

New lectotypifications and new synonyms in *Festuca* (Poaceae, Pooideae, Loliinae) from the Central Andes

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Abstract

New lectotypifications and new synonyms are provided as a result of a systematic study of the genus *Festuca* from the Central Andes. In the Andes mountains of Argentina, Bolivia, and Chile, several species of *Festuca* are dominant components of the grasslands and high Andean steppes. *Festuca circinata* and *F. dissitiflora* occur in this area and were described based on morphological characters. Some authors have considered *F. circinata* as a valid species while others have treated it as a synonym of *F. dissitiflora*, together with *F. dissitiflora* var. *loricata*, *F. dissitiflora* var. *villipalea*, and *F. erecta* var. *aristulata*. In this study, a review of the taxonomy and nomenclature of *F. castilloniana*, *F. circinata*, and *F. potosiana* was performed, and their morphological and anatomical characters were compared with *F. dissitiflora*. Based on morphoanatomical and epidermal characters, this study contributes to the delimitation of *F. circinata* and *F. dissitiflora*. Nomenclatural notes and new anatomical and epidermal descriptions are included for these species. Differential characters between *F. circinata* and *F. dissitiflora* are discussed and *F. circinata* is restored as a valid species for Argentina. *Festuca castilloniana* and *F. potosiana* are synonymised under *F. dissitiflora*. *Festuca dissitiflora* var. *loricata*, *F. dissitiflora* var. *villipalea*, and *F. erecta* var. *aristulata* are excluded from the synonymy of *F. dissitiflora* and it is suggested that these names should be subordinate under *F. fiebrigii*. *Festuca stuckertii* is proposed as a new synonym of *F. uninodis*. Lectotypes are designated for the names *F. argentinensis*, *F. dissitiflora*, *F. nemoralis* and *F. parodii*, and second-step lectotypes are designated for the names *F. circinata* and *F. ampliflora*.

Key words: Anatomy, Epidermal, *Festuca*, Lectotypification, Synonyms

Introduction

The genus *Festuca* Linnaeus (1753: 73), placed in subtribe Loliinae (Poeae, Poaceae), comprises approximately 450–600 species with its highest taxonomic diversity concentrated in temperate and alpine zones of both hemispheres (Clayton & Renvoize 1986, de Nova *et al.* 2006, Soreng *et al.* 2015). Approximately 140 *Festuca* species are found in South America, concentrated in the Andean highlands, with some extra-Andean representatives in southeastern Brasil and northeastern Argentina (Stančík 2003). *Festuca* represents an important component of natural grassland ecosystems in high mountains of the Central and Southern Andes of South America (Stuckert 1906, Cabrera 1957, Renvoize 1998, Stančík 2003), and some species are used in agriculture and gardening (Parodi 1953, Rúgolo 2004, Grialdo-Cañas 2010).

Phylogenetic studies have revealed that festucoid taxa (subtribe Loliinae) are monophyletic but that *Festuca*, as traditionally circumscribed, is not a natural genus, but a large monophyletic assemblage of distinctly related lineages, including *Lolium* Linnaeus (1753: 83), *Vulpia* Gmelin (1805: 8), and other genera (Soreng *et al.* 1990, Catalán *et al.* 2004, Catalán 2006, Catalán *et al.* 2007, Soreng *et al.* 2015). A historical biogeographical analysis of Loliinae suggested that the centers of origin of the older *Festuca* lineages are found in the Mediterranean and Eurasian regions, while the polyploid lineages have followed different migration routes to colonize other continents where successive radiation increased the diversity of the present known taxa (Inda *et al.* 2008).

The taxonomy of *Festuca* has been contentious. This is exemplified by disparate revisions for South America by St.-Yves (1927, 1932), Hitchcock (1927), and Alexeev (1984a, 1984b, 1985). Currently, the taxonomic concepts of some species of *Festuca* [e.g., *F. argentinensis* (Saint-Yves 1932: 138) Túrpe (1969: 254), *F. castilloniana* Túrpe (1973:285), *F. circinata* Grisebach (1879: 288), *F. dissitiflora* Steud. ex Grisebach (1879: 287), *F. fiebrigii* Pilger

(1906: 510), and *F. potosiana* Renvoize (1998: 122)] are not consistent in the taxonomic treatments and floristic catalogues of the Central and Southern Andes (Parodi 1935, 1950, 1953, Túrpe 1969, 1973, Nicora 1978, Nicora & Rúgolo de Agrasar 1987, Zuloaga *et al.* 1994, 2008, Catalán & Müller 2012), Bolivia (Renvoize 1998, Jorgensen *et al.* 2015), Chile (Matthei 1982, Marticorena & Quezada 1985, Ospina *et al.* 2015), and Peru (Infantes 1952, Tovar 1972), as there are conflicts between accepted and synonymised names.

A taxonomic revision of *Festuca* from the Central Andes is currently being carried out by the author. During this work it was noticed that (1) some species of *Festuca* have not been lectotypified, and (2) the taxonomic concepts and systematic statuses of *F. castilloniana*, *F. circinata*, *F. dissitiflora*, *F. potosiana*, *F. stuckertii* St.-Yves (1927: 95), and *F. uninodis* Hackel (1906: 520) are ambiguous among taxonomic works, because the species have overlapping diagnostic morphological characters, or because taxa previously recognized as synonyms have different morphological characters than the taxa of which they were considered synonyms.

