *F. lugens*; 2–8 mm long in *F. venezuelana* and *F. caldasii*; 10–15 mm long in *F. breviglumis*), entire or dentate; *paleas* 0.7 to as long as the lemma, 2-veined, keels scaberulous. *Flowers* perfect; *lodicules* 2; *anthers* 3–5.5 mm long, 3; *ovary* apex glabrous or hairy (*F. asperella, F. superba*). *Caryopses* glabrous or hairy (*F. superba*) at apex.

Etymology

The generic name honors Dr. Jesús Valdés-Reyna (1948–2024), an exemplary agrostologist, plant taxonomist, colleague, and friend (te extrañaremos amigo) who taught at the Universidad Autónoma Agraria Antonio Narro in Saltillo, Mexico for nearly 47 years.

Species

Seven (see below).

Distribution

North, central, and South America.

Valdesochloa asperella (E.B.Alexeev) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca asperella* E.B. Alexeev, Bot. Zhurn. (Moscow & Leningrad) 66: 1496. 1981.

Type: Mexico, Mexico, along Hwy 95, south of Mexico City, just south of El Gordo, high mountain meadow area, 9000 ft, 21 Aug 1972, *Dziekanowski, Dunn & Bolingbroke 2022* (holotype US-2729388!; isotypes CHAPA0000009 [image!], MO128941 [image!]).

Valdesochloa breviglumis (Swallen) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca breviglumis* Swallen, Contr. U.S. Natl. Herb. 29(9): 398. 1950.

Type: Costa Rica, Prov. San José, in dense oak and bamboo forest near Laguna de la Escuadra, NE of El Copey, 2000–2200 m, 16 Dec. 1925, *P.C. Standley 41998* (holotype US-1307123!).

(=) *Bromus cernuus* Swallen, Bol. Soc. Bot. México 23: 26–28, f. 1. 1958 [1959].

Type: Mexico, Jalisco, on steep mountain sides in pine forest, northern slopes of the Nevado de Colima, west of summit of the northern ridge, near junction of the old pack road to Zapotlan with Atenquique-Jazmin road, 2100–2200 m, 15 Oct 1952, *R. McVaugh 13525* (holotype US-2118494!; isotypes G00099282 [image!], K000433575 [image!], MEXU00114212 [image!], MICH1108611 [image!]).

Valdesochloa caldasii (Kunth) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Bromus caldasii* Kunth, Nov. Gen. Sp. (quarto ed.) 1:151. 1816.

Type: Ecuador, crescit locis altis regni Quitensis, prope Chillo, Conocoto et Sangolqui, *A.J.A. Humboldt &*

F.W.H.A. Bonpland s.n. (lectotype, designated by Stančík & Peterson, Contr. U.S. Natl. Herb. 56: 36. 2007: P00669421 [image!]; isolectotypes B, US-865519! fragm. ex P).

(≡) *Schedonorus caldasii* (Kunth) Roem. & Schult., Syst. Veg. 2: 709. 1819.

(≡) *Festuca quadridentata* var. *caldasii* (Kunth) St.-Yves, Candollea 3: 266. 1927.

****Valdesochloa chiriquensis*** (Swallen) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca chiriquensis* Swallen, Ann. Missouri Bot. Gard. 30(2): 116. 1943.

Type: Panama, Chiriqui, Volcan de Chiriqui, open places in woods, 1300–1500 m, 29–30 Sep 1911, *A.S. Hitchcock 8197* (holotype US-1006331!).

****Valdesochloa lugens*** (E.Fourn.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Uniola lugens* E. Fourn., Mexic. Pl. 2: 123. 1886.

Type: Mexico, Oaxaca, Cumbre de Estepa, Sep 1842, *F.M. Liebmann 502* [Lieb. Pl. Mex. 6247] (lectotype, designated by Gonzaléz-Ledesma: C10016959 [image!]; isolectotype C10016960 [image!]).

(≡) *Festuca lugens* (E.Fourn.) Hitchc. ex Hern.-Xol., Bol. Soc. Bot. México 23: 165. 1958.

****Valdesochloa superba*** (Parodi ex Türpe) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca superba* Parodi ex Türpe, Darwiniana 15: 210. 1969.

Type: Argentina, Jujuy: Dpto. Capital: Termas de Reyes, 2000 m, 5 Feb 1943, *L.R. Parodi 14552* (BAA00002132 [image!], lectotype designated here; isolectotypes BAA00002133 [image!], US-1865220!).

