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A new variety of *Schizachyrium* (Poaceae: Andropogoneae) from South America, with notes on the infraspecific taxa of *Schizachyrium tenerum*

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Abstract

A new variety of *Schizachyrium tenerum* from South America is described and illustrated. The new taxon (*S. tenerum* var. *muticum*) differs from the other varieties of the species (*S. tenerum* var. *tenerum* and *S. tenerum* var. *hirtiglume*) mainly by the absence of awns in the sessile spikelets, which is a very unusual character in the genus. The new variety occurs in Venezuela, Bolivia, and Brazil. A taxonomic discussion and an identification key for the infraspecific taxa of *S. tenerum* are also presented, as well as illustrations of all varieties of the species. Additionally, *Schizachyrium tenerum* var. *hirtiglume* is reported for the first time for Colombia.

Keywords: Gramineae, new taxon, *Schizachyrium tenerum* var. *muticum*

Introduction

Schizachyrium Nees (1829: 331) (Poaceae: Andropogoneae) is a cosmopolitan genus with ca. 64 species distributed in tropical and temperate regions (Kellogg 2015, Soreng *et al.* 2017). About half of the species occur in the Americas (Filgueiras 2003) and 23 of them are cited for South America, from Colombia and Venezuela to Chile, Argentina, and Uruguay (Peichoto 2010, Welker & Longhi-Wagner 2012, Peichoto *et al.* 2015). The species of *Schizachyrium* have solitary racemes in the apex of the culms, generally with axillary racemes, or spatheate false panicles with a single raceme per spatheole. As in most Andropogoneae, the racemes are differentiated into nodes and internodes, disarticulating at the nodes, with a sessile and a pedicellate spikelet in each node (Watson & Dallwitz 1992). The sessile spikelet is awned in almost all species of *Schizachyrium*; the only exception among South America taxa is *S. salzmännii* (Trinius ex Steudel 1854: 361) Nash (1912: 104) var. *salzmännii* (Peichoto 2010, Welker & Longhi-Wagner 2012). Molecular phylogenies indicate that *Schizachyrium* is closely related to the genera *Andropogon* Linnaeus (1753: 1045), *Diheteropogon* (Hackel 1889: 647) Stapf (1922: t. 3093), and *Hyparrhenia* Andersson ex Fournier (1886: 51) (forming the “DASH” clade), within the “core Andropogoneae” clade (Estep *et al.* 2014, Arthan *et al.* 2017, McAllister *et al.* 2018). Additional phylogenetic studies including a broad sampling of *Schizachyrium* are needed to investigate the monophyly of the genus (Kellogg 2015, Arthan *et al.* 2017, McAllister *et al.* 2018).

Two well-defined morphological groups of South American species of *Schizachyrium* can be distinguished based on inflorescence traits (Peichoto *et al.* 2008). The first group includes taxa with sparsely branched inflorescences with one to a few racemes and straight and thick rachis internodes and pedicels. The other group is characterized by highly branched inflorescences and flexuous and slender rachis internodes and pedicels, zigzagging at maturity (Peichoto *et al.* 2008). However, some species with intermediate morphology between the two groups were recently described [*S. angustispiculatum* Peichoto & Welker in Peichoto *et al.* (2015: 464) and *S. vallsii* Peichoto & Welker in Peichoto *et al.* (2015: 467)], which may have a hybrid origin between taxa of the two groups (Peichoto *et al.* 2015).

Schizachyrium tenerum Nees (1829: 336) belongs to the first morphological group and is distinguished from morphologically similar species by its filiform leaf blades, slender and usually flexuous culms which are sparsely branched at the upper nodes, and shorter sessile spikelets (Peichoto 2010, Welker & Longhi-Wagner 2012). This

species has a broad distribution in the Americas, occurring from the United States to Argentina, Brazil, and Uruguay (Peichoto 2010, Welker & Longhi-Wagner 2012, Welker & Peichoto 2015). It is a tender and palatable forage species, even when flowering and fruiting, being useful for cattle fattening (Araújo 1971). Freitas *et al.* (1994) found high percentages of protein and high in vitro digestibility of organic matter in the spring samplings of this species. The phylogenomic analysis of Arthan *et al.* (2017) indicated that *S. tenerum* is closely related to *S. imberbe* Camus (1923: 89), which is consistent with the morphology of these plants, since the latter species is also part of the morphological group with sparsely branched inflorescences and straight rachis internodes and pedicels (Welker & Longhi-Wagner 2012). A new variety of *S. tenerum* was proposed by Peichoto (2010), *S. tenerum* var. *hirtiglume* (Henrard 1921: 42) Peichoto (2010: 341), which differs from the typical variety in having sessile spikelets with densely pilose lower glume (*vs.* glabrous lower glume in *S. tenerum* var. *tenerum*). According to Peichoto (2010), *S. tenerum* var. *hirtiglume* occurs in Venezuela, Ecuador, Peru, Bolivia, Brazil, and Argentina.

During recent field trips in Serra da Canastra, Minas Gerais, Brazil, and the revision of the American taxa of *Schizachyrium*, some plants morphologically similar to *S. tenerum* but lacking awns were found. The absence of awns in the sessile spikelets is very rare in the genus *Schizachyrium* (Peichoto 2010, Welker & Longhi-Wagner 2012) and those specimens are herein described as a new variety of *S. tenerum*. A taxonomic discussion of the infraspecific taxa of *S. tenerum* is also presented, as well as the first record of *S. tenerum* var. *hirtiglume* for Colombia.

Material & Methods

Field trips to Serra da Canastra, Minas Gerais, Brazil, were carried out from December 2012 to September 2017. The collections of the new variety of *Schizachyrium tenerum* from Serra da Canastra were deposited at CTES, HUFU, and SPSC herbaria (acronyms according to Thiers 2019). Additional specimens of the new taxon and the other infraspecific taxa of *S. tenerum* from the following herbaria were also analyzed: BAA, BM, BR, C, COL, CTES, F, HUFU, ICN, K, L, LIL, LPB, M, MO, NY, P, SI, SPSC, UB, USM, VEN, W (see Appendix). Type specimens that have been examined in person by the authors are followed by exclamation marks.

Morphological observations and measurements were carried out based on living plants and the herbarium specimens examined. The taxonomic description of the new taxon was made following the terminology presented by Peichoto (2010) and Welker & Longhi-Wagner (2012). Illustrations of all varieties of *S. tenerum* were performed by Liliana Gómez (Instituto de Botánica del Nordeste, Argentina).