New lectotypes are here designated for the names *Festuca circinata*, *F. dissitiflora*, *F. nemoralis* Túrpe (1969: 213), and *F. parodii* St.-Yves (1927: 308), and second-step lectotypes are designated for *F. ampliflora* Döll (1878: 116) and *F. argentinensis*. New synonyms (*F. castilloniana* and *F. potosiana*) are proposed under *F. dissitiflora*. *Festuca circinata* is excluded from *F. dissitiflora* and the name is revalidated based on morphoanatomical and epidermal characters. *Festuca dissitiflora* var. *loricata* Grisebach (1879: 187), *F. dissitiflora* var. *villipalea* St.-Yves (1927: 250), and *F. erecta* var. *aristulata* Grisebach (1874: 250–251) are excluded from the synonymy of *F. dissitiflora* and it is suggested that these should be placed in the synonymy of *F. fiebrigii*. *Festuca stuckertii* is proposed as a new synonym under *F. uninodis*. Finally, the anatomical and epidermal characters of leaf blades are here examined for the first time in the following South American species: *F. castilloniana*, *F. circinata*, *F. dissitiflora*, and *F. fiebrigii*.

Material and methods

This study is based on specimens from the herbaria B, BAA, CORD, G, GOET, HAL, K, LE, LIL, LPB, MO, MVFA, NY, P, S, US, and W (Thiers 2015). All types were seen in person or as photographs or digital scans from JSTOR Global plants (<http://plants.jstor.org>) or herbarium websites, and the protologues were consulted for all names.

Nomenclatural notes

A lectotype is designated when there is no evidence that the author used only a single specimen to describe a species, or if it is doubtful whether or not the only specimen cited in protologue is the holotype. McNeill's (2014) suggestions for designating lectotypes were followed. Second-step lectotypifications are made (Art. 9.17 of the ICBN McNeill *et al.* 2012) where there are two or more specimens of the same collection in the same herbarium and when the author of the first-step lectotypification did not clearly designate one of the specimens as the lectotype. The new synonyms proposed or excluded here are based on morphological characters mentioned in the protologues and taxonomic treatments of *Festuca* available for the Central Andes. Furthermore, anatomical and epidermal characters are described and compared among all studied specimens.

Morphological and anatomical data

Macromorphological attributes were obtained by direct observation with a WILD Heerbrugg M5-26799 stereoscope of all specimens examined. The measurements were taken with a tape measure or a calibrated ocular micrometer, when the stereoscope was used. Spikelets were measured from the basal, medial, and distal regions of the panicle. The term 'scabrous' is used to refer to the presence of prickles, and 'pilose' to the presence of macro-hairs (Lawrence 1964, Aranda & Forceck 1990).

Epidermal and anatomical leaf-blades attributes were observed in two 5 mm long segments from the middle zone of the blade; they were obtained from two blades per specimen. A selected segment was coated with gold (40%) and palladium (60%), it was observed (adaxial and abaxial surfaces) with a scanning electron microscope (SEM), and photographic records were made with a Phillips-XL Series 30 camera. The terminology used to describe epidermal micromorphology follows Ellis (1979).

Anatomical attributes were observed in leaf cross sections obtained from another selected segment following the methodology proposed by Metcalfe (1960). The leaf cross sections were stained with safranin (contrast dye) for 2–3 minutes and they were fixed using the permanent mounting medium glycerinated gelatin (Ruzhin 1993). The anatomical observations and photographs were made/taken with a Nikon SMZ 800 microscope and with Nikon NIS elements software. The terminology used to describe anatomical features follows Ellis (1976).

All morphological, micromorphological, and anatomical characters are mentioned and described for each species under the taxonomic notes, and are contrasted with the characters mentioned in previous works. These characters have been chosen from those used by Türpe (1969), Renvoize (1998), Catalán & Müller (2012), characters suggested by Namaganda *et al.* (2009), Ortúñez & de la Fuente (2010) and Ortúñez & Cano-Ruiz (2013), and other characters explored for the first time for some taxa, because they showed taxonomic value.

Results

Festuca dissitiflora and related taxa

Morphology—All diagnostic vegetative and reproductive morphoanatomical characters cited for *Festuca dissitiflora*, *F. castilloniana*, and *F. potosiana* overlap; these taxa form a morphological continuum. However, these species differ from *F. circinata* by the following vegetative and reproductive characters: scabrous leaf sheaths (vs. glabrous), obtuse lobes of the auricles (vs. truncate), erect leaves with scabrous abaxial surfaces (vs. circinate, glabrous), obtuse blade apices (vs. acute), linear-acute glumes (vs. ovate-lanceolate), and apices of the lemma acute bidentate (vs. entire). These species differ from *F. loricata*, *F. villipalea*, and *F. erecta* var. *aristulata* (including *F. fiebrigii*) by their floriferous culms without nodes or rarely 2 nodes (vs. more than 4–5 nodes), permanently closed and conduplicate leaves (vs. expanded flat leaves occasionally rolled in when dry), acute blade apices (vs. obtuse), ovate-lanceolate glumes (vs. linear-acute), and apices of the lemmas entire (vs. acute-bidentate).

Leaf-blade anatomy—The outlines of leaf cross sections of *Festuca dissitiflora*, *F. castilloniana*, and *F. potosiana* are rounded, with distinguishable adaxial and abaxial ribs, ribs associated with 3–4 vascular bundles of first and second orders between the midrib and the margin, all situated on the abaxial surface. The sclerenchyma is arranged in small and well-developed subepidermal strands, which are not in contact with the vascular bundles, and formed by 2–3 cells on the adaxial side only. Bundle sheaths are round, complete or occasionally with small interruptions only on the abaxial surface, not extended, and formed by 13–16 relatively small cells (Fig. 1a–c).

In *Festuca circinata* the outline of the leaf cross section is elliptical, with adaxial ribs distinguishable and no abaxial ribs developed (smooth), ribs associated with 5–6 vascular bundles between the midrib and the margin of first and second orders all situated close to the abaxial surface. The sclerenchyma is arranged in a continuous ring formed by 2–3 cells on the abaxial side of the leaf section, and with well-developed T-shaped girder sclerenchyma cells with relatively long stems in contact with vascular bundles on the adaxial side. Bundle sheaths are round, incomplete with abaxial and adaxial interruptions and not extended, formed by 4–5 small cells (Fig. 1d).