****Valdesochloa venezuelana*** (Stančík) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca venezuelana* Stančík, Darwiniana 41(1–4): 111–112, f. 15b–l. 2003.

Type: Venezuela, Táchira. Municipio La Grita, Páramo La Negra, cross of the roads to La Grita and Pogonero, 08°13'22"N 71°52'51"W, shrubby margin of the road with Asteraceae, Melastomataceae, *Cordia* sp., 2800 m, 11 Nov 2000, *D. Stančík 4262* (holotype PRC451115 [image!]; isotypes AAU, CAR, COL, W).

Xanthochloa (Krivot.) Tzvelev, Bot. Zhurn. 91(2): 275. 2006. *Festuca* sect. *Xanthochloa* Krivot. Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 64. 1960.

Type: *Xanthochloa karatavica* (Bunge) Tzvelev, Bot. Zhurn. (Moscow & Leningrad) 91(2): 275. 2006.

(≡) *Poa karatavica* Bunge, Beitr. Fl. Russl.: 349. 1852.

(≡) *Festuca karatavica* (Bunge) B.Fedtsch., Izv. Peterb. Bot. Sada 14(Suppl. 2): 86. 1915.

(≡) *Leucopoa karatavica* (Bunge) V.I.Krecz. & Bobrov., Fl. SSSR 2: 496. 1934.

(=) *Patzkea* G.H.Loos, Jahrb. Bochum. Bot. Vereins 1: 126. 2010.

Type: *Patzkea paniculata* (L.) G.H.Loos, Jahrb. Bochum. Bot. Vereins 1: 126. 2010.

(≡) *Anthoxanthum paniculatum* L., Sp. Pl.: 28. 1753.

(≡) *Festuca paniculata* (L.) Schinz & Thell., Vierteljahrsschr. Naturf. Ges. Zürich 58: 40. 1913.

Description

Perennials tufted, butt sheaths thickened and sometimes forming a tuberose base (*P. durandoi, P. paniculata*), persistent and investing base of culm with fibrous dead sheaths, basal innovations intravaginal, sometimes extravaginal. *Culms* 50–140 cm tall, erect. *Leaf sheaths* glabrous, sometimes open for most of their length and antrorsely scabrous along margins (*F. sclerophylla*); *ligules* 1–8 mm long, membranous, eciliate; *blades* 0.4–2 mm wide, filiform, conduplicate or convolute (*P. durandoi* and *P. paniculata*) or 2–10 mm wide, flat or convolute (*X. karatavica* and *F. sclerophylla*), glabrous or marginally scabrous. *Inflorescence* 8–30 cm long, oblong, dense, narrow, sometimes open (*F. sclerophylla*). *Spikelets* 7–14 mm long, 3–7-flowered, oblong, lanceolate (*P. durandoi*) or obovate (*P. paniculata*), laterally compressed; *rachilla* glabrous; *glumes* shorter than the spikelet, the lower 0.7–0.9 as long as the upper, usually hyaline; *lower glumes* 3.5–6 mm long, lanceolate, 1-veined or unveined (*X. karatovica*); *upper glumes* 4–7.5 mm long, oblong (*P. durandoi* and

P. paniculata) or ovate (*F. sclerophylla* and *X. karatavica*), hyaline or membranous to scarious, 3-veined; *lemmas* 6–11 mm long, lanceolate, 5-veined, chartaceous, sometimes membranous (*X. karatavica*), apex entire or mucronate, scaberulous; *paleas* 2-veined, keels scaberulous. *Flowers* perfect, sometimes dioecious (*F. sclerophylla*); *lodicules* 2; *anthers* 2.5–4.5 mm long, 3; *ovary* pubescent on apex, sometimes glabrous (*X. karatavica*). *Caryopses* glabrous, sometimes hairy at apex (*F. sclerophylla*).

Species

**Xanthochloa griffthiana* (St.-Ives) Tzlelev, *X. karatavica* (Bunge) Tzvelev, and five more (see below).

Distribution

Europe, temperate Asia (western and Caucasus), northern Africa (*P. paniculata*).

****Xanthochloa baetica*** (Hack.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca spadicea* var. *baetica* Hack., Monogr. Festuc. Eur. 167. 1882.

Type: Spain, Andalucía, Prope Algeciras in Sra. de Palma, 19 Aug 1876, *E. Hackel s.n.* (lectotype, designated by De la Fuente et al. in Candollea 43(2): 517. 1988: W19160013770 [image!]).