Taxonomic Treatment

Schizachyrium tenerum* var. *muticum Welker & Peichoto, *var. nov.* Type:—BRAZIL. Minas Gerais: São Roque de Minas, Serra da Canastra National Park, 20°14'38.47"S, 46°26'52.10"W, 1359 m, 30 July 2015, C. Z. Fieker & M. G. Reis 95 (holotype: HUFU!; isotypes: CTES!, SPSC!). (Figs. 1, 2).

Diagnosis:—*Schizachyrium tenerum* var. *muticum* differs from the other infraspecific taxa of *S. tenerum* mainly by the absence of awns in the sessile spikelets. It is similar to *S. tenerum* var. *tenerum* due to the glabrous lower glume of the sessile spikelets; in *S. tenerum* var. *hirtiglume* the lower glume of the sessile spikelets is densely pilose.

Description:—Perennial, with short rhizomes. Culms 15–82 cm tall, slender, flexuous. Leaf sheaths glabrous; ligules 0.5–0.75 mm long, papyraceous, truncate, with tiny trichomes in the upper portion; blades 5–15 cm × 1.5–2 mm, flat or convolute, glabrous, generally with long trichomes in the basal portion, near the ligular region. Inflorescence composed of a solitary raceme in the apex of the culm, rarely with axillary racemes; spatheole 5.5–7 cm long, convolute, sometimes with a short blade; peduncle 6.5–17 cm long, exerted at maturity. Racemes 4–7 cm long, differentiated into nodes and internodes, disarticulating at the nodes, with 9–18 pairs of spikelets. Rachis internodes (2.5–)3–5.5 mm long, straight, glabrous, apex oblique and 2-dentate, ventral side flat, dorsal side convex. Callus oblique, pilose, the trichomes 0.5–1 mm long, stiff. Spikelets appressed to the rachis. Sessile spikelets 5–6.5 mm long, bisexual, awnless; lower glume 4.5–6 mm long, papyraceous, the back flat or slightly convex, with 5–7(–9) visible nerves, glabrous, scabrous at margins and in the upper half of the back, apex acute, sometimes 2-denticulate; upper glume slightly shorter than the lower one, papyraceous, laterally compressed, keeled, margins pilose, scabrous in the upper half of the back; lower lemma ca. 4.5 mm long, sterile, hyaline, margins pilose, with tiny trichomes in the upper half of the back, apex entire; lower palea absent; upper lemma 3.2–4.5 mm long, fertile, hyaline, margins pilose, apex 2-lobed,

the lobes 1–2 mm long, without an awn, rarely with a mucro between the lobes, the mucro 0.5–1.5(–2.5) mm long, not protruding from the spikelet; upper palea 0.8–1 mm long, hyaline, apex truncate with trichomes; lodicules 0.3–0.5 mm long; anthers 1.2–2.3 mm long; caryopsis ca. 3.5 mm long. Pedicellate spikelets (3–)4–6 mm long, neuter or rarely male, awnless, similar to the sessile spikelets; pedicel 3–4.5 mm long, dorsally compressed, with a marginal line of trichomes in the upper portion, the trichomes 1–3.5 mm long.

