

Syntrichia boliviana (Pottiaceae, Bryophyta), a New Species from the Tropical Andes

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Abstract—A moss from the puna of Urmiri, Department of La Paz in Bolivia, is described and illustrated as the new species *Syntrichia boliviana*. This species is characterized by its keeled and lanceolate leaves with bistratose to tristratose laminae, plane or weakly recurved bordered margins, acute apex, dorsal surface costal cells in the upper third like those of the lamina, and costa ending a few cells below the apex, sporophytes with a short seta, and a peristome membrane hardly projecting above the urn. Detailed light and scanning electron microscope photographs of the main characters are presented. The principal characters that separate this from similar species are briefly discussed. *Syntrichia napoana*, previously only known from Ecuador, is reported from Bolivia. A key to the species of *Syntrichia* in Bolivia is provided.

Keywords—Bolivia, Bryophyta, Pottiaceae, *Syntrichia*, taxonomy.

The Pottiaceae are the largest family of mosses in the Neotropics and characteristic of harsh environments. In terms of species diversity, *Syntrichia* Brid., is the most species-rich genus of this family (Gradstein et al. 2001). The genus appears to be a monophyletic group (Mishler 2007), and mainly characterized by red laminal KOH color reaction and the lack of a dorsal epidermis in costal cross section of the leaves. According to Crosby et al. (1999), *Syntrichia* comprises 78 species distributed worldwide, of which 39% are presently recognized in the Neotropics (Mishler 1994; Churchill and Linares 1995; Delgadillo et al. 1995; Churchill et al. 2000; Churchill 2008), showing a notable diversification in this area. Recently, Cano and Gallego (2008) have transferred many *Tortula* Hedw. species to *Syntrichia* and have synonymized several names previously placed in *Tortula* under *Syntrichia*. Furthermore, new reports of *Syntrichia* for South America (Gallego et al. 2006; Gallego and Cano 2007a), as well as one new species (Gallego and Cano 2007b), have been published. These various studies have notably altered the nomenclature and the number of species recognized for *Syntrichia*.

About 22 species of *Syntrichia* have been reported for the Bolivian moss flora (Churchill et al. 2000; Churchill and Fuentes 2005; Appendix 1). Recent studies (Cano 2008; Cano and Gallego 2008; Cano et al. 2008; Gallego et al. 2009) have considerably changed the species previously reported for the country (Appendix 1). Recent transfers include *Hennediella angustifolia* to *Syntrichia* as *S. angustifolia* (Cano 2008), *S. xerophila* to *Pseudocrossidium*, *Tortula napoana*, *T. polylepidis* and *T. buchtienii* to *Syntrichia* as *S. napoana*, *S. polylepidis*, and *S. buchtienii* (Cano and Gallego 2008). New synonymies include *Tortula brunnea*, *T. fragillima* and *T. ligulata* with *S. fragilis*, *Tortula sordida* with *Syntrichia andicola* (Cano and Gallego 2008), and finally, *S. ciliata* with *S. andicola*, *S. viridula* with *S. lacerifolia*, and *S. bipedicellata* and *S. linguifolia* with *S. fragilis* (Gallego et al. 2009). In addition, Cano et al. (2008) recorded *S. ammonsiana* for the first time from Bolivia.

During ongoing studies toward a revision of *Syntrichia* in South America, we found a peculiar specimen of uncertain affinity at the La Paz National Bolivian Herbarium (LPB) which was identified as *Tortula* and collected in November of 1986 by Marko Lewis in La Paz. After studying the types of the American taxa attributed to *Syntrichia* and *Tortula* (Gallego and Cano 2007a; Cano and Gallego 2008; Gallego et al. 2009), and comparing the specimens with relevant literature (Magill 1981; Lightowers 1986; Kramer 1988; Zander 1993; Mishler

1994, 2007; He 1998; Li et al. 2001; Allen 2002; Gallego 2005), the unusual combination of characters left no doubt that this specimen could not be accommodated into any known species of *Syntrichia*. The new species is here described, illustrated, and compared with other closely related species (Table 1). A key to all *Syntrichia* species of Bolivia is provided.