The outlines of the leaf cross sections in *Festuca fiebrigii*, *F. erecta* var. *aristulata*, *F. loricata*, and *F. villipalea* have expanded and undulating outlines, with undulating abaxial surfaces and ribs distinguishable on the adaxial surfaces, ribs associated with (8–)9–10 vascular bundles between the midrib and the margin of first order and third orders all situated in different levels of the blade. The sclerenchyma is arranged in well-developed girders that narrower towards the bundle, triangular or trapezoidal, formed by 5–6 cells at the abaxial and adaxial side of the leaf section, with relatively long stems in contact with vascular bundles on adaxial side. Bundle sheaths are round, incomplete with abaxial and adaxial interruptions and extended, formed by 8–13 small cells (Fig. 1e).

Leaf-blade epidermal micromorphology—The abaxial leaf surfaces of *Festuca dissitiflora* (Figs. 2a–b), *F. castilloniana* (Figs. 2c–d), and *F. potosiana* (Figs. 2 e–f) are heterogeneous, with differences between costal and intercostals areas; sparse epicuticular wax in threads subtype; rectangular cells that are usually more than eight times longer than wide; isodiametric short cells with silica bodies; prickles found along the costal zone in one row, which are sparse; and stoma and macro-hairs are absent. The adaxial surfaces are homogeneous, with differences between costal and intercostals areas. They have the same subtype of epicuticular wax; long and short cells are similar; stoma are present in the intercostal zones, forming rows parallel to the long cells, with a homogeneous distribution and frequency; macro-hairs are absent; and prickles are present in costal and intercostal zones, with variable apex orientations.

Festuca fiebrigii, *F. erecta* var. *aristulata*, *F. loricata*, and *F. villipalea* are homogeneous abaxial leaf surfaces, the intercostal and costal areas are slightly different, the epicuticular wax is absent; rectangular long cells are usually more than six or seven times longer than wide, the short cells with silica bodies are isodiametric; the prickles are present on the costal and intercostals zone, and they are scattered; stoma and macro-hairs are absent (Fig. 2g). The adaxial surfaces are homogeneous, the intercostal and costal areas are differentiated, the epicuticular wax is sparse in platelets subtype; the long cells more than five times shorter than wide, the short cells are absent; the stoma are situated on intercostal zones (forming rows parallel to the long cells), with homogeneous distribution and frequency; macro-hairs

are present at the costal and intercostals zones, with the orientation in different directions, sparse; prickles are absent or rare at the margin of the blade (Fig. 2h).

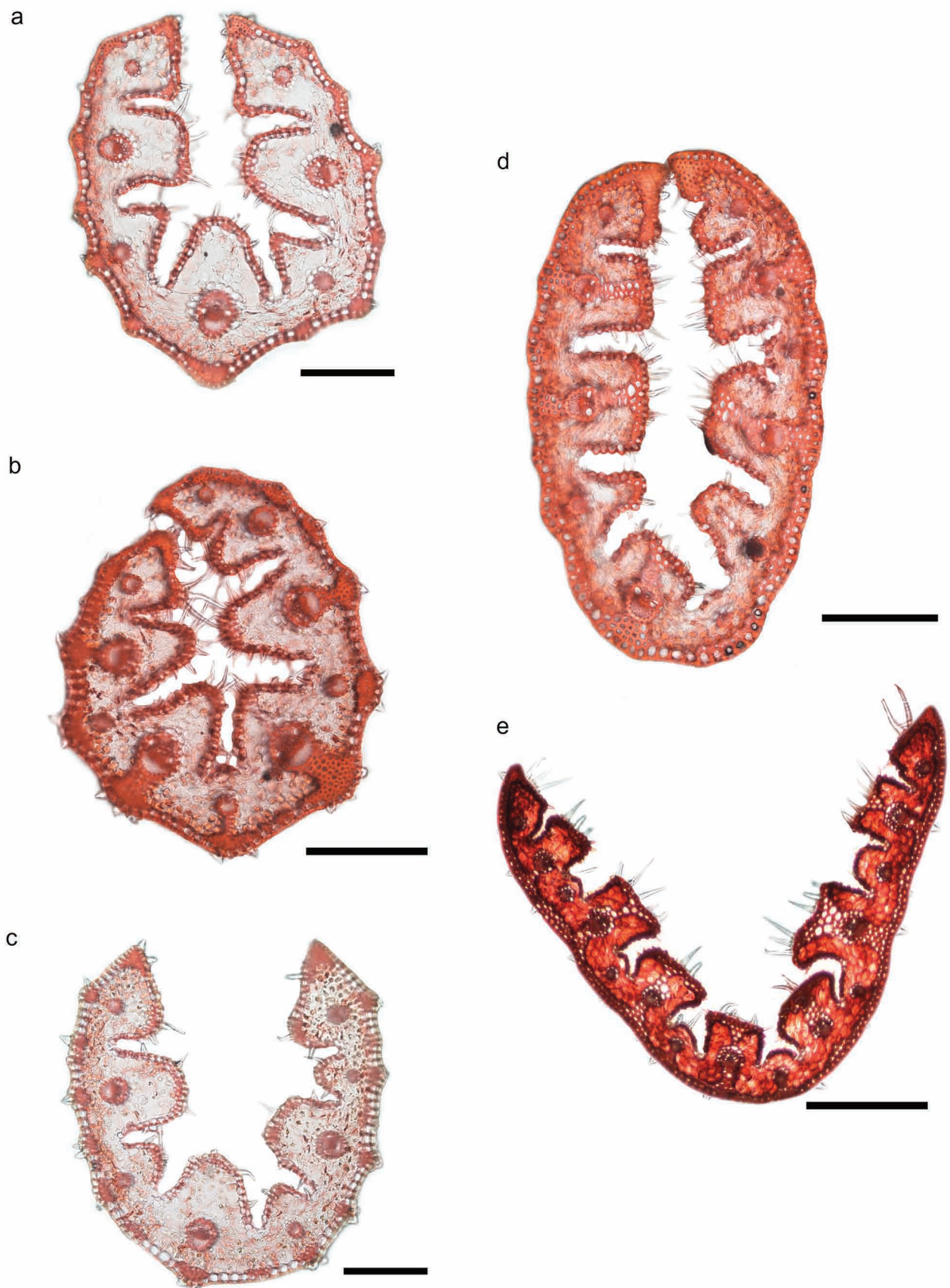


FIGURE 1. Leaf-blade cross section. a. *Festuca dissitiflora* (Barros A. 39, BAA). b. *Festuca castilloniana* (Castillón L. 2884, LIL). c. *Festuca potosiana* (Renvoize S. A. et al. 5294, LPB). d. *Festuca circinata* (Hieronymus G. H. E. W. 535, CORD). e. *Festuca fiebrigii* (Fiebrig K. A. G. 3118, BAA). Scale bars a, c = 100µm, b, d, e = 200 µm.