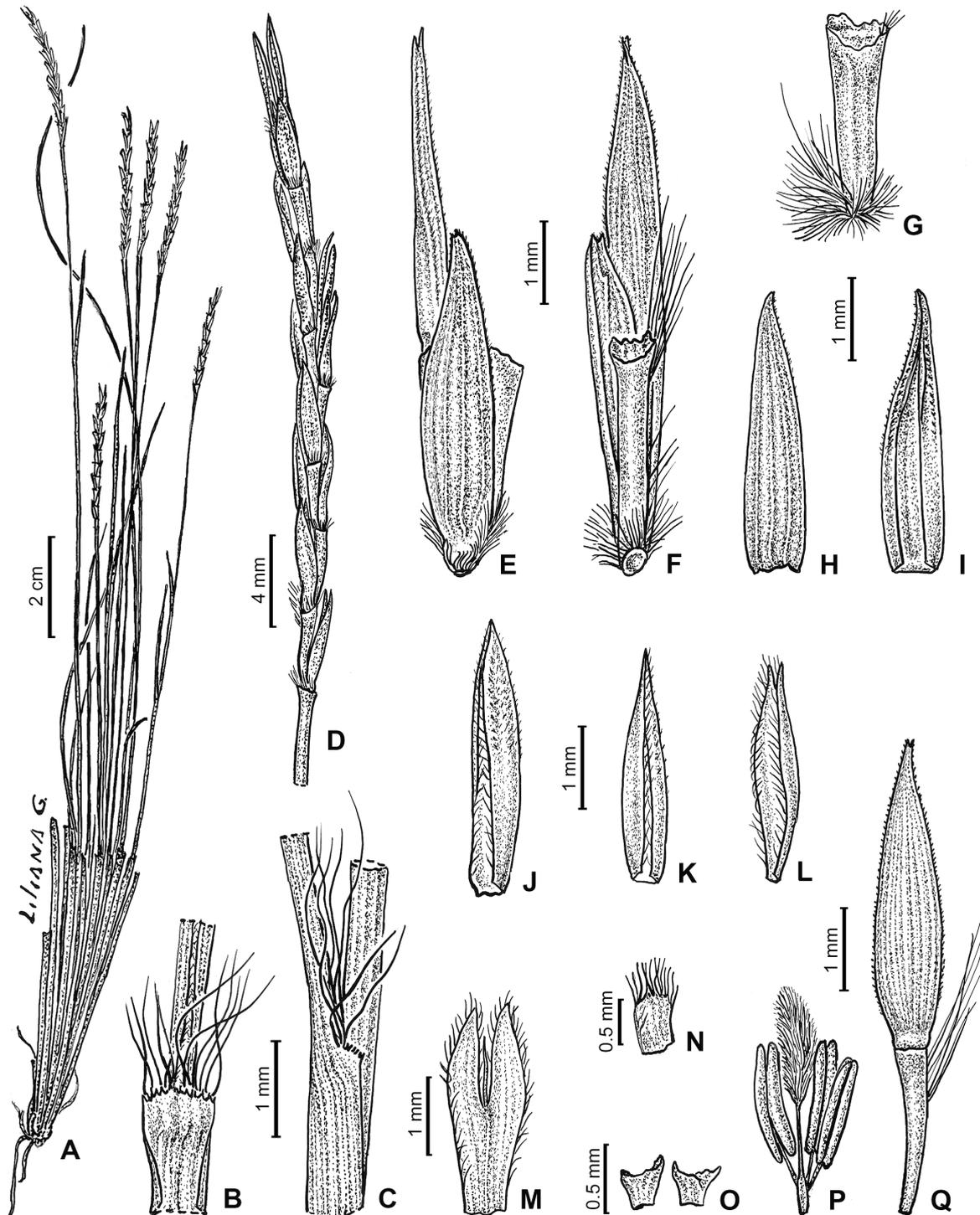


FIGURE 1. *Schizachyrium tenerum* var. *muticum*. A. Habit. B. Ligular region, ventral view. C. Ligular region, lateral view. D. Raceme. E. Pair of spikelets and rachis internode, view of the sessile spikelet. F. Pair of spikelets and rachis internode, view of the rachis internode. G. Rachis internode. H–P. Sessile spikelet. H. Lower glume, dorsal view. I. Lower glume, ventral view. J. Upper glume, ventral view. K. Lower lemma, ventral view. L. Upper lemma, ventral view. M. Upper lemma expanded, showing the mucro between the lobes. N. Upper palea, ventral view. O. Lodicules. P. Stamens and gynoecium. Q. Pedicellate spikelet with pedicel. Based on C. Z. Fieker & M. G. Reis 95 (CTES) [A] and C. Z. Fieker & M. G. Reis 109 (CTES) [B–Q].

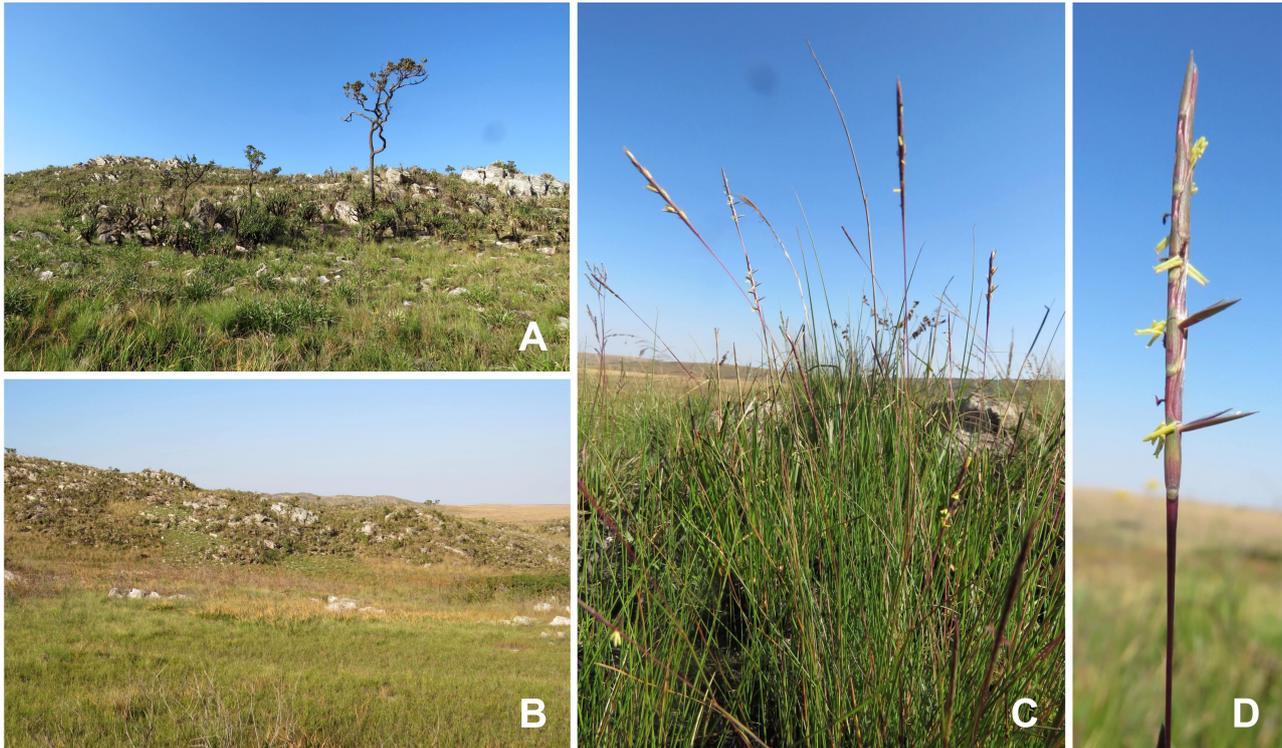


FIGURE 2. *Schizachyrium tenerum* var. *muticum*. A–B. Grasslands with rocky outcrops in Serra da Canastra National Park (Minas Gerais, Brazil). C. Habit. D. Raceme (note the spikelets open with anthers exerted during anthesis). Photo credit: C. Z. Fieker [A, C, D] and M. G. Reis [B].

Etymology:—The name of the variety refers to the awnless sessile spikelets of this taxon, which is a very unusual character in the genus *Schizachyrium*.

Phenology:—Collected with flowers and/or fruits throughout most of the year, especially from December to February and from July to August. Burnings appear to stimulate the flowering of *Schizachyrium tenerum* var. *muticum*, since flowering specimens were observed in considerable abundance in newly burned areas of Serra da Canastra National Park, within two or three months after burning. Some herbarium specimens from other localities also have fire marks at the base of the plants. It is well known that several grass species are stimulated by fire or are even fire-dependent for blooming (Coutinho 1976, Killeen 1990, Fidelis & Blanco 2014, Massi *et al.* 2017).

Distribution and habitat:—The new variety is currently known from Venezuela, Bolivia, and southeastern Brazil. Due to the disjunct areas of occurrence, it is possible that the taxon has an even wider distribution in South America. It occurs in dry grasslands, savannas, grasslands with rocky outcrops (*campo rupestre*), open rocky hillsides with white sandy soil, sandy roadsides, and occasionally in seasonally wet grasslands. It is recorded at elevations of 450–2100 m.