MATERIALS AND METHODS

The type specimen cited below is deposited in LPB. The specimen was studied with the typical anatomical and morphological methods applied for Pottiaceae (Zander 1993). For the study of comparative morphology, we examined all the described species present in the Neotropics. The habitat description is based on label information. General morphology and measurements were undertaken with an Olympus-BH2 light microscope, while microphotographs were obtained with a spot insight 3.5 camera mounted on this microscope. Leaf surfaces were studied using a Jeol JSM-6100 scanning electron microscope (SEM), using 10–25 kv acceleration. For the SEM study, the material was fixed in 3% glutaraldehyde with 0.1M cacodylate buffer at 4°C, then washed in cacodylate and saccharose buffer, and dehydrated in an increasing acetone series, critical point dried, and coated with a 20–30 nm gold layer. The collection is fertile with numerous sporophytes, but only two have complete peristomes. To avoid damage to these sporophytes, they were not studied with electronic microscopy.

TAXONOMIC TREATMENT

Syntrichia boliviana M. T. Gallego & M. J. Cano, sp. nov.—

TYPE: BOLIVIA. La Paz: Loayza, Urmiri, along the Urmiri Hot Springs road cutoff ca. 1 km above Urmiri Hot Springs and 4 km S of Sapahaqui, 16°54'S, 67°56'W, 3470 m, Nov 1986, *Lewis 86–2084* (holotype: LPB!).

Folia adpressa, lanceolata vel ovato-lanceolata, pr. medium haud constricta, carinata et apice acuta, lamina regulatim bistratosa, interdum tristratosa, marginibus plerumque planis, basi nonnumquam recurvatis, unistratosis quidem, sed cellulis incrassatis efformatis, ita ut phyllidium aperte marginatum appareat, nervo non apicem prorsus attingenti dorsaliterque laevi. Sporophytum seta brevi longitudineque tota dextrorsum retorta, capsula cylindrica et membrana basali peristomii brevissima.

Plants 1.0–1.5 cm high, growing in dense turfs, olive-green. Stems erect, branched; in cross-section circular, hyalodermis absent, sclerodermis with the outer cells thicker-walled, central strand differentiated; axillary hairs of hyaline cells. Rhizoids brownish, smooth. Leaves appressed, with the upper part irregularly twisted when dry, spreading when moist,

TABLE 1. Comparison of key morphological characters distinguishing *Syntrichia boliviana*, *S. breviseta*, *S. chisosa*, *S. napoana* and *S. percarcosa*.

| | <i>S. boliviana</i> | <i>S. breviseta</i> | <i>S. chisosa</i> | <i>S. napoana</i> | <i>S. percarcosa</i> |
|---|--|---|---|---|---|
| leaf shape | lanceolate | lingulate | lingulate to lingulate-spathulate | lingulate | lingulate to lingulate-lanceolate |
| leaf constriction at the middle | no | weakly | weakly | no | weakly |
| leaf apex | keeled, acute | not keeled, obtuse to rounded | not keeled, obtuse to rounded | not keeled, obtuse to rounded | cucullate, rounded |
| leaf margins | bordered, plane or recurved one third of the leaf length | bordered, plane or weakly recurved at base | not bordered, plane | bordered, recurved to the middle, sometimes plane | bordered, usually plane, sometimes weakly recurved |
| upper and middle laminal cells size (μm) | 3–7.5 \times 4.5–8 | 7.5–12.5 \times 7.5–12.5 | 5–7.5(10) \times 5–7.5(10) | 10–15(17.5) \times 10–12.5(15) | 7.5–12.5 \times (5)7.5–10(12.5) |
| lamina stratification | regularly bi to tristratose | irregularly bistratose in patches | regularly bistratose | irregularly bistratose in patches | regularly to irregularly bistratose in patches |
| costa | finishing few cells below apex, smooth dorsally | excurrent as a smooth hair-point, strongly papillose dorsally | excurrent as a mucro, strongly papillose dorsally | finishing few cells below apex, weakly papillose dorsally | finishing few cells below apex, usually smooth dorsally |
| dorsal surface cells of the costa at upper third | like those of the lamina | like those of the lamina | stereids | stereids | like those of the lamina |
| seta | spirally twisted to right throughout | spirally twisted to right throughout | sporophytes unknown | spirally twisted to left below and to right above | spirally twisted to left below and to right above |
| peristome membrane | hardly projects over the urn | projects over the urn like a short tube | sporophytes unknown | hardly projects over the urn | projects over the urn like a tube |
| vegetative diaspores | absent | absent | brood leaves | leaf fragments | absent |