The abaxial leaf surface in *Festuca circinata* (Figs. 2i–j) is homogeneous, the intercostal and costal areas are not differentiated, the epicuticular wax absent; the long cells are rectangular and more than seven times shorter than wide, the short cells with silica bodies are isodiametric; stoma, macro-hairs, and prickles are absent. The adaxial surface is homogeneous, the intercostal and costal areas are differentiated, epicuticular wax is the same to abaxial surface; the long and short cells showed similar micromorphology; the stoma are situated on intercostal zones, with heterogeneous distribution and frequency; macro-hairs are absent; the prickles are usually orientated toward the apex, abundant, with homogeneous distribution on adaxial surface.

Festuca uninodis* and *F. stuckertii

The following morphological characters were observed in specimens attributed to *Festuca uninodis* and *F. stuckertii*, as well as in examined type material of these species: culms 30–45 cm tall with one node at the base, scabrous; sheaths greenish, papery; auricles 1–1.5 cm long; ligules 0.8–1.2 cm long with truncate apex, scabrous, margin membranaceous-dentate and ciliate; lower glumes 3–3.5 mm long with acuminate apex, upper glume 4–4.5 mm long, with acute apex; and lemmas 6–7.5 mm long.

The following anatomical attributes were observed in both species: outline rounded in V-shape, with adaxial and abaxial distinguishable ribs, ribs associated with 4–5 vascular bundles between the midrib and the margin of first and second orders all situated in the abaxial surface; sclerenchyma arranged in small and well developed girder that are in contact with the vascular bundles, formed by 3–5 cells at the adaxial and abaxial side; bulliform cells scarcely differentiated in the adaxial surface are present between the ribs [interpretation based on Türpe (1969, Fig. 16f, pp. 237; Fig. 20f, pp. 247)].

Discussion

Morphological, epidermal, and anatomical characteristics of *Festuca dissitiflora* (Figs. 1a–b, 2a), *F. castilloniana* (Figs. 1c–d, 2b), and *F. potosiana* (Figs. 1e–f, 2c) overlap among the examined specimens (including the type material). Also, the geographical distributions of these species overlap, indicating a wide Andean distribution (sierras andinas, according to Cabrera & Willink 1973) in the following ecoregions sensu Olson *et al.* (2001): southern Andean steppe, Atacama desert, and central Andean dry puna. The three taxa are characterized by their scabrous and erect blades. Their leaf cross sections have distinguishable ribs on the adaxial and abaxial surfaces, with sclerenchyma arranged in very small girders in contact with the vascular bundles, and the epidermis of the abaxial leaf surface is heterogeneous, with differences between costal and intercostals areas. *Festuca castilloniana* and *F. potosiana* are therefore placed as new synonyms under *F. dissitiflora*.

Festuca circinata has been placed as a synonym under *F. dissitiflora* (Catalán & Müller 2012). However, the epidermal (Figs. 1i–j) and the anatomical (Fig. 2d) features in all examined specimens of these species, including the type material, provide support for their separation into distinct species. Furthermore, the specimens attributed to *F. circinata* exhibit the same pattern of morphological characters and an extra-Andine distribution that is restricted to the ‘sierras pampeanas’ of the province Córdoba (Argentina). The specimens attributed to *F. dissitiflora* have a different morphological pattern, and they have an Andean distribution in northern Argentina (provinces Jujuy, Salta, and Tucumán), indicating disjunct geographical distributions for *F. circinata* and *F. dissitiflora*, as considered by other authors (Türpe 1969, Darbyshire *et al.* 2003, Zuloaga *et al.* 2008).

Catalán & Müller (2012) also cited *Festuca dissitiflora* var. *loricata*, *F. dissitiflora* var. *villipalea*, and *F. erecta* var. *aristulata* as synonyms of *F. dissitiflora*. All morphological, epidermal (figs. 1g–h), and anatomical (Fig. 2e) characteristics of these three taxa showed several differences with *F. dissitiflora*, indicating that these taxa have been erroneously placed as synonyms of *F. dissitiflora*. Based on these differences as well as Catalán & Müller’s (2012) taxonomic considerations of these species, *F. dissitiflora* var. *loricata*, *F. dissitiflora* var. *villipalea*, and *F. erecta* var. *aristulata* are here excluded from *F. dissitiflora* and it is suggested that they should be considered synonyms of *F. fiebrigii* (see taxonomic notes).

The morphological and anatomical characters mentioned by Türpe (1969) and Catalán & Müller (2012) as diagnostic for *Festuca stuckertii* and *F. uninodis* also overlap. Furthermore, the anatomical and epidermal features compared between all specimens of both taxa confirm that all characters are part of the same variation pattern.