Additional material examined (paratypes):—BOLIVIA. Santa Cruz: Ñuflo de Chávez, Est. Las Madres on road to Monte Verde, 16°00'S, 62°00'W, 500 m, 13 February 1986, *T. J. Killeen 1775* (F); Ñuflo de Chávez, comunidad Puesto Nuevo, 60 km S of Concepción, 16°25'S, 62°00'W, 450–750 m, 21 February 1986, *T. J. Killeen 1831* (F). BRAZIL. Minas Gerais: Serra do Espinhaço, ca. 10 km SW of Diamantina, 1250 m, 3 February 1972, *W. R. Anderson et al. 35226* (MO, NY, UB); Serra do Espinhaço, ca. 8 km N of Gouveia on road to Diamantina, 1220 m, 4 February 1972, *W. R. Anderson et al. 35404* (F, MO, NY); Serra do Cipó, 110 km NE of Belo Horizonte, 900–1000 m, 28 March–1 April 1925, *A. Chase 9153* (F, MO, NY); Diamantina, Serra de San Antonio, 1300–1400 m, 27–30 December 1929, *A. Chase 10335* (F, MO, NY); São Roque de Minas, Serra da Canastra National Park, 20°14'38.47"S, 46°26'52.10"W, 1359 m, 31 July 2015, *C. Z. Fieker & M. G. Reis 109* (CTES, HUFU, SPSC); 20°14'22.56"S, 46°26'23.28"W, 1400 m, 9 August 2016, *C. Z. Fieker et al. 205* (HUFU, SPSC); 20°14'37.51"S, 46°26'50.38"W, 1361 m, 23 December 2016, *C. Z. Fieker & M. G. Reis 225* (HUFU, SPSC), 228 (HUFU, SPSC); Serra do Cipó, ca. 145 km N of Belo Horizonte, 1250 m, 16 February 1968, *H. S. Irwin et al. 20294* (MO, NY, UB). VENEZUELA. Anzoátegui: Pedro María Freites, Cerro Peonía, above Los Pajaritos, 31 km NE of Bergantín and N of Mundo Nuevo, 1400–1700 m, 2–3 December 1981, *G. Davidse & A. C. González 19911* (MO, VEN); Cerro Peonía (Cerro Los Pajaritos), above Santa Cruz, headwaters of

Rio Manantiales, east of Bergantín, 1800–2000 m, 20 March 1945, *J. A. Steyermark 61637* (F). Lara: Morán, near the quebrada del Vino, via Paramo Los Nepes, 2100 m, 18 July 1978, *R. F. Smith V8718* (MO). Monagas: Via Cueva del Guacharo, Sabana de Piedras, 19 August 1983, *R. A. Montes 1653* (MO). Sucre: in valley between base of Cerro de Diablo (western extension of southern peak of Cerro Turimiquire) and Cerro de Neverí along headwaters of Río de Amana, 2000 m, 11 May 1945, *J. A. Steyermark 62723* (MO, NY).

Taxonomic notes:—Nees (1829) described *Elionurus dubius* Nees (1829: 358) in the *Flora Brasiliensis* and stated “*Habitat in marginibus sylvarum prope Almada et Ferradas, prov. Bahiensis. Floret Decembri*” in the protologue of the species, without citing the collector, collection number or the herbarium where the specimen was deposited. Later, Hackel (1883) accepted the taxon as a variety of *Andropogon tener* (Nees 1829: 336) Kunth (1832: 565), making the new combination *Andropogon tener* var. *dubius* (Nees 1829: 358) Hackel (1883: 302). *Andropogon tener* is currently considered a synonym of *Schizachyrium tenerum* (Filgueiras 2003, Welker & Longhi-Wagner 2012). The morphological descriptions of Nees (1829) and Hackel (1883) indicate that the sessile spikelets of *Elionurus dubius* (or *Andropogon tener* var. *dubius*) are awnless, as in the new taxon herein described.

Filgueiras (2003) and the Tropicos database (Tropicos 2019) cite the specimen “*Brasilia, in arenosis subhumidis S. da Lapa, Nov 1824, Riedel 950 (LE)*” as the possible type of *Elionurus dubius*. There are two sheets of this collection at LE herbarium (LE00000597 and LE00000598) and one at K (K000307911), but they are clearly not the type material of *Elionurus dubius* due to differences in the locality and the date. The collection “*Riedel 950*” is from Serra do Cipó (or “*Serra da Lapa*”), in the Brazilian state of Minas Gerais, whereas the material cited in the protologue of *Elionurus dubius* is from the Brazilian state of Bahia (“*prov. Bahiensis*”). Besides that, the former material was collected in November (“*Nov 1824*”), while the latter in December (“*floret Decembri*”). On the other hand, the type material of *Elionurus dubius* was not found in any of the European and American herbaria that we have revised (no herbarium specimen with the information “*Habitat in marginibus sylvarum prope Almada et Ferradas, prov. Bahiensis*” was found). Based on the description in the protologue, it is possible that *Elionurus dubius* corresponds to the new variety of *Schizachyrium tenerum* herein described. However, as we cannot find the type material of that name to be sure of the identity of that taxon, we are describing here a new taxon (*Schizachyrium tenerum* var. *muticum* Welker & Peichoto var. nov.) instead of making a new combination based on *Elionurus dubius*.

Schizachyrium tenerum var. *muticum* var. nov. is morphologically similar to the other varieties accepted for the species, *S. tenerum* var. *tenerum* (Fig. 3) and *S. tenerum* var. *hirtiglume* (Fig. 4), but is clearly distinguished by the absence of awns in the sessile spikelets (Fig. 1D–E). The new taxon has sessile spikelets with 2-lobed upper lemma, without an awn or rarely with a mucro 0.5–1.5(–2.5) mm long between the lobes (Fig. 1L–M), the mucro not protruding from the spikelet. The other varieties of *S. tenerum* have sessile spikelets with 2-lobed upper lemma, with a well-developed awn between the lobes (Figs. 3L, 4L), the awn 8–11 mm long and protruding from the spikelet. The absence of awns in the sessile spikelets is a very unusual character in the genus *Schizachyrium*. In South America, only *S. salzmännii* var. *salzmännii* has awnless spikelets (Peichoto 2010, Welker & Longhi-Wagner 2012).

Schizachyrium tenerum var. *tenerum* and *S. tenerum* var. *hirtiglume* are distinguished by the glabrous back of the lower glume of the sessile spikelets in the former (Fig. 3H) and densely pilose in the latter (Fig. 4H). The typical variety of this species occurs from the United States to Argentina, Brazil, and Uruguay (Peichoto 2010, Welker & Longhi-Wagner 2012, Welker & Peichoto 2015). *Schizachyrium tenerum* var. *hirtiglume* occurs in Venezuela, Ecuador, Peru, Bolivia, Brazil, and Argentina (Peichoto 2010) and in Colombia, where it is reported here for the first time. The material examined of these taxa is presented in the Appendix. The specimens of *S. tenerum* var. *hirtiglume* from Colombia, which document the new citation of the taxon for this country, are highlighted in bold.