lanceolate to ovate-lanceolate, 2.7–3.7 \times 0.4–0.6 mm, keeled, not constricted at midleaf, lamina regularly bistratose, sometimes tristratose; apex acute; margins plane or recurved one third of the leaf length from the base, unistratose, bordered by 1–3 rows of thicker-walled and smooth cells; costa 85–100 μm wide at midleaf, without dorsal stereids in the upper third, ending a few cells below the apex; ventral surface cells of the costa differentiated, quadrate to rectangular, not bulging, papillose; in transverse section with 1 row of guide cells and 3–4 crescent-shaped dorsal substereid rows, with hydroids; on the dorsal surface without papillae; upper and midlamina cells quadrate, oblate or rounded, 3–7.5 \times 4.5–8 μm , thin-walled, with 2–4 papillae per cell, bifurcate, not pedicellate, 2.5 μm high; juxtacostal basal cells long-rectangular, 50–87.5 \times 12.5–17.5 μm , hyaline, thin-walled, smooth, forming a clearly differentiated hyaline area like two inverted “U’s” up to 30% of leaf length; marginal basal cells chlorophyllose, rectangular, 12.5–25 \times 12.5–15 μm , thin-walled, smooth. Dioicous?. Perichaetial leaves weakly differentiated, not sheathing at base. Setae erect, ca. 0.4 cm long, spirally twisted to right throughout, reddish brown. Capsules erect, cylindrical, ca. 2 \times 0.6 mm, brownish, exothecial cells rectangular, thin-walled, smooth; annulus of 1–2 rows of quadrate to rectangular cells, 12.5–20 μm in width. Peristome of 32 papillose, weakly spirally twisted teeth when dry, straight when moist, 250–380 μm high; basal membrane of 1–3 rows of cells, 25–30 μm high. Opercula long conical, ca. 0.9 mm high. Calyptrae cucullate, long conical, ca. 3.2 mm high. Spores spherical, (10)12.5–15 μm in diameter, papillose. Laminal KOH color reaction reddish. Figures 1–2

Etymology—The species epithet *boliviana* refers to the country of origin.

Geographical Distribution and Ecology—The family Pottiaceae is well adapted to xerophytic environments of the Central Andes, such as the Bolivian dry puna and dry inter-Andean valleys. In the latter ecoregion, the Pottiaceae comprises nearly half of presently recorded moss species, and

the genus *Syntrichia* is the most diverse (Churchill 2008). The province of Loayza (in Department of La Paz) is located in the north-central portion of the country, where the upper limit of the puna exhibits a dominant shrub and thicket vegetation. *Syntrichia boliviana* is only known from the type locality in Bolivia (Dpt. La Paz, Prov. Loayza). According to label information, this specimen was found in desert scrub growing as an epiphyte at the base of a shrub at 3,470 m.

DISCUSSION

Syntrichia boliviana is characterized by its keeled and lanceolate leaves, with bistratose to tristratose lamina, small upper and middle laminal cells 3–7.5 \times 4.5–8 μm , with 2–4 bifurcate papillae per cell, plane or recurved one third of the leaf length from the base, bordered margins, with border consisting of 2–3 rows of thicker-walled and smooth cells, acute apex, dorsal surface cells of the costa in upper third similar to those of the lamina instead of stereids and costa ending a few cells below apex. The sporophytes have short seta which is spirally twisted to the right throughout and the peristome membrane hardly projects above the urn.

Multistratose lamina are otherwise found in a few *Syntrichia* taxa recorded from the Neotropics such as *Syntrichia chisosa*, *S. percarcosa*, and *S. napoana*, all very dissimilar to the newly described *S. boliviana* (Table 1).

Syntrichia chisosa differs from *S. boliviana* in the lingulate to lingulate-spathulate, nonkeeled and weakly constricted leaves, with plane and not bordered leaf margins, obtuse to rounded leaf apex, costa excurrent as a mucro, with dorsal stereids in the upper third, strongly papillose dorsally with simple papillae up to 15 μm high and cross section with 4–8 dorsal stereid rows at midleaf. Furthermore, *S. chisosa* usually exhibits brood leaves borne in clusters at the tip of the stem and also on stalks in axils of the upper leaves.