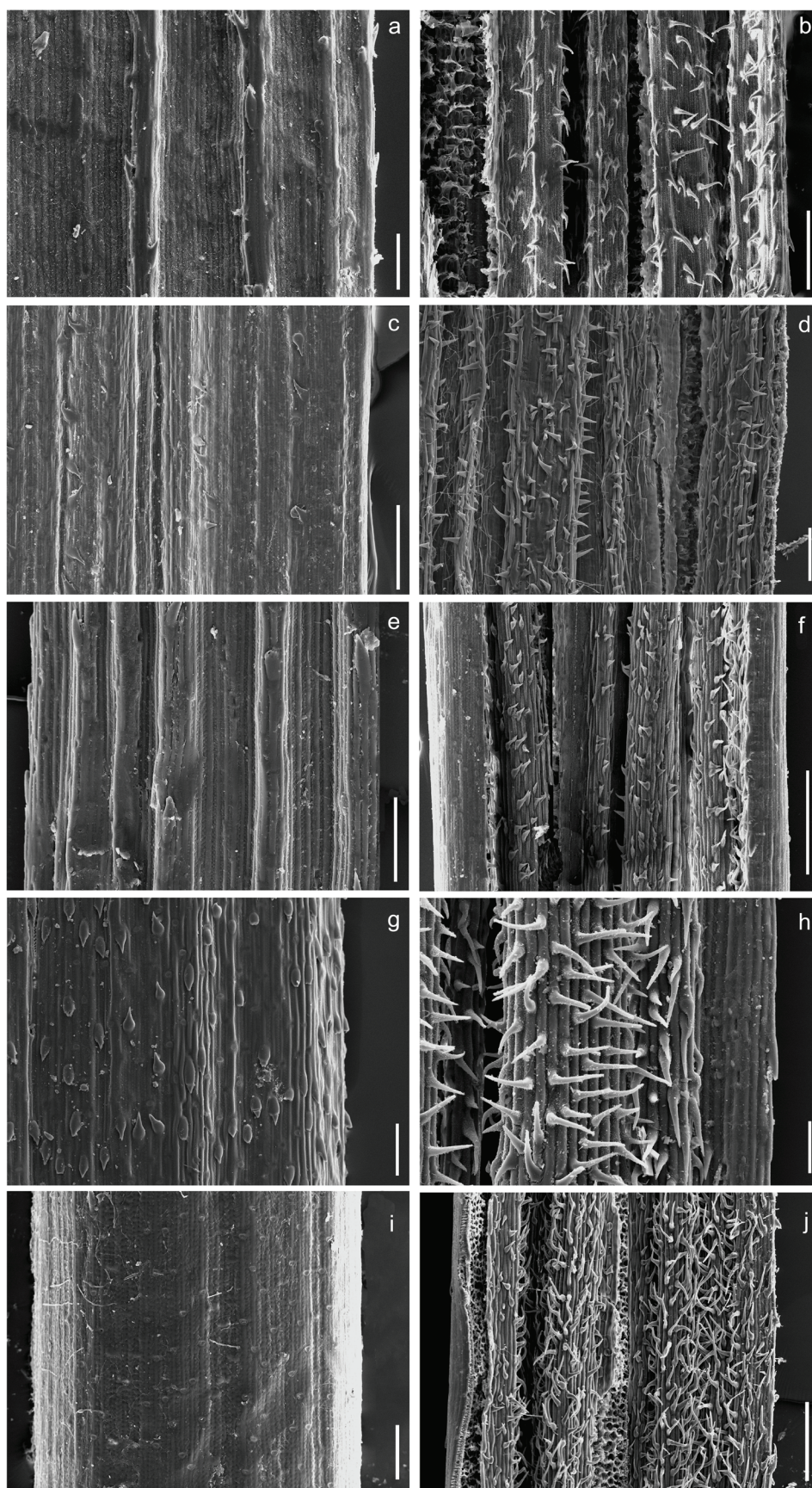


FIGURE 2. Micromorphology of abaxial and adaxial leaf blade epidermis. a–b. *Festuca dissitiflora* (Barros A. 39, BAA). c–d. *Festuca castilloniana* (Castillón L. 2884, LIL). e–f. *Festuca potosiana* (Renvoize S. A. et al. 5294, LPB). g–h. *Festuca fiebrigii* (Fiebrig K. A. G. 3118, BAA). i–j. *Festuca circinata* (Hunziker A.T. 9042, BAA). Scale bars a = 100 μ m, b = 50 μ m, c = 200 μ m, d = 100 μ m, e = 200 μ m, f = 200 μ m, g = 50 μ m, h = 50 μ m, i = 200 μ m, j = 100 μ m.

Taxonomy and nomenclature

Festuca argentinensis (Saint-Yves) Túrpe (1969: 254)

Basionym: *Festuca scirpifolia* var. *argentinensis* Saint-Yves (1932: 138). Lectotype:—ARGENTINA. Catamarca: Tinogasta, “Reales Blancos”, 4000 m s.m., 2 February 1930, *R. Schreiter 6119* (first-step lectotype BAB and LIL, designated by Túrpe (1969: 255); second-step lectotype LIL 44139!, **designated here**; isoelectotype MVFA 0000358 (ex LIL)!).

Taxonomic notes:—In the protologue of *Festuca scirpifolia* var. *argentinensis*, Saint-Yves (1932: 139) cited the following syntypes: ‘*Argentine*. Prov. De Jujuy, Leg *Parodi 1931*; Alra Pampa. 14-II común in suelos húmidos, *N° 9602*; La Quiaca, 12 II abundante en toda le región *N° 9612*; 15 II comun en los mallines *N° 9648*; et 13 II comun en las vegas, *N° 9657*; Humahuaca, 17 II comun en las vegas, forma grandes matas *No 9656* (herb. Parodi et herb. St.-Y.); Catamarca: Reales Blancos, 400 m. leg. *Schreiter II 1930 N° 6119* (herb. Schreiter, herb St.-Y.); and ‘*Chili*. Dep. Illapel: Cajón de los Pelambres 2900 m. leg. *Looser N° 2151* (herb. Par., herb. St.-Y.)’. Later, this taxon was recognized at the species level, as *F. argentinensis*, by Túrpe (1969: 254) who designated ‘*R. Schreiter 6119* (BAB y LIL) as *typus speciei*’. This is here considered as a first-step lectotypification because the author mentioned two collections of a single gathering (one deposited in BAB and the other deposited in LIL) but did not specify one of these as the type specimen. The *R. Schreiter 6119* collection was not found in BAB, while other specimens of this gathering were found in LIL and MVFA. The specimen at LIL (LIL 44139) is chosen here as the second-step lectotype for the name *F. argentinensis* because it bears Schreiter’s handwriting, the original material was deposited in LIL, and it is the most complete specimen.