Key to the infraspecific taxa of *Schizachyrium tenerum*

1. Sessile spikelets awnless (Fig. 1D–E); upper lemma without an awn, rarely with a mucro between the lobes (Fig. 1L–M), the mucro 0.5–1.5(–2.5) mm long, not protruding from the spikelet.....*S. tenerum* var. *muticum*
- Sessile spikelets awned (Figs. 3D–E, 4D–E); upper lemma with a well-developed awn between the lobes (Figs. 3L, 4L), the awn 8–11 mm long, protruding from the spikelet.....2
2. Back of the lower glume of the sessile spikelet densely pilose (Fig. 4H).....*S. tenerum* var. *hirtiglume*
- Back of the lower glume of the sessile spikelet glabrous (Fig. 3H).....*S. tenerum* var. *tenerum*

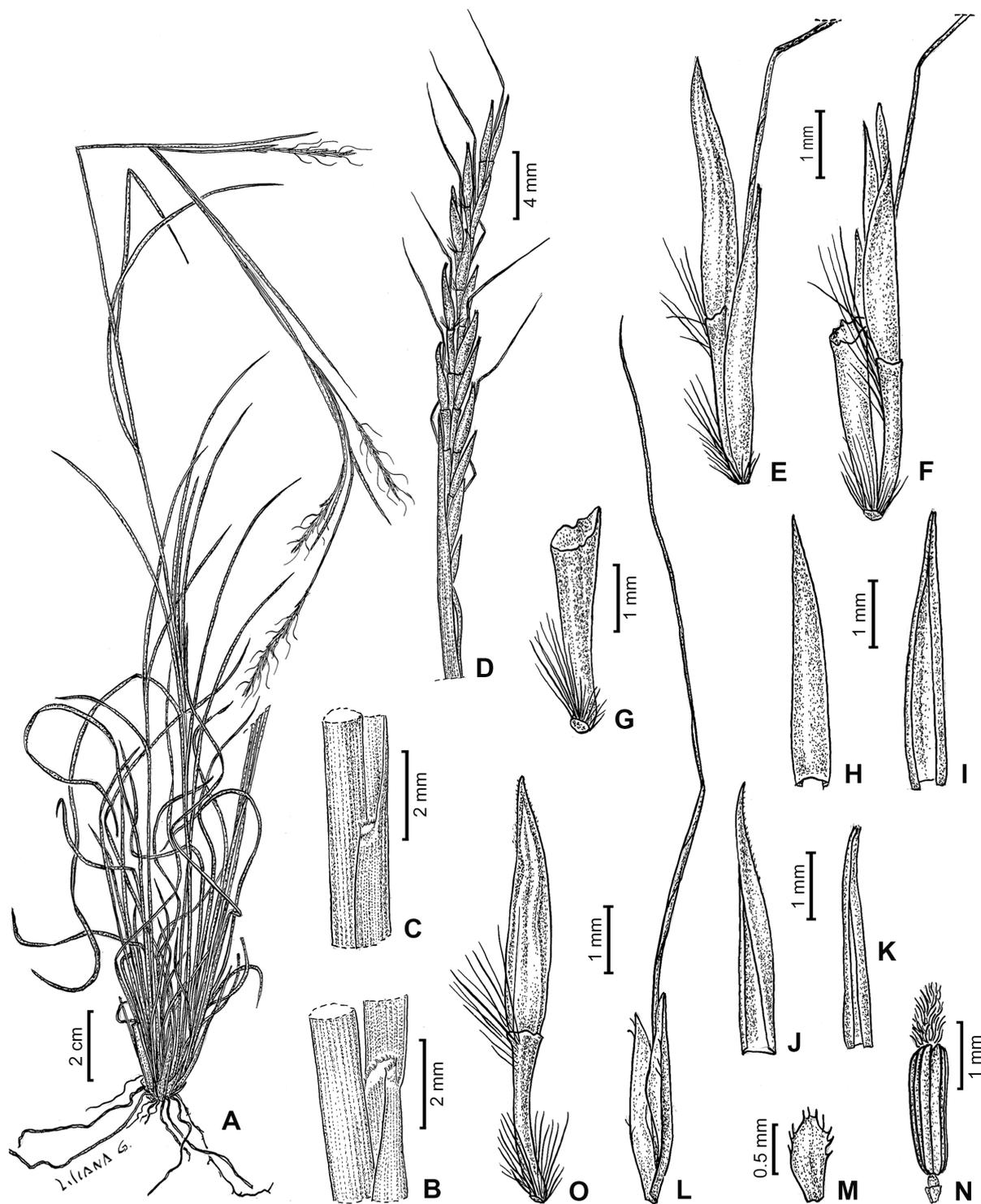


FIGURE 3. *Schizachyrium tenerum* var. *tenerum*. A. Habit. B. Ligular region, ventral view. C. Ligular region, lateral view. D. Raceme. E. Pair of spikelets and rachis internode, view of the sessile spikelet (awn partially removed). F. Pair of spikelets and rachis internode, view of the pedicellate spikelet (awn partially removed). G. Rachis internode. H–N. Sessile spikelet. H. Lower glume, dorsal view. I. Lower glume, ventral view. J. Upper glume, ventral view. K. Lower lemma, ventral view. L. Upper lemma, ventral view. M. Upper palea, ventral view. N. Stamens and gynoecium with lodicules covering the ovary. O. Pedicellate spikelet with pedicel. Based on *M. M. Arbo et al.* 4827 (CTES).