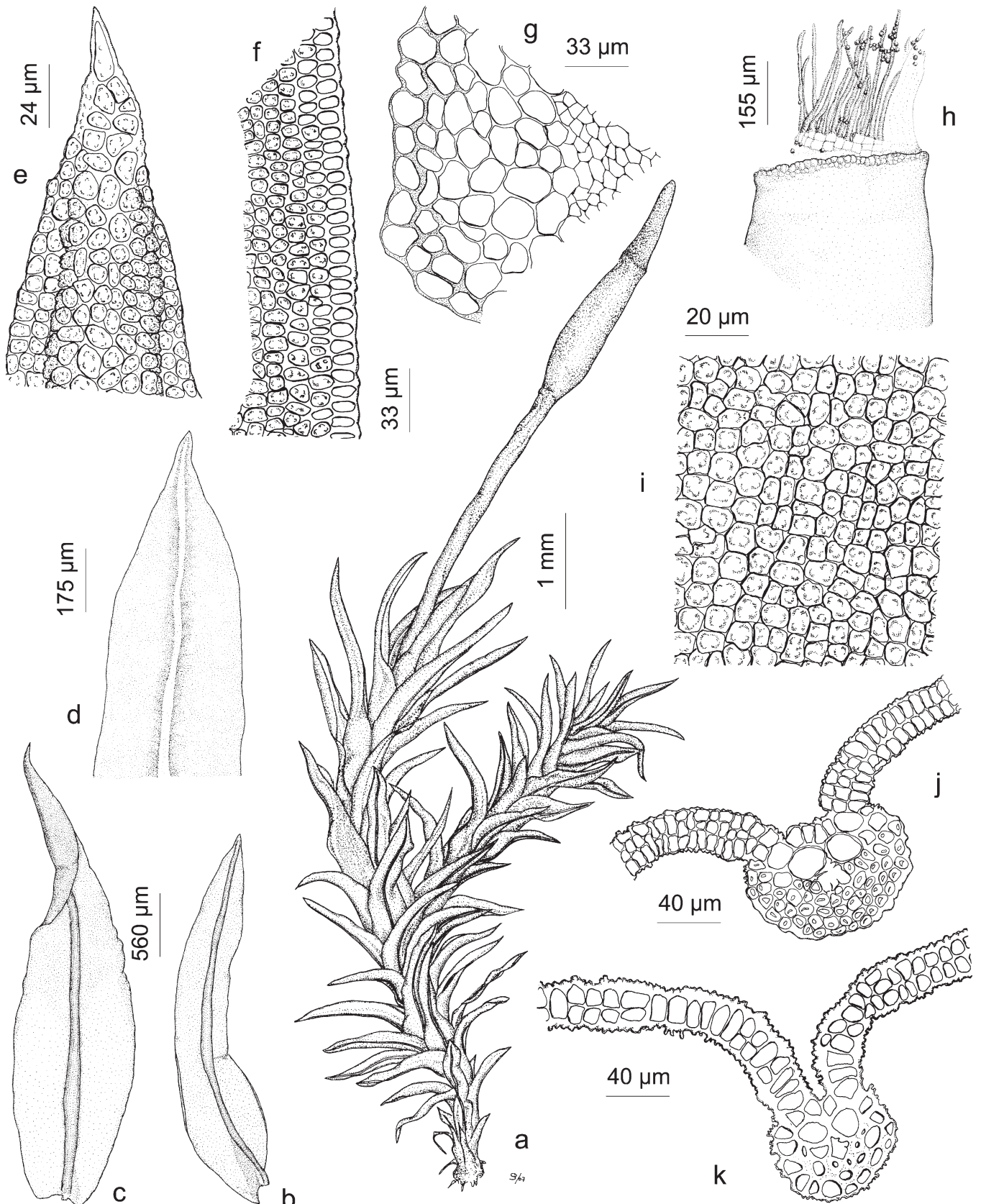


FIG. 1. *Syntrichia boliviana* M. T. Gallego & M. J. Cano. A. Habit when wet. B. Leaf. C. Perichaetial leaf. D. Upper ventral surface of the leaf. E. Detail of the upper dorsal surface of the leaf apex. F. Leaf margin at midleaf. G. Transverse section of stem. H. Peristome. I. Middle laminal cells. J. Transverse section of the peristome at midleaf. K. Transverse section of the costa at midleaf. All from the holotype [Lewis 86-2084 (LPB)].