Festuca circinata Grisebach (1879: 288)

Lectotype:—ARGENTINA. Córdoba: Santa Rosa de Calamuchita, ‘cerca de la Cuesta del Cerro, Sierra de Achala’, 17 March 1876, *G. H. E. W. Hieronymus 535* (lectotype CORD 00004673! **designated here**; isoelectotype US 28765391! (fragm. ex GOET)).

Taxonomic notes:—In the protologue of *Festuca circinata*, Grisebach (1879) cited ‘C. [Córdoba]: S. Achala, cuesta del Cerro’. Later, Darbyshire *et al.* (2003) and Catalán & Müller (2012) cited the following syntypes: ‘Córdoba. Cerca de la Cuesta del Cerro, Sierra de Achala, 17 March 1876, *G. H. E. W. Hieronymus 535* (GOET; isosyntypes CORD, US-28765391 fragment ex GOET)’, and ‘Cerro Champaquí, cerca del río del Catre, 30 Ene 1877, *G. H. E. W. Hieronymus 783* (GOET; isosyntype CORD)’. The specimen *G. H. E. W. Hieronymus 535* was not found in GOET (M. Appelhans pers. comm. 2015). Many of Hieronymus’s duplicate collections were deposited in CORD. Thus, the specimen deposited in CORD (CORD 00004673) is chosen as lectotype for *F. circinata*, because it is the most complete specimen, and the label bears the date and locality cited in the protologue.

Festuca circinata was recognized as a valid species for Argentina (Túrpe 1969, Darbyshire *et al.* 2003, Zuloaga *et al.* 2008). Currently, this taxon is treated as a of *F. dissitiflora* by Catalán and Müller (2012) because ‘the specimens with glaucescens and circinate leaves, larger diameter, have been attributed to *F. circinata*; however, the remaining characters are shared with *F. dissitiflora*, so this taxon has been subordinated to the latter species’. The current study, including type material, provides support for separation of *F. dissitiflora* and *F. circinata* into distinct species, based on several differences in morphological, epidermal (Figs. 1i–j), and anatomical (Fig. 2d) characters in all specimens examined. Based on this evidence *F. circinata* is revalidated for the Argentina flora.

Specimens examined:—ARGENTINA. ARGENTINA. **Córdoba:** Department of Calamuchita, Pampa de Achala, 29 December 1935, *Burkart A. 7229, 7233* (SI, BAA); Sierra grande, cerca de la cumber del Champaquí, 14 March 1951, *Hunziker A. T. 9042* (BAB); Sierra Grande, filo de la sierra al sur del Cerro Champaquí, *Hunziker A. T. 9540* (SI, CORD); Cerro Champaquí, 2800 m, 13 March 1952, *Krapovickas A. 7676* (LIL); Pampa de Achala, 2200 m, 3 Decembre 1926, *Millán A. R. 731* (SI); Sierra de Achala, 2200 m, 1–4 Decembre 1926, *Parodi L. R. 7516* (BAA); cumber del Champaquí, 6 April 1944, *Pentzul 15202* (SI, BAA).

Festuca dissitiflora Steudel ex Grisebach (1879: 287)

Lectotype:—ARGENTINA. Salta: General Güemes. ‘Nevado del Castillo, alt. 10-15000’, 19–23 March 1873, *P. G. Lorentz & G. H. E. W. Hieronymus 71* (lectotype B 10 0002575! **designated here**; isoelectotypes BAA 0000377!, CORD 00004667!, CORD 00004668!, LIL 519023!, S S-R-2260!).

Festuca castilloniana Túrpe (1973: 285). Type:—ARGENTINA. Tucumán: Tafi del Valle, ‘Dpto. Tafi: Cumbres Calchaquies, Portezuelo’, 3600 m, March 1913, *L. Castillón 2884* (holotype LIL 44250!; isotype BAA 00002021!). **Syn. nov.**

Festuca potosiana Renvoize (1998: 122). Type:—BOLIVIA. Potosi: ‘Sud Lípez, 37 km from San Pablo towards Tupiza, steep stony slopes’, 8 April 1992, *S. A. Renvoize, G. Flores & C. Peca 5294* (holotype LPB!; isotypes K 000433644!, MO 5151203!, G, NY 00074024!, US 3323521!). **Syn. nov.**

Taxonomic notes:—Grisebach (1879: 278) in the protologue of *Festuca dissitiflora* cited ‘S. [Salta]: Nevado del Castillo, alt. 10–15000. (Peru)’. Two syntypes were cited by Darbyshire *et al.* (2003) and Catalán and Müller (2012) for this taxon: ‘S. [Salta]: Nevado del Castillo, alt. 10–15000, *P. G. Lorentz & G. H. E. W. Hieronymus 71* (GOET!; isosintipo, CORD)’, and ‘Peru. Lechl. pl. peruv. 1829’ (without herbarium). The type collection deposited in GOET was not found (M. Appelhans pers. comm. 2015). Duplicates were found in B, BAA, LIL, and S. The specimen deposited in B was determined as *F. dissitiflora* by Grisebach (it bears his handwriting), and it was studied by St.-Yves, who reaffirmed Grisebach’s determination. Therefore, the specimen B 10 0002575 is chosen as lectotype of *F. dissitiflora*. The second specimen cited by Darbyshire *et al.* (2003) and Catalán and Müller (2012) corresponds to the type specimen of *F. dissitiflora* Steud. ex Lechler (1857: 56) *nom. nud.*

Festuca castilloniana was described by Túrpe (1973: 285). She found only the type specimen and therefore the validity of this taxon is not well supported, and she added that *F. castilloniana* is related to *F. dissitiflora* by their morphological similarity. All morphological, epidermal (Figs. 1c–d), and anatomical (Fig. 2b) characteristics overlap, indicating that *F. castilloniana* has been wrongfully recognized as a species different from *F. dissitiflora* (Figs. 1a–b, and 2a). Therefore, *F. castilloniana* is proposed as a new synonym under *F. dissitiflora*.