(≡) *Festuca baetica* (Hack.) Richt., Pl. Eur. 1: 103. 1890.

(≡) *Festuca paniculata* subsp. *baetica* (Hack.) Markgr.-Dann., Bot. J. Linn. Soc. 76(4): 326. 1978.

(≡) *Patzkea paniculata* subsp. *baetica* (Hack.) H.Scholz, Willdenowia 40(2): 200. 2010.

****Xanthochloa durandoi*** (Clausen) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca durandoi* Clausen, Annot. Fl. France Allemagne 163. 1859.

Type: Algeria, Recolté sur le Zaccar, May 1858, *M. Lirou* s.n. (lectotype, designated by Cebolla Lozano et al. in Fontqueria 48: 82. 1997): P00434516 [image!] ex herb Cosson).

(≡) *Festuca spadicea* var. *durandoi* (Clauson) Hack., Monogr. Festuc. Eur. 167. 1882.

(≡) *Festuca spadicea* subsp. *durandoi* (Clauson) Trab. Fl. Alger 217. 1895.

(≡) *Patzkea durandoi* G.H.Loos, Jahrb. Bochum. Bot. Vereins 1: 126. 2010.

Notes

The specimen on the right side of the sheet.

****Xanthochloa paniculata*** (L.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Anthoxanthum paniculatum* L., Sp. Pl. 28. 1753.

Type: France, Dei dicto Gallo Provincia, 1600–1625, *J. Burser I: 46* (lectotype, designated by W.T. Stearn, in An introduction to the Species Plantarum and cognate botanical works of Carl Linnaeus 1: 128. (XIII). 1957, C. von Linnaeus Sp. Pl. Facsimile. Ray Society, London: UPS V-172813).

(≡) *Festuca paniculata* (L.) Schinz & Thell. Vierteljahrsschr. Naturf. Ges. Zürich 58: 40. 1913.

(≡) *Patzkea paniculata* (L.) G.H.Loos, Jahrb. Bochum. Bot. Vereins 1: 126. 2010.

****Xanthochloa sclerophylla*** (Boiss. ex Bisch.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca sclerophylla* Boiss. ex Bisch., Del. Sem. (Heidelberg) 1849: 4. 1849.

Type: Iran, in locis schistosis m. Elbrus [Elburz] pr. Derbend, 5 Jun 1843, *C.G.T. Kotschy 245* (isolectotype designated by Bor in Gramineae. Fl. Iranica 70/30: 73. 1970: W0033063 [image!]).

Xanthochloa spadicea (L.) P.M.Peterson, Romasch. & Soreng, **comb. nov.**

Bas.: *Festuca spadicea* L., Syst. Nat., ed. 12, 2: 732. 1767.
Type: France, Habitat Monspelii, *A. Gouan s.n.* (lectotype designated by Kerguélen & Plonka, Bull. Soc. Bot. Centre-Ouest 10: 243. 1989: LINN-HL92-37 [image!]).

(≡) *Schedonorus spadiceus* (L.) Roem. & Schult., Syst. Veg. 2: 700. 1817.

(≡) *Festuca paniculata* subsp. *spadicea* (L.) Litard., Candollea 10: 111. 1945.

(≡) *Patzkea spadicea* (L.) G.H.Loos, Jahrb. Bochum. Bot. Vereins 1: 126. 2010.

(≡) *Patzkea paniculata* subsp. *spadicea* (L.) B.Bock, Bull. Soc. Bot. Centre-Ouest 42: 274. 2012.

Provisional key to the genera in *Festuca* subtr. Loliinae

1 Plants annual 2

- Plants perennial..... 4

2 Lower glume absent; inflorescence a spike with sessile-inserted spikelets oriented radially to the main axis ..... ***Lolium*** p.p.