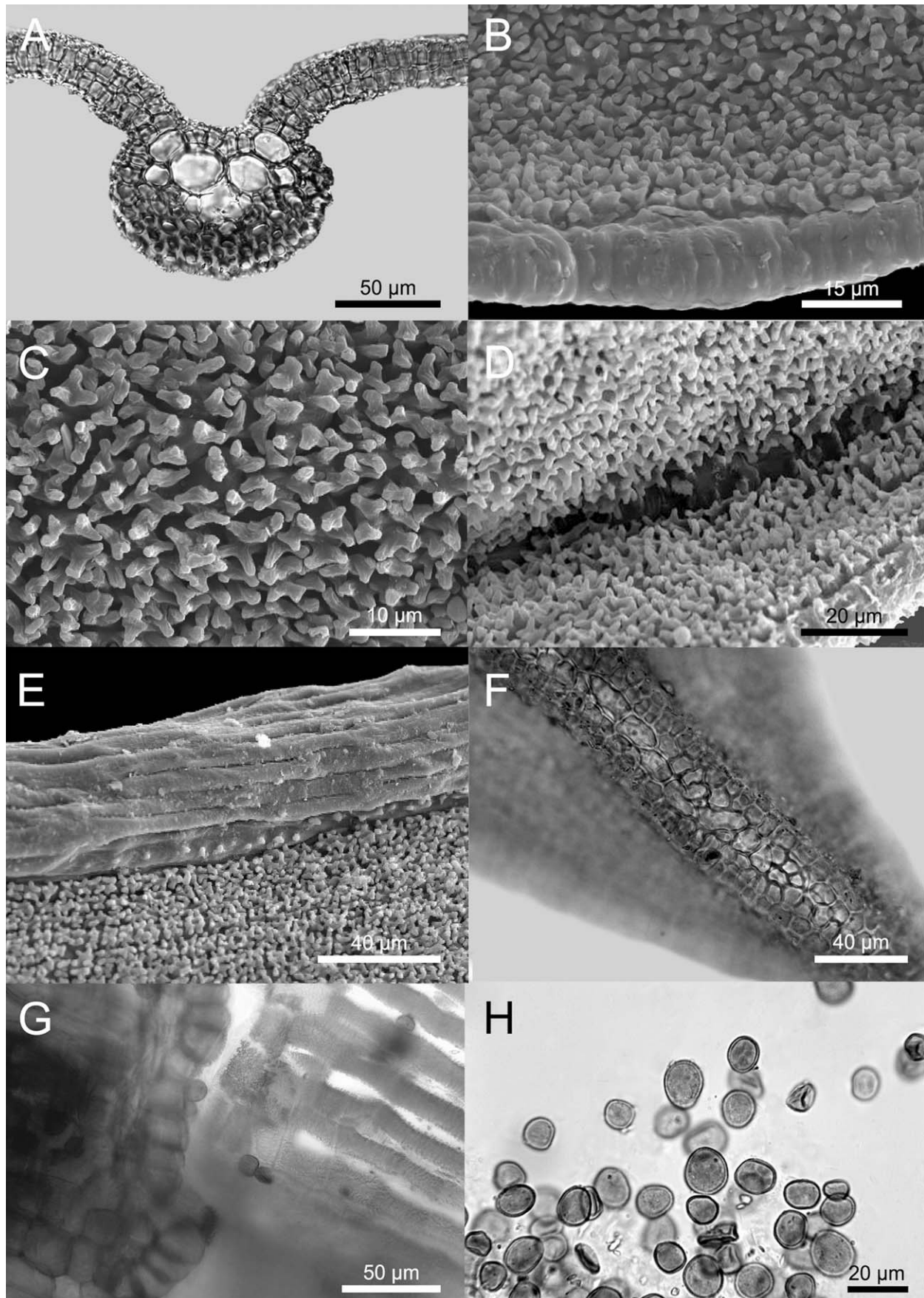


FIG. 2. LM and SEM photographs of *Syntrichia bolivoiana* M. T. Gallego & M. J. Cano. A. Transverse section of the costa at midleaf. B. Leaf margin at midleaf. C. Middle laminal cells. D. Leaf ventral surface at upperleaf. E. Costa dorsal surface at midleaf. F. Costa dorsal surface at upperleaf. G. Detail of the peristome. H. Spores. All from the holotype [*Lewis 86-2084* (LPB)].

Syntrichia percarinosa resembles the new species in the dorsal surface costal cells, leaf margins bordered and lamina bistratose, but can be easily separated by its rounded and cucullate leaf apex, weakly constricted leaves, upper and middle laminal cells $7.5\text{--}12.5 \times (5\text{--}7.5\text{--}10\text{--}12.5) \mu\text{m}$ and higher peristome membrane (125–175 μm high).

Syntrichia napoana has a lamina irregularly bistratose in patches, bordered leaf margins, not constricted leaves, and very short peristome membrane, but has fragile, nonkeeled leaves with an obtuse to rounded apex, upper and middle laminal cells $10\text{--}15\text{--}(17.5) \times 10\text{--}12.5\text{--}(15) \mu\text{m}$, recurved from the base to midleaf, sometimes plane and the dorsal surface costal cells in the upper third of stereids. In addition, the seta

is longer than in *S. boliviana* (0.8–1.2 mm long) and spirally twisted to the left below and to the right above.