Festuca potosiana described by Renvoize (1998) from Potosi (Bolivia), forms part of the morphological variation pattern of vegetative and reproductive morphological characters found in *F. dissitiflora* and *F. castilloniana*. All anatomical (Fig. 1c) and epidermal (Figs. 2e–f) characters observed in specimens of *F. potosiana* (Figs. 1e–f) from general collections and type material form a continuum with the characters of specimens of *F. castilloniana* and *F. dissitiflora*. Therefore, *F. potosiana* is proposed here as a new synonymy under *F. dissitiflora*.

Festuca loricata, *F. villipalea*, and *F. erecta* var. *aristulata* were considered as synonyms of *F. dissitiflora* by Catalán and Müller (2012). In this study, morphological, epidermal and anatomical characteristics, including type material, provide several differences (Figs. 1g–h, 2e) supporting their separation from *F. dissitiflora*, because these characters are part of the morphological variability pattern of *F. fiebrigii*. Taxonomic statuses of *F. loricata*, *F. villipalea*, and *F. erecta* var. *aristulata* regarding *F. fiebrigii* were clarified by Ospina *et al.* (*in press*).

Many of the specimens mentioned here were found to be determined in herbaria as *F. castilloniana*, *F. erecta*, *F. loricata*, but actually belong to *F. fiebrigii*. Below are cited specimens determined as *F. dissitiflora* or its synonyms according to criteria established herein.

Specimens examined:—ARGENTINA. **Jujuy:** Department of Tilcara, camino de Campo de Laguna hacia Alfarcito, 4055 m, 23°35’8’’S, 65°18’30’’W, 13 February 2010, *Zuloaga F. O. et al. 11763* (SI); camino de Yuto Pampa a Coral de Ventura, 3520 m, 23°34’19’’S, 65°14’44’’W, 12 February 2010, *Zuloaga F. O. et al. 19629* (SI); between Hwy 9 and Río Grande at iturbe on Hwy 13 to Iruya, ca 0,5 km w of Iturbe, 3417 m, 22°58’53’’S, 65°21’21’’W, 30 March 2006, *Peterson P. M. et al. 11731* (SI); de Yavi, Ruta Nacional 40, de La Quiaca a Santa Catalina, 3640 m, 28°8’11’’S, 65°44’19’’W, 19 February 2011, *Zuloaga F. O. et al. 13081* (SI). **Mendoza:** Department of Las Heras, Parque Provincial Aconcagua, 3786 m, 69°89’S, 86°90’W, 26 January 2011, *Barros A. 38, 39, 40* (SI). **Salta:** Department of Santa Victoria, ruta 7, km 30, cerca de Pueblo Viejo, 6 February 2003, *Sanso M. & Xifreda C. 211* (SI); camino de Abra Fundición a Nazareno, 4010 m, 22°29’1’’S, 65°6’30’’W, 21 February 2011, *Zuloaga F. O. et al. 13182* (SI). **BOLIVIA. La Paz:** Province of Aroma, Cañawiri, 17°20’S, 68°20’W, 19 February, *Yanapa R. 345* (LPB). **Oruro:** Province of Sebastián Pagador, 2 min E of Urmiri, 3650–3850 m, 8 March 1993, *Peterson P. M. et al. 12769* (LPB). **Potosi:** Province of Sud Chicas, 26 mi N of San Vicente and 9 mi S of Atocha, 3980 m, 14 March 1993, *Peterson P. M. et al. 12915* (LPB); 15–16 mi E of Atocha on road towards Santa Barbara, 4300–4600m, 15 March 1993, *Peterson P. M. et al. 12933* (LPB); Province of Sud Lípez, 37 km E de San Pablo, March 1998, *Renvoize S. A. et al. 5294* (LPB); 15–16 mi E of Atocha on road towards Santa Barbara, 4300–4600m, 15 March 1993, *Peterson P. M. et al. 12933* (LPB).

Festuca fimbriata Nees (1829: 472)

Type:—BRASIL [URUGUAY]. [Montevideo]: ‘Habitat ad Monte-video’, s.d., *F. Sellow s.n.* (holotype B 10 0002567!; isotypes B 10 0002568!, HAL 0107005!, LE 00000731!, LE 00000732 (ex B)!, US 557541 (ex B)!, US 1441522 (ex B)!, US 1126679 (fragm. ex W)!, W 18890252147!).

Festuca ampliflora Döll (1878: 116). Lectotype:—BRASIL. State of Minaru [Minas Gerais]: ‘Habitat in prov. Minarum’, February 1846, A. F. Regnell III 1409 (first-step lectotype S, designated by E.B. Alexeev (1984a), second-step lectotype S S04-1260! **designated here**, isoelectotypes S S04-1259!, P 00625301!).

Taxonomic notes:—Döll (1878: 116) cited in the protologue of *F. ampliflora* two syntypes ‘Habitat in prov. Minarum (Widgren) e. Gr. ad Caldas (Regnell III n.1409)’. Later, Alexeev (1984a: 348) indicated as lectotype the specimen ‘Herb. Brasil. Regnalli III, n° 1409, prov. Minas Geraes, Caldas, II 1876, Widgren (S)’. This is here considered a first-step lectotypification. Many inconsistencies between Alexeev’s publication and Regnell and Widgren’s collections considered as type material were found, because many specimen deposited in S and their duplicates deposited in other herbaria did not have consistent in the label data and the name of the collector that has been attributed to each of the different specimens. In addition, the specimen chosen as lectotype by Alexeev is not clearly indicated as one of these collections found (S, US, W), which differ in the collector and date of collection that have been attributed as type materials of the name *F. ampliflora*. Alexeev’s lectotypification needs to be clarified. A specimen at S (S04-1260) is chosen as the second-step lectotype for *F. ampliflora*, because its label bears the same date, collector, number of collection, and type-locality cited in the protologue, and it is the most complete specimen.