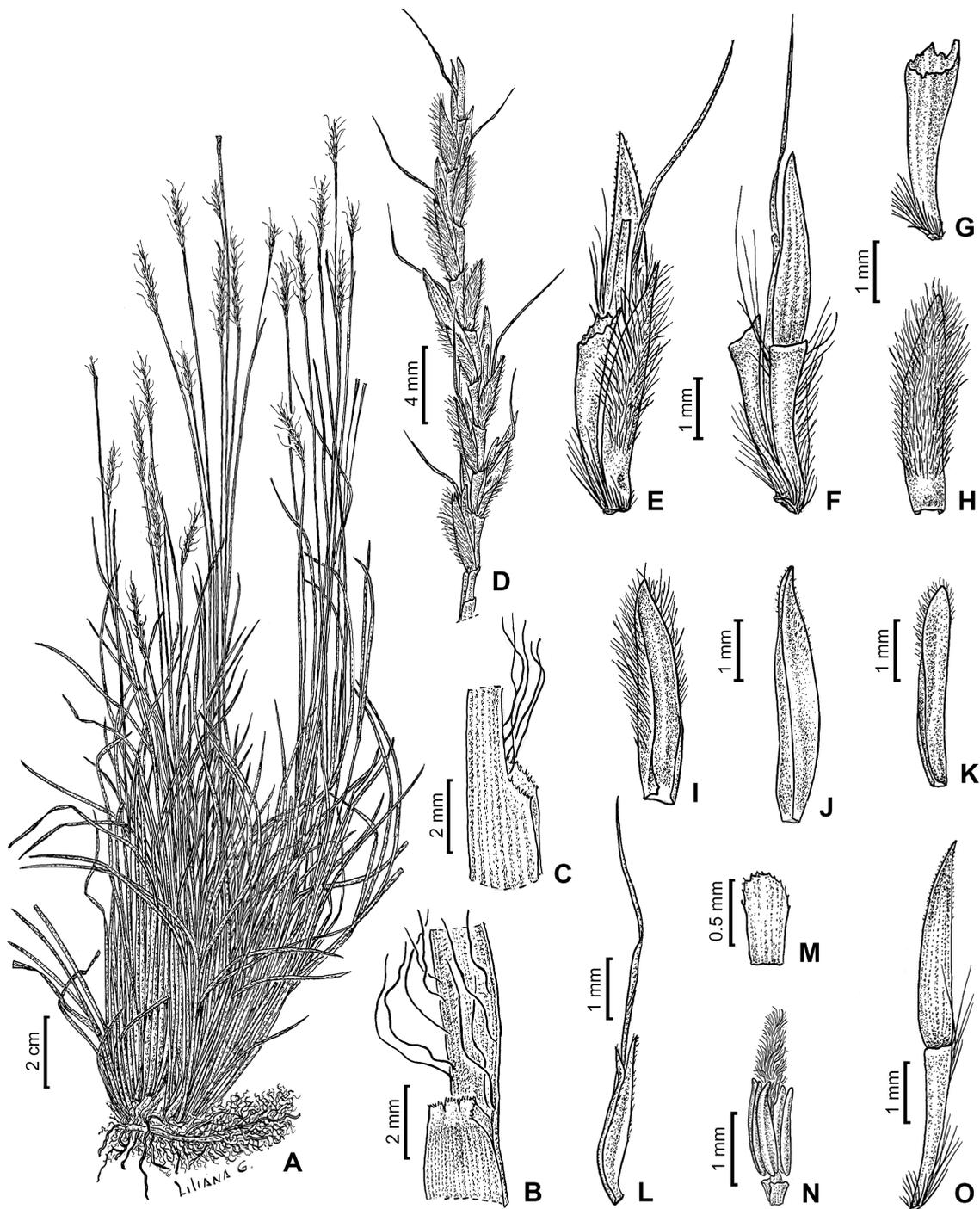


FIGURE 4. *Schizachyrium tenerum* var. *hirtiglume*. A. Habit. B. Ligular region, ventral view. C. Ligular region, lateral view. D. Raceme. E. Pair of spikelets and rachis internode, view of the sessile spikelet. F. Pair of spikelets and rachis internode, view of the pedicellate spikelet. G. Rachis internode. H–N. Sessile spikelet. H. Lower glume, dorsal view. I. Lower glume, ventral view. J. Upper glume, lateral view. K. Lower lemma, lateral view. L. Upper lemma, ventral view. M. Upper palea, ventral view. N. Stamens and gynoecium with lodicules covering the ovary. O. Pedicellate spikelet with pedicel. Based on *P. Santiago Díaz et al.* 921 (COL).

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Appendix

Additional material examined

1. *Schizachyrium tenerum* Nees var. *tenerum* (Fig. 3).

Type:—BRAZIL. Rio Grande do Sul, *F. Sellow* s.n. (lectotype, designated by Peichoto 2010: K[000307907]!; isolectotypes: BR!, W!).