The combination of short cells like those of the lamina on the costal dorsal surface, and short seta spirally twisted to the right throughout, together with bordered leaf margins occurs in the Chilean *Syntrichia breviseta* (Mont.) M. J. Cano & M. T. Gallego, but this last species differs from *S. boliviana* in the lingulate, nonkeeled and weakly constricted leaves, obtuse to rounded leaf apex, costa excurrent as a smooth hair-point, and larger leaf cells ($7.5\text{--}12.5 \times 7.5\text{--}12.5 \mu\text{m}$). On the other hand, *S. breviseta* sometimes exhibits a lamina irregularly bistratose in patches in the upper third of the leaf, while *S. boliviana* has regularly bi to tristratose lamina.

KEY TO THE BOLIVIAN SYNTRICHIA SPECIES

1. Plant with dimorphic leaves, lower leaves ovate-lanceolate, usually mucronate, constricted at midleaf, apex usually persistent, upper leaves long lanceolate, subulate, with a deciduous leaf apex and margins recurved near the base *S. angustifolia* 2
1. Plant with monomorphic leaves, without the above combination of characters 2
2. Leaf costa excurrent as a hair-point or apiculus, 130–2,500 μm long 3
3. Costal dorsal stereids disappearing above midleaf 4
4. Leaf margins plane to weakly reflexed near the base *S. bogotensis*
4. Leaf margins strongly recurved up to the upper third *S. andicola*
3. Costal dorsal stereids present throughout the leaf 5
5. Propagules present (brood leaf, costal gemmae) 6
6. Propagules are brood leaves; laminal cells with papillae on dorsal and ventral surfaces, papillae bifurcate; dorsal costal surface smooth *S. laevipila*
6. Propagules are costal gemmae; laminal cells with papillae only on dorsal surface, papillae simple; dorsal costal surface strongly papillose *S. papillosa*
5. Propagules absent 7
7. Leaf margins bordered by thick-walled and weakly papillose to smooth cells 8
8. Dorsal costal surface strongly papillose at base; leaf margins recurved from base to the upper third *S. glacialis*
8. Dorsal costal surface smooth at base; leaf margins plane from base or recurved from base to the middle 9
9. Leaves constricted, basal margins plane or weakly recurved; hair-point or apiculus hyaline; costal cross section with hydroids; peristome basal membrane of 8–15 rows of cells *S. laevipila*
9. Leaves not constricted, basal margins recurved to middle; hair-point or apiculus brownish; costal cross section usually without hydroids; peristome basal membrane of 3–4(6) rows of cells *S. polylepidis*
7. Leaf margins not bordered 10
10. Upper and middle laminal cells $(5\text{--}7.5\text{--}10\text{--}15) \times (5\text{--}7.5\text{--}10\text{--}12.5) \mu\text{m}$ 11
11. Leaf costa excurrent as a spinose hair-point 400–1800 μm long; leaves ovate-lanceolate or ovate-lingulate *S. ruralis*
11. Leaf costa excurrent as a smooth or spinulose apiculus 150–300 μm long; leaves lingulate or lingulate-lanceolate 12
12. Dorsal costal surface smooth at base; leaves constricted at the middle; costal cross section usually with hydroids *S. buchtienii*
12. Dorsal costal surface strongly papillose at base; leaves not constricted at the middle; costal cross section usually without hydroids *S. glacialis*
10. Upper and middle laminal cells $(12.5\text{--}15\text{--}17.5\text{--}25) \times 12.5\text{--}17.5\text{--}(25) \mu\text{m}$ 13
13. Leaf costa excurrent as a smooth hair-point; leaf basal margins plane or weakly recurved, leaf constricted at the middle *S. laevipila*
13. Leaf costa excurrent as a spinose hair-point, rarely spinulose; leaf basal margins recurved to upper third, leaf not constricted at the middle 14
14. Plants repeatedly branched; dorsal costal surface smooth or weakly papillose in the upper third; peristome basal membrane of 5–7 rows of cells *S. ramosissima*
14. Plants few-branched; dorsal costal surface clearly papillose; peristome basal membrane of 15–18 rows of cells 15
15. Hair-point long compared to leaf length (ratio leaf length/hair-point length 1–2); apex usually emarginate; costal cross section usually without hydroids; autoicous or dioicous *S. obtusissima*
15. Hair-point not long compared to leaf length (ratio leaf length/hair-point length 2.5–4); apex usually not emarginate; costal cross section usually with hydroids; synoicous or dioicous *S. princeps*
2. Leaf costa percurrent, ending a few cells below the apex or excurrent as a mucro, $(7.5)15\text{--}60\text{--}(115) \mu\text{m}$ long 16
16. Propagules present (brood leaves, laminar gemmae, deciduous leaf apex) 17
17. Plant with brood leaves 18
18. Leaf lamina unistratose; dorsal costal surface weakly papillose, papillae simple, 2.5 μm high; mid lamina cells 12.5–20 μm wide *S. ammoniana*
18. Leaf lamina bistratose; dorsal costal surface strongly papillose, papillae simple, to 12.5 μm high; mid lamina cells 5–10 μm wide *S. chisosa*
17. Plant with a different type of propagule (laminar gemmae, deciduous leaf apex) 19
19. Leaf with laminar gemmae, gemmae are cylindrical and smooth, usually present on the ventral surface, leaves not abruptly narrowed at the apex; margins incurved, usually bordered; mid lamina cells 12.5–15(–20) μm wide *S. amphidiacea*
19. Leaf with a deciduous leaf apex, fusiform and papillose, leaves abruptly narrowed at the apex; margins plane, not bordered; mid lamina cells $(5\text{--}7.5\text{--}10\text{--}12.5) \mu\text{m}$ wide *S. lithophila*
16. Propagules absent 20
20. Basal hyaline leaf cells forming a horn-shaped group on each side of the costa; leaf margins dentate in upper third *S. robusta*
20. Basal hyaline leaf cells forming an inverted U-shaped group on each side of the costa; leaf margins entire in upper third 21
21. Leaves not fragile, unbroken 22