- Lower glume present; inflorescence a panicle, spike-like or a spike..... 3

3 Lemma surface tuberculate, the apex unawned; leaf blades broad and flat..... ***Castellia***

- Lemma surface not tuberculate, apex often awned; leaf blades usually narrow..... ***Festuca*** p.p. (*Vulpia*)

4 Lower glume absent; inflorescence a spike ..... ***Lolium*** p.p.

- Lower glume present; inflorescence a panicle 5

5 Leaf blades with lanceolate or crescent shaped or falcate auricles at the base..... ***Lolium*** p.p. (*Schedonorus*)

- Leaf blades without falcate auricles, sometimes with auriculate extensions arising from the upper sheaths..... 6

6 Glumes coriaceous and firm, membranous only at the margins; leaf blades usually narrow and convolute, mostly ≤2 mm wide when expanded; ligules <1mm long, apex truncate; anthers <1 mm long; flowers bisexual; plants mostly ≤50 cm tall; plants cosmopolitan ..... ***Festuca*** p.p. (NLC)

- Glumes membranous to chartaceous, rarely coriaceous, usually entirely membranous; leaf blades flat, broad, mostly >2 mm wide, rarely narrow and convolute; ligules sometimes > 1mm long, apex acute, obtuse or truncate; flowers unisexual or bisexual; plants >50 cm tall..... 7

7 Ligules 2–5 mm long; lemmas awnless; flowers bisexual; panicles lax with thin branches; plants 50–150 cm tall; plants of Eurasia or Australia ..... ***Drymochloa***

- Ligules of various lengths; lemmas awned or awnless; flowers unisexual or bisexual; panicles lax to erect, often with thicker branches; plants not confined to Eurasia..... 8

8 Leaf blades broad and flat with prominent cross venation or transverse veinlets; plants from Africa ..... ***Pseudobromus*** p.p.

- Leaf blades broad and flat or narrower without prominent cross venation or transverse veinlets; plants not restricted to Africa 9

9 Culms with bulbous or tuberous bases; plants from Africa and Eurasia..... 10

- Culms without bulbous or tuberous bases; plants not confined to Eurasia..... 13

10 Lower sheath bases with retrorse velvet silver hairs; ligules 2–5 mm long; panicles contracted, branches smooth or nearly so; lemmas asperulous, apex entire, mucronate or short awned, the awns up to 1.2 mm long; plants of southern Africa highlands..... ***Munnikopoa***

- Lower sheath bases lacking retrorse velvet silver hairs; lemmas mostly smooth, mucronate or unawned; plants of the Mediterranean or central Asia..... 11

11 Culms 20–45 cm tall; plants dioecious..... ***Leucopoa***

- Culms 50–140 cm tall; plants hermaphroditic with perfect flowers, rarely dioecious (*Xanthochloa sclerophylla* 12