Selected material examined:—ARGENTINA. Córdoba: Rio Cuarto, near the pueblo de Achiras, 1 April 1983, *E. Marchesi 18767* (BAA, LIL); Santa María, Ochoa, 6 April 1904, *T. J. V. Stuckert 14163* (MO, SI, W). Corrientes: Paso de los Libres, campo Gral. Ávalos, Ea. San Pedro, 5 April 1972, *R. Carnevali 3211* (CTES, ICN); Empedrado, Ea. Las Tres Marias, 13 March 1966, *T. M. Pedersen 7732* (C, MO); San Roque, Chavarría, ruta 123, 16 March 1995, *C. L. Quarín et al. 4139* (CTES, K); Mercedes, 17 February 1966, *O. Royo Pallarés 173* (CTES, F, SI); Itatí, ruta 12, 37 km E del desvío a Itatí, 19 February 1983, *A. Schinini & R. Carnevali 23310* (CTES, LIL, MO). Entre Ríos: Flora Entre-Riana, Arroyo Yeruá, 5 February 1876, *P. G. Lorentz 1014* (K). Jujuy: El Carmen, camino de cornisa a Salta, 6 March 1967, *A. L. Cabrera et al. 18165* (BAA, CTES); Capital, desvío al Dique Los Alisos, camino a la Almona, 24 March 1992, *A. L. Cabrera et al. 34775* (F, SI); Palpalá, Sierra de Zapla, Mina 9 de Octubre, 24°13'S, 65°04'W, 1700 m, 14 February 1997, *F. O. Zuloaga et al. 5860* (CTES, SI). Misiones: 7 km of Bernardo de Irigoyen, camino a San Pedro, 17 February 1973, *A. Krapovickas et al. 23343* (CTES). Salta: Santa Victoria, camino a Los Toldos, 22°14'46.7"S, 64°41'26.6"W, 1621 m, 20 April 2010, *M. C. Peichoto 159* (BAA, CTES); La Caldera, La Calderilla, 1400 m, 12 February 1997, *A. A. Sulekic & G. Cano 1666* (CTES); Santa Victoria, La Misión, 4 km N of Los Toldos, 1650 m, 20 April 1998, *A. A. Sulekic & G. Cano 1994* (CTES); La Caldera, 1400 m, 28 February 1999, *A. A. Sulekic & R. Neumann 2441* (CTES). BOLIVIA. La Paz: Nor Yungas, arriba de Coroico, 1900 m, 10 April 1990, *St. G. Beck 17549* (CTES, K); Nor Yungas, pathway from Unduavi to Coroico by the new road Los Yungas, 17.5 km E of Unduavi, 16°12'47"S, 67°47'38"W, 1725 m, 20 March 2004, *O. Morrone & M. J. Belgrano 4847* (CTES). Santa Cruz: Inca ruins of Samaipata, 120 km W of Santa Cruz de la Sierra, 18°10'S, 63°50'W, 1900 m, 2 June 1987, *T. J. Killeen 2489* (F). Tarija: Aniceto Arce Ruiz, 21°52'S, 64°52'W, 2700 m, 15 March 1998, *St. G. Beck 26128* (LPB). BRAZIL. Bahia: Abaíra, Campo de Ouro Fino, 13°15'N, 41°54'W, 1600–1700 m, 10 January 1992, *R. M. Harley et al. 50739* (F). Distrito Federal: ca. 25 km SW of Brasília, 950 m, 19 February 1966, *H. S. Irwin et al. 13009* (F, MO); Fazenda Água Limpa (University of Brasília field station) near Vargem Bonita, 10 May 1976, *J. A. Ratter & S. F. Fonsêca R3006* (MO). Goiás: Corumbá de Goiás, Serra dos Pirineus, 10 km NW of Cocalzinho de Goiás, 1150–1250 m, 7 April 1979, *A. G. Burman & T. S. Filgueiras 396* (F); 17 km NE of Abadiânia along Highway BR-060, 940 m, 9 April 1976, *G. Davidse 12178* (K, MO); Serra do Cristais, ca. 10 km W of Cristalina, 1200 m, 5 March 1966, *H. S. Irwin et al. 13546* (F, MO). Minas Gerais: 7–12 km N of Santana do Riacho, road to Lapinha, 19°10'S, 43°41'W, 11 February 1991, *M. M. Arbo et al. 4827* (CTES); Barbacena, Serra da Mantiqueira, 1230 m, 28 February–3 March 1925, *A. Chase 8647* (F, MO); Serra do Cipó, 110 km NE of Belo Horizonte, 850 m, 28 March–1 April 1925, *A. Chase 9115* (F, MO); São Roque de Minas, Serra da Canastra National Park, 20°14'10.94"S, 46°26'45.39"W, 1385 m, 13 April 2014, *C. Z. Fieker & M. G. Reis 41* (HUFU, SPSC); Ouro Branco, Serra de Ouro Branco, 20°30'21"S, 43°38'16"W, 1300 m, 15 March 2005, *H. M. Longhi-Wagner et al. 9539* (CTES, ICN). Paraná: 4 km E of Guarapuava along Highway BR-277 to Curitiba, 1050 m, 15 March 1976, *G. Davidse et al. 11318* (K, MO); 17 km N of Castro along Highway PR-11, 960 m, 15 March 1976, *G. Davidse et al. 11397* (C, K, MO); Jaguariaíva, Parque Estadual do Cerrado, 8 March 2005, *H. M. Longhi-Wagner et al. 9461* (CTES, ICN); Ponta Grossa, Estação Experimental, 28 January 1946, *J. R. Swallen 8324* (MO). Rio Grande do Sul: 27 km NW of Vacaria along Highway BR-285 to Passo Fundo, 950 m, 11 March 1976, *G. Davidse et al. 11156* (MO); Rosário do Sul, 14 km W of Rosário do Sul along Highway BR-290, 19 January 1973, *A. Krapovickas et al. 22793* (CTES, ICN); 20 km W of São Pedro do Sul, on road to General Vargas, 15 March 1991, *T. M. Pedersen 15715* (C, CTES, MO). São Paulo: Campos do Jordão, Serra da Mantiqueira, 1600–1625 m, 20–22 May 1925, *A. Chase 9897* (MO). Santa Catarina: 5 km N of Lajes along Highway BR-116, 940 m, 10 March 1976, *G. Davidse et al. 11110a* (MO). COLOMBIA. Antioquia: San Jerónimo, km 10 of road San Jerónimo-Medellín, 6°25'N, 75°42'W, 1225 m, 19 September 1987, *J. L. Zarucchi et al. 5415* (MO, NY). Boyacá: desierto 4 km SW de Villa de Leiva, carretera Sáchica-Sutamarchán, 2200 m, 26 December 1971, *A. M. Cleef 357* (COL). Cauca: “El Ramal” to Río Sucio, west of Popayán, 1600–1900 m, 3 July 1922, *F. W. Pennell & E. P. Killip 8109* (NY); Carretera Cali-Popayán, entre Mandomo y Pescador, 1630 m, 26 June 1989, *F. O. Zuloaga & X. Londono 4191* (MO). Cundinamarca: Suesca, Hac. Susatá, 2700 m, 23 November 1999, *J. P. Groenendijk & N. Rietman 1360* (COL); Ubaté, 2700 m, 1983, *J. R. I. Wood 3503* (COL, K). Santander: La Mesa de Los Santos, 1600 m, 3 July 1984, *J. R. I. Wood 4493* (COL, K).