22. Leaf lamina unistratose *S. scabrinervis*
22. Leaf lamina tristratose to bistratose throughout or in patches 23
23. Dorsal costal surface cells in upper third stereids; costa excurrent as a mucro, dorsal surface strongly papillose, papillae simple, to 12.5 μm high; leaf margins not bordered *S. chisosa*
23. Dorsal costal surface cells in upper third like those of the lamina; costa ending a few cells below the apex, dorsal surface usually smooth; leaf margins bordered 24
24. Leaf apex acute; leaf not constricted at the middle; midleaf cells 3–7.5 \times 4.5–8 μm ; peristome membrane hardly projecting above the urn *S. boliviana*
24. Leaf apex rounded to obtuse and cucullate; leaf weakly constricted at the middle; midleaf cells (5)–7.5–10(–12.5) \times 7.5–10(–12.5) μm ; peristome membrane projecting above the urn as a tube *S. percarnosa*
21. Leaves fragile, readily fragmenting 25
25. Leaf margins bordered 26
26. Leaf apex reflexed when moist; lamina unistratose, constricted at the middle, lamina unistratose; dorsal costal surface strongly papillose near the apex, papillae simple, 2.5–10 μm high *S. serripungens*
26. Leaf apex straight when moist, not constricted at the middle, lamina usually bistratose in patches, not constricted at the middle; dorsal costal surface weakly papillose or smooth near the apex, papillae when present simple, 2.5 μm high *S. napoana*
25. Leaf margins not bordered 27
27. Leaf apex reflexed when moist; lamina constricted at the middle *S. serripungens*
27. Leaf apex straight when moist; lamina not constricted at the middle 28
28. Leaf lamina lacerate, youngest leaves usually with deep lacerate splits *S. lacerifolia*
28. Leaf lamina not lacerate, youngest leaves usually unbroken *S. fragilis*

NEW RECORD

SYNTRICHIA NAPOANA—BOLIVIA. La Paz: Inquisivi, to 2 km S of Cavari, ca. 18 km W of Independencia, 17°06'S, 66°59'W, *Lewis* 86–2280 (LPB).

Syntrichia napoana is a neotropical species previously known only from Ecuador (Cano and Gallego 2008). This species was described as *Tortula napoana* (De Notaris 1859) and later transferred to the genus *Syntrichia* (Cano and Gallego 2008) on the basis of morphological characters. The Bolivian collection grows on soil in shrubby and shady areas with small trees and boulders at 3,150 m elevation.

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APPENDIX 1. List of *Syntrichia* species for the Bolivian moss flora, and voucher information or literature citation for species used in the present study. Taxa are listed in alphabetical order by species. Taxa in bold are accepted in the present study. Information is presented in the following order: Taxon; locality, collector(s) and number, herbarium. The previous *Syntrichia* species reported by Churchill et al. (2000) and Churchill and

Fuentes (2005) are denoted by an asterisk and between square brackets, the name of synonyms.