12 Ovary apex densely strigose with stiff hairs; leaf blades generally flat..... ***Locajonoa***

- Ovary apex pubescent or glabrous but not with densely strigose hairs; leaf blades filiform, conduplicate or convolute..... ***Xanthochloa***

13 Plants of Mexico, Central America, and South America (found in humid ravines, cloud forests, or associated with oak woodlands..... ***Valdesochloa***

- Plants of temperate North America (*Hesperochloa amplissima* ranges from Mexico to Colombia), temperate Eurasia, Hawaii, and southern South America ..... ***Hesperochloa***

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APPENDIX 1

Taxon voucher (collector, number, and where the specimen is housed), country of origin, and GenBank accession for DNA ITS region; **bold** indicates new accession; asterisk (*) indicates GenBank data.

	Taxa	Voucher	Country	ITS
1	*Avenella flexuosa* (L.) Drejer	Peterson 24054, Soreng, Romaschenko & Abeid (US)	Tanzania, Njombe	**PV126333**
2	*Drymochloa donax* (Lowe) H.Scholz & Foggi	Sequeira 4515 & Catalán (UZ)	Portugal, Madeira	EF584935*
3	*Drymochloa drymeja* (Mert. & W.D.J.Koch) Holub	BS3675	Hungary	HM453181*
4	*Drymochloa lasto* (Boiss.) Holub	BS3748	Spain, Los Barrios	HM453180*
5	*Drymochloa lasto* (Boiss.) Holub	UZ 29.08 (UZ)	Spain, Cadiz	MT145291*
6	*Festuca abyssinica* Hochst. ex A.Rich.	Peterson 24019, Soreng, Romaschenko & Abeid (US)	Tanzania, Njombe	**PV126334**
7	*Festuca alatavica* (Hack. ex St.-Yves) Roshev.	Soreng 7678, Johnson, Shuvalov, Chapurin, Samsaliev & Samsaliev (US)	Kyrgyzstan, Naryn	**PV126335**
8	*Festuca aloha* Catalán, Soreng & P.M. Peterson	Wood 1701 & Perlman (US)	USA, Hawaii	GQ162205*
9	*Festuca altaica* Trin.	Soreng FE-426 & Olonova (US)	Russia, Kamchatka	**PV126336**
10	*Festuca altissima* All.	Catalán 1.98 (UZ)	France, Aspe	AF303411*
11	*Festuca amplissima* Rupr.	Peterson 21097 & Saarela (US)	Mexico, Nuevo Leon	MT145278*
12	*Festuca argentina* (Speg.) Parodi	Catalán 0210 (UZ)	Argentina, Rio Negro	OP120917*
13	*Festuca argentina* (Speg.) Parodi	Peterson 17158, Soreng, Refulio-Rodríguez & Belgrano (US)	Argentina, Santa Cruz	**PV126337**
14	*Festuca arundinacea* var. *glaucescens* Boiss.	GenBank (UZ)	Spain, Segovia	AF532950*
15	*Festuca arundinacea* subsp. *cirtensis* (St.-Yves) Gamisans	GenBank	Morocco, Agadir Gouj	HM453189*
16	*Festuca asperella* E.B.Alexeev	Trott 142, Dziekanowski, Case, Dunn, Hess & Thurm (MO)	Mexico	OP120918*
17	*Festuca baetica* (Hack.) Richt.	Rivas s.n. (UAM)	Spain, Cadiz	AF303405*