***Festuca nemoralis* Túrpe (1969: 213)**

Lectotype:—ARGENTINA. Tucumán: Tañi del Valle, ‘La Ciénaga’, 2800 m s.m., 5 February 1933, L. R. Parodi 11049 (first-step lectotype BAA, designated by Túrpe (1969: 213), corrected from “typus”, second-step lectotype BAA 00000170!, **designated here**, isoelectotypes BAA 00422!, LIL 505103!, US 1539751!).

Taxonomic notes:—The specimen ‘Tucumán. Depto. Tañi: La Ciénaga, a 2800 m s.m. leg. L. R. Parodi 11049, 5-II-1933 (BAA)’ was indicated as ‘*Typus speciei*’ in the protologue of *Festuca nemoralis* by Túrpe (1969: 213). The author used the word ‘Typus’ to indicate the original material from *F. nemoralis*. More than one sheet of original material was found at BAA, LIL, and US. Túrpe’s designation is corrected to “lectotype”, applying Art. 9.9 (McNeill *et al.* 2012), and a sheet at BAA is designated as the second-step lectotype.

***Festuca parodii* Saint-Yves (1927: 308)**

Lectotype:—ARGENTINA. Catamarca: ‘Pomán’, December 1909, L. R. Parodi 2342 (lectotype BAA 00000175! **designated here**, isoelectotype LIL 505358!).

Taxonomic notes:—*Festuca parodii* was described by St.-Yves (1927: 308) who cited two syntypes in the protologue: ‘Argentine. Prov. de Catamarca: poman, Leg. L. R. Parodi, XII-1909 No 2342, <<Quebrados>> (herb. Par., herb. St-Y)’. The specimen BAA 00000175 is chosen as lectotype because it bears a label with handwriting of the author and collector, as well as the date and location cited in the protologue. The specimen deposited in G, where St-Yves herbarium is now housed, was not found (L. Gautier pers. comm. 2015).

***Festuca uninodis* Hackel (1906: 524)**

Type:—ARGENTINA. Tucumán: Tañi del Valle, ‘Cerro Muñoz, región de la Puna’, 4150 m, 29 January 1903, M. Lillo 3025b [Herb. T. Stuckert 15,372] (holotype W 19160004765!, isotypes CORD 00001663!, LIL 44217!, US 341298!).

Festuca stuckertii Saint-Yves (1927: 304). Type:—ARGENTINA. Tucumán: Tañi del Valle, ‘Río Blanco, Barrancas, 2600 m s.m.’, 26 December 1908. M. Lillo 8873 (holotype G 00099480!; isotypes BAA 00000178 [Col. Typus 1338!], CORD 00001661!, LIL 44100!). **Syn. nov.**

Taxonomic notes:—*Festuca stuckertii* has been considered as valid for the flora of Argentina taxon. Túrpe (1969) mentioned that *F. stuckertii* is clearly characterized by bi-nodes culms, the anatomical structure of their blades with semi-locked vascular bundles, and its florets and anthers are larger than *F. weberbaueri*. Also, Catalán & Müller (2002) considered *F. stuckertii* and *F. weberbaueri* as similar species by their morphology, but they also differ to *F. stuckertii* by their bi-nodes culms, auricles absent, and its midribs of the blade with girder sclerenchymatous present. However, morphological and anatomical characteristics of the taxon to which it was compared, *F. weberbaueri*, are similar to *F. fiebrigii* (Ospina *et al.* in press). All morphological and anatomical characteristics cited by Túrpe (1969) and Catalán

& Müller (2012) indicate that *F. stuckertii* has been mistakenly recognized as a species different from *F. uninodis*. The specimens determined here as *F. stuckertii* and the specimens re-determined following the criteria of Túrpe (1969) and Catalan & Müller (2012) have characters forming a continuum with specimens of *F. uninodis*. Therefore, *F. stuckertii* is proposed here as a new synonym under *F. uninodis*.

Specimens examined:—ARGENTINA. **Catamarca:** Department of Belén, “El Potrero”, Laguna Blanca, 3500 m, 25 March 1934, *Peirano 305* (LIL). **Jujuy:** Department of Humahuaca, 10 km de cianzo camino a Santa Ana, Abra de Zenta, ruta provincial 73, 4500 m, 23°10'S, 65°2'W, 12 February 1998, *Morrone O. et al. 2502* (SI); entre Palca de Aparzo y St. Ana, Abra de Zenta, 4400 m, 23 °10'13"S, 65° 2'60"W, 11 February 2007, *Zuloaga F. O. et al. 9192* (SI). **Salta:** Department of Santa Victoria, Ruta provincial 7, km 12., 4290 m, 13 February 1995, *Deginani N. et al. 796* (SI); Abra de Lizoite, 4590 m, 22°13'8"S, 65°13'33"W, 8 March 2002, *Negritto, M. A. 409a* (SI); Department unknown, La Laguna, 25 January 1914, *Rodríguez F. M. 1330* (BAB, LIL, SI). **Tucumán:** Department of Tafi, Cerro Negrito-Cumbres Calchaquies, 4500 m, 17 February 1990, *Ayarde H. 346* (LIL); Cumbres Calchaquís, próximo a las lagunas, 4300 m, 27 July 1913, *Castillón L. 3209* (LIL); C. Calchaquies, callejones, 4200 m, 1 March 1971, *Castillón L. 2858* (LIL); Cumbres Calchaquís, 4200 m, 4 February 1907, *Lillo, M. 5615* (LIL); Cumbres Calchaquies, lagunas, 4600 m, 3 February 1903, *sin colector 3067 LIL 44223* (LIL).

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