*Syntrichia andicola** (Mont.) Ochyra [*S. aculeata** (Wilson) R. H. Zander, *S. ciliata** (Broth.) R. H. Zander, *Tortula sordida* Herzog]; URURO: pr. Leque Palca, Cano, Jiménez & Sanjines 3411a (MUB).– *S. ammonsiana* (H. A. Crum & L. E. Anderson) Ochyra; TARIJA: O'Connor, Lewis 84-2639 (LPB).– *S. amphidiacea** (Müll. Hal.) R. H. Zander; SANTA CRUZ: Cantón Camiri, Churchill 20723 (LPB).– *S. angustifolia* (Herzog) M. J. Cano [*Hennediella angustifolia* (Herzog) R. H. Zander]; LA PAZ: Larecaja, Lewis 82-175 (LPB).– *S. bogotensis* (Hampe) R. H. Zander; URURO: Parque Nacional Sajama, Cano & Jiménez 3741 (LPB).– *S. boliviana* M. T. Gallego & M. J. Cano; LA PAZ: Loayza, Lewis 86-2084 (LPB).– *S. buchtienii* (Herzog) M. J. Cano & M. T. Gallego [*T. buchtienii* Herzog]; POTOSÍ: Salar de Uyuni, Cano & Jiménez 3701 (MUB).– *S. chisosa** (Magill, Delgad. & L. R. Stark) R. H. Zander; POTOSÍ: pr. Millares, Cano & Jiménez 3623 (MUB).– *S. fragilis** (Taylor) Ochyra [*S. bipedunculata** (E. Britton) R. H. Zander, *S. linguifolia** (Herzog) R. H. Zander, *T. fragillima* Herzog, *T. ligulata* Herzog]; CHUQUISACA: Maragua, Cano, Jiménez, Aldana & Lozano 3581 (MUB).– *S. glacialis** (Kunze ex Müll. Hal.) R. H. Zander; (Churchill et al. 2000).– *S. lacerifolia** (R. S. Williams

R. H. Zander [*S. viridula** (Müll. Hal.) R. H. Zander]; COCHABAMBA: entre Quillacollo y Morochata, Cano, Jiménez & Aldana 3532 (MUB).– *S. laevipila* Brid. [*S. pagorum** (Milde) J. J. Amann]; COCHABAMBA: Quillacollo, Linneo 245 (MUB).– *S. napoana* (De Not.) M. J. Cano & M. T. Gallego; LA PAZ: Inquisivi, Lewis 86-2280 (LPB).– *S. obtusissima** (Müll. Hal.) R. H. Zander; POTOSÍ: carretera Potosí-Uyuni, Cano & Jiménez 3665 (MUB).– *S. papillosa** (Wilson) Jur.; LA PAZ: Murillo, Churchill et al. 22831 (NY).– *S. percarinosa** (Müll. Hal.) R. H. Zander; POTOSÍ: pr. río Mulatos, Cano & Jiménez 3704 (MUB).– *S. polylepidis* (Herzog) M. J. Cano & M. T. Gallego [*T. polylepidis* Herzog]; LA PAZ: Omasuyos, Asplund 81 (JE).– *S. princeps** (De Not.) Mitt.; COCHABAMBA: Lagunas Wara-Wara, Cano, Jiménez & Sanjines 3468 (MUB).– *S. lithophila* (Dusén) Ochyra & R. H. Zander [*S. pygmaea** (Dusén) R. H. Zander]; (Churchill et al. 2000).– *S. ramosissima** (Thér.) R. H. Zander; LA PAZ: Murillo, Lewis 79-1705 (NY).– *S. robusta* (Hook. & Grev.) R. H. Zander [*T. runcinata* (Müll. Hal.) Broth.]; COCHABAMBA: Llavetal, Herzog 4928 (s-KBO).– *S. ruralis** (Hedw.) F. Weber & D. Mohr; COCHABAMBA: pr. Llavivi, Cano, Jiménez & Sanjines 3421 (MUB).– *S. scabrinervis** (Müll. Hal.) R. H. Zander; (Churchill et al. 2000).– *S. serripungens** (Lorentz & Müll. Hal.) R. H. Zander; TARIJA: Yacuiba, Linneo & Velásquez 1021 (MUB).– *S. xerophila** (Herzog) S. P. Churchill [*Pseudocrossidium* R. S. Williams].