	Taxa	Voucher	Country	ITS
18	*Festuca bajacalifornica*na Gonz.-Led. & S.D. Koch	Peterson 5287, Annable, Thorne & Noyes (US)	Mexico, Baja California Norte	KY368814*
19	*Festuca breviglumis* Swallen	Peterson 21366, Saarela & Flores Villegas (US)	Mexico, Mexico	OP120919*
20	*Festuca brevissima* Jurtzev	Soreng 6170 & Soreng (US)	USA, Alaska	**PV126338**
21	*Festuca bromoides* L.	Banks 57 (US)	USA, Alabama	**PV126339**
22	*Festuca caldasii* (Kunth) Kunth	HUTPL 14055 (HUTPL)	Ecuador, Catamayo	MT145280*
23	*Festuca californica* Vasey	Hoover 4940 (US)	USA, California	**PV126340**
24	*Festuca campestris* Rydb.	Lackschewitz 7288 (US)	USA, Montana	**PV126341**
25	*Festuca caprina* var. *macra* Stapf	Sylvester 3406, Soreng & Sylvester (US)	South Africa, Kwazulu-Natal	**PV126342**
26	*Festuca chiriquensis* Swallen	Gamboa Romero 830, Alfaro & Picado (MO)	Costa Rica, Cartago	OP120920*
27	*Festuca costata* Nees	Peterson 24025, Soreng, Romaschenko & Abeid (US)	Tanzania, Njombe	**PV126343**
28	*Festuca dasyclada* Hack. ex Beal	Irvine 193 & Chichester (US)	USA, Colorado	**PV126344**
29	*Festuca dichoclada* Pilg.	Peterson 14056 & Tovar (US)	Peru, Junín	**PV126345**
30	*Festuca dichoclada* Pilg.	Peterson 20603, Soreng & Romashchenko (US)	Peru, Cusco	OP120921*
31	*Festuca dimorpha* Guss.	Coste s.n. (US)	France, St Etienne de Tinée	**PV126346**
32	*Festuca drakensbergensis* Sylvester, Soreng & M.Sylvester	Sylvester 3660, Soreng & Sylvester (US)	South Africa, Lesotho	**PV126347**
33	*Festuca elmeri* Scribn. & Merr.	Howell 1534/24310 (US)	USA, California	**PV126348**
34	*Festuca extremiorientalis* Ohwi	Soreng FE-040 & Olonova (US)	Russia, Primorsky	**PV126349**
35	*Festuca hallii* (Vasey) Piper	Stevens 2189 (US)	USA, North Dakota	**PV126350**
36	*Festuca hallii* (Vasey) Piper	Weber 9694 & Pickford (US)	USA, Colorado	**PV126351**
37	*Festuca heterophylla* Lam.	Holmgren s.n. (US)	Sweden, Blekinge	**PV126352**
38	*Festuca horridula* Pilg.	Tovar 6607 & Soplín	Peru, Junín	OP120923*
39	*Festuca hubsugulica* Krivot.	Pezhemskyi 99 III (LE)	Russia, Eastern Sayan	KY368809*
40	*Festuca idahoensis Elmer*	Piemeisel 10 (US)	USA, Idaho	**PV126353**
41	*Festuca incurva* (Gouan) Gutermann	Iter Mediterraneum IV Cyprus 767 (MA)	Cyprus	**PV126354**
42	*Festuca killickii* Kenn.-O'Byrne	Catalán SA041 & Pimentel (JACA)	South Africa, KwaZulu Natal	KY368803*
43	*Festuca komarovii* Krivot.	Malyshev s.n. (LE)	Russia, Buryatia	KY368807*
44	*Festuca longipes* Stapf	Soreng ZA-09 & Sylvester (US)	South Africa, Orange Free State	**PV126355**
45	*Festuca lugens* (E.Fourn.) Hitchc. ex Hern.-Xol.	Peterson 17573 & Catalán (US)	Mexico, Chihuahua	KY368795*
46	*Festuca megalura* Nutt.	Peterson 13791 & Refulio-Rodríguez (US)	Peru, Ancash	**PV126356**
47	*Festuca mekiste* Clayton	Carvalho 4521	Kenya	ON243855
48	*Festuca microstachys* var. *ciliata* A. Gray ex Beal	Sharsmith 3528 (US)	USA, California	**PV126357**
49	*Festuca modesta* Pilg.	Soreng, Peterson & Sun (US)	China, Yunnan	EF584953*
50	*Festuca molokaiensis* Soreng, P.M.Peterson & Catalán	Oppenheimer H40704, Perlman & Tangalin (BISH)	USA, Hawaii	MT145294*
51	*Festuca muelleri* Vickery	Burcham 93 (US)	Australia, Victoria	**PV126358**
52	*Festuca muelleri* Vickery	Walsh 6797 & Coates (MEL)	Australia, Victoria	KJ598993*
53	*Festuca myuros* L.	Peterson 18750, Saarela & Smith (US)	Canada, British Columbia	**PV126359**
54	*Festuca nitidula* Stapf ex Hook. f.	sine col.	China	KY999975*
55	*Festuca octoflora* Walter	Freeman 54128 (US)	USA, North Carolina	**PV126360**
56	*Festuca ovina* L.	Mueller 6879 (UZ)	Spain	JQ972950*
57	*Festuca parvigluma* Steud.	Soreng 5576, Peterson & Sun Hang (US)	China, Xizang	EF584960*
58	*Festuca patula* Desf.	Catalán UZ39.17 (UZ)	Morocco	MT145306*
59	*Festuca patula* Desf.	Catalán UZ95.2000, Torrecilla & López Rodríguez (UZ)	Spain, Cádiz	AF538362*