PERU. Amazonas: Chachapoyas, 2000–2400 m, 28 May 1962, *J. J. Wurdack 578* (F, K, MO, NY, USM). Cajamarca: Cajamarca, 1 km S of Huambocancha on road towards Cajamarca, 2770 m, 14 March 2000, *P. M. Peterson & N. Refulio Rodriguez 14851* (K, MO, USM). Pasco: Oxapampa, road to Mallam-pampa, 5–8 km SW of Huancabamba, 10°25'S, 75°34'W, 1740 m, 21 January 1984, *D. N. Smith & J. Canne 5769* (MO). URUGUAY. Artigas: Acevedo entre A° Mandiyú y A° Naquiná, 21 March 1972, *B. Rosengurt 11302* (CTES, ICN, K, MO). Rivera: near Paso Empedrado, ca. 10 km N of boundary of the department, on main road from Montevideo to Rivera, 21 March 1984, *T. M. Pedersen 13878* (C, MO, SI). Tacuarembó: 10 km NW de Tacuarembó, camino a Gruta de Los Helechos, 23 February 2005, *M. Dematteis & A. Schinini 1829* (CTES). VENEZUELA. Amazonas: Atabapo, alto Río Ventuari, sabana del Oso, ribera S del río Ventuari, 160 m, 4°57'N, 65°24'W, 17 August 1978, *O. Huber 2301* (MO, NY). Anzoátegui: Libertad, ridges and tops of Montañas Negras, along the Sucre and Anzoátegui border, 20 km NE of Bergantín, NE of Buenos Aires, Serranía de Turimiquire, 10°04'N, 64°11'W, 2000–2350 m, 28 November 1981, *G. Davidse & A. C. Gonzalez 19562* (MO, NY, VEN); Fondo El Saman, entre Quebrada El Onoto y el río Cabrutica, 9 October 1984, *R. Montes 2712* (MO). Aragua: distrito Ricaurte, 12–18 km al norte de La Victoria, hacia la Colonia Tovar, 890–1560 m, 8 December 1982, *J. A. Steyermark et al. 127728* (MO). Bolívar: Piar, middle part of Río Purpur, affluent of Río Ambutuir, along trail to Uriman, 5°32'N, 62°33'W, 850 m, 30 November 1982, *G. Davidse & O. Huber 23003* (MO); Sta. Elena, Mata Cutia, 6 September 1979, *N. A. Rosa & O. C. Nascimento 3324* (NY); Mount Roraima, southwest-facing slopes between base of mountain at Quebrada Ka-hua-parú and Glycon swamp, 1220–1980 m, 1 October 1944, *J. A. Steyermark 59020* (F, NY), *59035* (F); Gran Sabana, between Kun and Uadaura-parú, in valley of Río Kukenán, south of Mount Roraima, 1065–1220 m, 1 October 1944, *J. A. Steyermark 59055* (NY); 15 km west of airport of Santa Elena, 4°30'N, 61°15'W, 850 m, 23 August 1976, *J. A. Steyermark et al. 112297* (MO, VEN). Distrito Federal: 11 km SW of Carayaca by road, 1400 m, 6 November 1971, *G. Davidse 2899* (COL, K, MO, SI). Lara: Palavecino, en lomas arriba de La Mata hacia Parque Nacional Terepaima, 1 June 1978, *C. Burandt Jr. V0219* (MO).

2. *Schizachyrium tenerum* var. *hirtiglume* (Henrard) Peichoto (Fig. 4).

Type:—BOLIVIA. Tarija, 2300 m, 21 March 1904, *M. Fiebrig 3154* (holotype: L!; isotypes: BM!, K!, M!, P!).

Selected material examined:—ARGENTINA. Córdoba: Copina, 1400 m, February 1947, *A. P. L. Digilio & M. M. Grassi 2267* (LIL). Jujuy: León, 1625 m, February 1943, *L. R. Parodi 14651* (BAA); Cerro Zapla, en los terrenos de la mina, March 1983, *C. B. Villamil et al. 2938* (SI). Salta: Dique Campo Alegre, March 1978, *L. J. Novara 763* (LIL). BOLIVIA. Chuquisaca: Oropeza, ca. 2 km along road to Orurillo (beyond school) going off main highway to Cochabamba, ca. 10 km from Sucre, 2900 m, 7 February 1999, *J. R. I. Wood 14426* (LPB). La Paz: Nor Yungas, Coroico 4 km hacia el Sur, 2000 m, 5 March 1989, *St. G. Beck 14817* (K, LPB); Nor Yungas, Coroico, 2100 m, 13 May 1989, *St. G. Beck 14957* (LPB). Tarija: Cercado, Cuesta de Sama, 2200 m, 18 March 1986, *E. Bastián 1139* (LPB); Jose María Aviléz, Aliso, subiendo 5 km a Antigal, colinas arriba del pueblo, 21°48'S, 64°54'W, 2360 m, 20 April 2000, *St. G. Beck & N. Paniagua 27150* (LPB); Aniceto Arce Ruiz, cerca de 1 km de Chaguaya hacia Padcaya, 21°52'S, 64°41'W, 2000 m, 13 March 1998, *St. G. Beck et al. 32902* (CTES); Mendez, 10.4 km SW of Tomatas (5 km N of Tarija), Rincón de la Victoria, 21°32'S, 64°50'W, 2200–2300 m, 10 May 1983, *J. C. Solomon 10606* (K, LPB). BRAZIL. Distrito Federal: Sobradinho, 15°40'S, 47°44'W, 1100 m, 6 January 2009, *J. F. M. Valls et al. 15354* (CTES), *15355* (CTES). Minas Gerais: Serra do Curral, Southeast of Belo Horizonte, 1200 m, 26 March 1925, *A. Chase 9093* (F, MO, W). COLOMBIA. Cauca: **Popayán, alrededores de la ciudad de Popayán, vía al Oriente, 1800 m, 18 October 1999, P. B. R. Ramírez 12377** (COL). Nariño: **La Unión, cumbre del Cerro de La Jacoba, 2440 m, 31 July 1977, E. Polidoro Pinto et al. 1779** (COL), *1791* (COL); **La Unión, Cerro de La Jacoba, 1990–2440 m, 31 July 1977, P. Santiago Díaz et al. 921** (COL). ECUADOR. Loja: 9 km NE of Celica on road to Guachanamá, 2500 m, 3 June 1990, *P. M. Peterson & E. J. Judziewicz 9510* (MO); 4 km E of Guachanamá on steep road down to Macará-Catacocha Highway, 2530 m, 3 June 1990, *P. M. Peterson & E. J. Judziewicz 9514* (K, MO). PERU. Cajamarca: Chota, Chororco, a 6 km sobre la carretera Chota-Lajas, 2250 m, 14 June 1980, *I. Sánchez Vega 2286* (MO, SI); Ichocán, en el arboretum “Chancay II” de CICAFOR, entre la localidad de Chancay y Valle Condebamba, 2450 m, 29 March 1981, *I. Sánchez Vega et al. 2436* (BR, MO); Cajamarca, Namora, en la quebrada del río Llallumayo, 2775 m, 23 June 1984, *I. Sánchez Vega & W. Ruiz Vigo 3630* (MO). VENEZUELA. Bolívar: Gran Sabana, between Kun and Uadaura-parú, in valley of Río Kukenán, south of Mount Roraima, 1065–1220 m, 1 October 1944, *J. A. Steyermark 59116* (F); Gran Sabana, ca. 10 km SW of Karaurin Tepui at junction of Río Karaurin and Río Asadon (Río Sanpa), 5°19'N, 61°03'W, 900–1000 m, 23 April 1988, *R. Liesner 23713* (MO, VEN).

Many other specimens of these taxa, which are listed in Peichoto (2010) and Welker & Longhi-Wagner (2012), were also examined.