	Taxa	Voucher	Country	ITS
60	*Festuca pseudoeskia* Boiss.	Cebolla s.n. & Rivas (UAM)	Spain, Granada	AF303417*
61	*Festuca pulchella* subsp. *pulchella* Schrad.	Muller 7807 (UZ)	Switzerland, Bern	AF519980*
62	*Festuca pulchella* subsp. *jurana* (Gren.) Markgr.-Dann.	Muller 8421 (UZ)	Italy, Trento	AF519981*
63	*Festuca quadridentata* Kunth	Acosta-Solis 7581 (US)	Ecuador, Chimborazo	MT145303*
64	*Festuca roemeri* (Pavlick) E.B.Alexeev	Swallen 5985 (US)	USA, Oregon	**PV126362**
65	*Festuca rubra* L.	Peterson 18424, Saarela & Smith (US)	Canada, Alberta	**PV126363**
66	*Festuca salzmannii* (Boiss.) Boiss. ex Coss.	Catalán 111.07 (UZ)	Spain	JQ972946*
67	*Festuca saximontana* Rydb.	Peterson 18349, Saarela & Smith (US)	Canada, Manitoba	**PV126364**
68	*Festuca scabra* Vahl	Hoener 1923 (US)	South Africa, Lesotho	**PV126365**
69	*Festuca scabra* Vahl	Sylvester 3456, Soreng & Sylvester (US)	South Africa, Eastern Cape	**PV126366**
70	*Festuca scabra* Vahl	Sylvester 3532, Soreng & Sylvester (US)	South Africa, Lesotho	**PV126367**
71	*Festuca scariosa* (Lag.) Asch. & Graebn.	Cebolla s.n. & Rivas (UAM)	Spain, Granada	AF303408*
72	*Festuca schimperiana* A.Rich.	Peterson 24362, Soreng & Romaschenko (US)	Tanzania, Kilimanjaro	**PV126368**
73	*Festuca sciurea* Nutt.	Hermann 4437 (US)	USA, New Jersey	**PV126369**
74	*Festuca sclerophylla* Boiss. & Hohen.	Rechinger 5987 & Rechinger (US)	Iran, Shahrud-Bustam	**PV126370**
75	*Festuca simensis* Hochst. ex A.Rich.	Namaganda 204K (MHU)	Uganda, Uchuya	GU573752*
76	*Festuca sinensis* Keng ex E.B.Alexeev	sine col.	China	KY999957*
77	*Festuca sororia* Piper	Darrow 3185 & Phillips (US)	USA, Arizona	**PV126371**
78	*Festuca sororia* Piper	Makings 2474 & Olsen (US)	USA, New Mexico	**PV126372**
79	*Festuca spectabilis* Jan	Catalán s.n. (UZ)	Bosnia and Herzegovina,	MT145304*
80	*Festuca subulata* Trin.	Ahart 8950 (US)	USA, California	**PV126373**
81	*Festuca subuliflora* Scribn.	Baker 156 & Ruhle (US)	USA, Oregon	**PV126374**
82	*Festuca superba* Parodi ex Türpe	Catalán 356.08 (UZ)	Argentina, Jujuy	MT145305*
83	*Festuca valdesii* Gonz.-Led. & S.D.Koch	Peterson 18796 & Valdes-Reyna (US)	Mexico, Coahuila	**PV126375**
84	*Festuca valdesii* Gonz.-Led. & S.D.Koch	Peterson 21456, Saarela & Stancik (US)	Mexico, Coahuila	OP120925*
85	*Festuca valesiaca* Schleich. ex Gaudin	Soreng 7896, Johnson, Johnson, Dzyubenko, Dzyubenko & Belous (US)	Russia, Stavropol	**PV126376**
86	*Festuca venezuelana* Stancik	Stancik 4262 (AAU)	Venezuela, Tachira	OP120926*
87	*Festuca washingtonica* E.B.Alexeev	Bjork CCDB-24911-F08	USA, Washington	MG216346*
88	*Helictochloa agropyroides* (Boiss.) Romero Zarco	Medina 4050, Aedo, Cabezas, Calvo, Castroviejo, Constantidinis, Gonzalo, Güemes, Herrero, Karidas, Navarro, Pedrol, Prunell, Quintanar, Rico & Rodríguez Gracia (MA)	Greece, Peloponnissos	**PV126377**
89	*Hesperochloa kingii* (S.Watson) Rydb.	Quibell 149	USA, California	OP120924*
90	*Hesperochloa kingii* (S.Watson) Rydb.	Terrell 4384 & Hatch (US)	USA, Utah	**PV126378**
91	*Leucopoa albida* (Turcz. ex Trin.) V.I.Krecz. & Bobrov	Kamelin 1171 et al. (LE)	Mongolia, Eastern aimak	KY368808*
92	*Leucopoa calabrica* (Huter, Porta & Rigo ex Hack.) H.Scholz & Foggi	Muller 10838	Italy, Calabria	KY368798*
93	*Locajonoa coerulescens* (Desf.) Soreng	Catalán UZ19.08 (UZ)	Spain	JQ972941*
94	*Locajonoa coerulescens* (Desf.) Soreng	Soderstrom 1432 (US)	Tunisia, Tunis	**PV126379**
95	*Lolium apenninum* (De Not.) Ardenghi & Foggi	Muller 7965 (UZ)	Switzerland, Valais	AF548028*
96	*Lolium arundinaceum* (Schreb.) Darbysh.	GenBank	Mediterranean	HM453186*
97	*Lolium arundinaceum* subsp. *corsicum* (Hack. ex Barbey) J.-M.Tison	Inda s.n. (UZ)	France, Corsica	EF379052*
98	*Lolium atlantigenum* (St.-Yves) Banfi, Galassos, Foggi, Kapecký & Ardenghi	GenBank		HM453188*
99	*Lolium canariense* Steud.	Santos 13.3.02 (UZ)	Spain, Tenerife	EF379062*
100	*Lolium edwardii* H.Scholz, Stierst. & Gaisb.	Scholz Berlin 24-3 (DNA)	Spain, Canarias	EF379066*

	Taxa	Voucher	Country	ITS
101	*Lolium font-queri* Banfi, Galasso, Foggi, Kopecký & Ardenghi	Catalán 1.97 (UZ)	Morocco, Rif Mountains	AF303404*
102	*Lolium giganteum* (L.) Darbysh.	Catalán 1331.88 (UZ)	Spain, Navarra	AF303416*
103	*Lolium interruptum* (Desf.) Banfi, Galasso, Foggi, Kopecký & Ardenghi	GenBank	Spain, Aoiz	HM453192*
104	*Lolium letourneuxianum* (St.-Yves) Banfi, Galasso, Foggi, Kopecký & Ardenghi	GenBank		AJ240156*
105	*Lolium loliaceum* (Bory & Chaub.) Hand.-Mazz.	Whinray 829 (MEL)	Australia, Tasmania	KJ598997*
106	*Lolium lowei* Menezes	MADS 06842 (MADS)	Portugal, Madeira	EF379068*
107	*Lolium mairei* (St.-Yves) Banfi, Galasso, Foggi, Kopecký & Ardenghi	Rivas 4064 (UAM)	Morocco, Marrakech	AF303424*
108	*Lolium multiflorum* Lam.	GenBank		HM453190*
109	*Lolium perenne* L.	Leicester University Herbarium s.n. (LEI)	United Kingdom,	AF303401*
110	*Lolium persicum* Boiss. & Hohen.	USDA Pullman PI 3174.50 88i	Afghanistan, Tarbulock	EF379076*
111	*Lolium pratense* (Huds.) Darbysh.	Soreng 6025 & Soreng (US)	USA, Alaska	AF532948*
112	*Lolium remotum* Schrank	USDA Pullman PI 233613	Sweden	EF379080*
113	*Lolium rigidum* Gaudin	USDA Pullman PI 545604 90i	Turkey, Saparozu	EF379081*
114	*Lolium subulatum* Vis.	USDA Pullman PI 197310 82i	Argentina	AF171165*
115	*Lolium temulentum* L.	GenBank		HM453179*
116	*Lolium tuberosum* (Romero Zarco & Cabezudo) Banfi, Galasso, Foggi, Kopecký & Ardenghi	Catalán 87.07 (UZ)	Spain	JQ972944*
117	*Micropyrum patens* (Brot.) Rothm. ex Pilg.	Lopez Rodrıguez 01194 (UZ)	Spain, Madrid	AF478495*
118	*Patzkea durandoi* (Clauson) G.H.Loos	Lopez Rodrıguez 6-6-00 (UZ)	Spain, Segovia	AF543514*
119	*Patzkea durandoi* (Clauson) G.H.Loos	sine col. (UZ)	Portugal, Serra Arga Alto do Espinheiro	MT145283*
120	*Patzkea paniculata* (L.) G.H.Loos	Catalán 40.07 (UZ)	Spain, Caceres	MT145297*
121	*Patkea paniculata* (L.) G.H.Loos	Alarcón 231, Aedo, Aizpuru, Aldasoro, Castroviejo, Valdecasas, Güemes, Herrero, Navarro, Pedrol, Prunell, Quintanar, Rico, Rodríguez Garcia & Vladimirov (MA)	Bulgaria, Sofía	**PV126380**
122	*Peyritschia erectifolia* (Hitchc.) P.M.Peterson, Soreng, Romasch. & Barberá	Peterson 19109 & Sánchez Alvarado (US)	Mexico, Jalisco	MK695723
123	*Poa billardierei* St.-Yves	Walsh 5678& Smith (MEL)	Australia, Victoria	AY524824*
124	*Pseudobromus africanus* (Hack.) Stapf	DeWinter 104 (US)	South Africa, Limpopo	KX873146*
125	*Pseudobromus africanus* (Hack.) Stapf	Namaganda 190 (MHU)	Uganda, Gahinga	MT145277*
126	*Pseudobromus breviligulatus* Stapf ex A.Camus	Vorontsova F1221	Madagascar	KY368806*
127	*Pseudobromus engleri* (Pilg.) Clayton	Namaganda 1739	Kenya	KY368802*
128	*Pseudobromus silvaticus* K.Schum.	Peterson 24392, Soreng & Romaschenko (US)	Tanzania, Morogoro	**PV126381**
129	*Pseudobromus silvaticus* K.Schum.	Renvoize 1900 & Abdallah (US)	Tanzania, Iringa, T7	**PV126382**
130	*Xanthochloa griffithiana* (Bunge) Tzvelev	Furse 8489 (LE)	Afghanistan, Hajigak pass	KY368813*