New synonymy in *Syntrichia* (Pottiaceae) in the Neotropics

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Abstract. In developing a revision of *Syntrichia* in the Neotropics, seven names are newly synonymized based on morphological data. *Syntrichia ciliata*, *S. prostrata*, *S. ruralis* var. *spiralis* and *S. viridula* are considered to be conspecific with *S. andicola*, *S. serrulata, S. princeps* and *S. lacerifolia*, respectively. *Tortula goudotii* var. *boliviana* is transferred into *Syntrichia* and synonymized with *S. andicola*. *Syntrichia bipedicellata* and *S. linguifolia* are newly synonymized with *S. fragilis*. Lectotypes for three names currently included in *Syntrichia* are designated here.

Keywords. Pottiaceae, *Syntrichia*, synonymy, lectotypification, Neotropics.

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Syntrichia Brid. is one of the largest genera of the Pottiaceae in the tropical Andes (Churchill et al. 1995), accounting for just over 39% of the total number of species in that family. The generic limits of *Syntrichia* are sufficiently defined (Gallego 2005; Gallego et al. 2002; Spagnuolo et al. 1999; Zander 1989, 1993) but since the general treatment of Mitten (1869), no systematic revisions have been undertaken for the Neotropical species of this genus, causing confusion in regard to the nomenclature and taxonomy of *Syntrichia*. Only regional treatments (Allen 2002; Churchill & Linares 1995; Churchill & Salazar Allen 2001; Kramer 1988; Mishler 1994), checklists (Churchill et al. 2000; Delgadillo et al. 1995) and the recent taxonomic revision of the genus *Tortula* in South America (Cano & Gallego 2008) exist, and based on these, nearly 30 species of *Syntrichia* are presently recognized for the Neotropics. As a result of the high morphological diversity in some species of this genus, several synonyms have been published and the status and range of the taxa to which some of them apply need revision. On the other hand, a significant number of species remain unexamined since first publication and numerous names are in circulation. As part of our ongoing work to resolve this confusion by providing a taxonomic revision of the South American species of *Syntrichia*, preliminarly nomenclatural novelties and some taxonomical notes are presented here.

Material and Methods

In developing a revision of *Syntrichia* in the Neotropics, about 1400 specimens belonging to *Syntrichia* were studied with the typical anatomical and morphological methods applied for bryophytes. In addition, for the study of comparative morphology, we examined all the described species present in the Neotropics. All types of the American taxa attributed to *Syntrichia* and *Tortula* have been studied (Cano & Gallego 2008; Gallego & Cano 2007), and the specimens have been compared with the relevant literature (Allen 2002; Gallego 2005; He 1998; Kramer 1988; Li et al. 2001; Lightowlers 1986; Magill 1981; Mishler 1994, 2007; Zander 1993). All type citations refer to the information on the labels of the type material. The names that we accept are shown in **bold**.

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Results

The new synonymized names and new lectotypes are listed below.

Syntrichia bipedicellata (E. Britton) R. H. Zander, Bull. Buffalo Soc. Nat. Sci. 32: 269. 1993; *Tortula bipedicellata* E. Britton, Bull. Torrey Bot. Club 23: 481. 1896. Protologue: [Bolivia] "Mapiri, 5000 ft., May 1886 (3123a)". type: "Bolivia, Mapiri", May 1886, *Rusby 3123a* (holotype: ny!, isotype: fi!), *syn. nov.* = ***Syntrichia fragilis*** (Taylor) Ochyra

Discussion. Britton (1896) described *Tortula bipedicellata* on the basis of the presence of paired setae. In addition, she mentioned in the protologue that her new taxon was close to "*T. glacialis* Kze" (now as *Syntrichia glacialis* (Müll. Hal.) R. H. Zander). *Syntrichia glacialis* resembles *S. fragilis* in the size of the laminal cells, shape of the leaves and sometimes fragile leaves, but can be easily separated by its apiculate leaves, with margins weakly bordered and recurved to the upper third, dorsal surface of the costa strongly papillose at base and longer basal membrane of the peristome. The original material of *S. bipedicellata* has fragile, long lingulate leaves (4.0–5.0 × 1.1–1.2 mm), unistratose laminae that are not constricted at the middle, a costa excurrent in a mucro (ca. 75 μm in length), upper and middle laminal cells (10–15 × 10–12.5 μm) papillose, margins recurved from the insertion to mid-leaf and the peristome basal membrane 140 μm high. All these characters are found in *S. fragilis* and except for the multiple setae we have no found differences to separate these two species. The polysety has been observed by us in other Neotropical species of *Syntrichia* such us *S. limensis* (R. S. Williams) R. H. Zander [*Rose 18603c* (ny), from Peru] and *S. bogotensis* (Hampe) R. H. Zander [*Lewis 85-1804* (lpb), from Bolivia].

Syntrichia ciliata (Broth.) R. H. Zander, Bull. Buffalo Soc. Nat. Sci. 32: 269. 1993; *Tortula ciliata* Broth., Bot. Jahrb. Syst. 49: 175. 1912. Protologue: "Bolivien: Aguila, an der Cordillera Real, 5200 m ü. M. (Edith Knoche n.41a, 60)". type: [bolivia] "Aguila an der Cordillera Real", Apr 1909, *Knoche 41* (lectotype here designated: h-br! 4203 008, isolectotype: pc!), *syn. nov.* = ***Syntrichia andicola*** (Mont.) Ochyra

Discussion. *Tortula ciliata* was described by Brotherus in Perkins (1912) from two specimens collected by Edith Knoche in the Bolivian Cordillera Real numbered as 41a and 60. These specimens actually belong to number 41, not to number 41a as was indicated in the protologue. In addition, we have studied another specimen from b which belongs to an unnumbered collection by the same collection and on the same date, from Quimsacruz (Bolivia). Because no more original collections of *T. ciliata* have been found, we select the specimen at h-br 4203 008 as lectotype because it matchs exactly with the protologue and it is the only one with sporophytes. The type material shows ovate-lingulate leaves with margins recurved to the upper third or near the apex, strongly toothed apex, flat and hyaline hair-point, with dorsal costal surface strongly papillose, costal papillae simple and bifurcate, 2.5–5(–10) μm high, costa without dorsal stereids in the upper third and with a short basal membrane of the peristome. In the protologue Brotherus (in Perkins 1912) only commented on the beauty of the species: "species pulcherrima, cum *T. andicola* Mont. und *T. aculeata* Wils. Comparanda." After examining the Knoche collections we have not found significant differences between *Tortula ciliata* and *Syntrichia andicola.* The only differential characters are the flat hair-point and strongly toothed apex in *S. ciliata* in contrast to the typical *S. andicola* with a terete hair-point and a weakly toothed apex. However, these characters are quite variable in *S. andicola* and we do not view them as taxonomically significant.

Syntrichia linguifolia (Herzog) R. H. Zander, Bull. Buffalo Soc. Nat. Sci. 32: 269. 1993; *Tortula linguifolia* Herzog, Biblioth. Bot. 87: 49. 1916. Protologue: "Am einem alten Baumstamm im Cocapatatal, ca. 3900 m, No. 4179". type: [bolivia] "Am einem alten Baumstamm Cocapatatal", Aug 1911, *Herzog 4179* (holotype: je!, isotypes: b!, l!, m!), *syn. nov.* = ***Syntrichia fragilis*** (Taylor) Ochyra

Discussion. The original material has fragile, lingulate to lingulate-spathulate leaves, with a mucronate apex, margins recurved to the middle and unbordered, upper and middle laminal cells 12.5 × 10–12.5 μm, dorsal surface of the costa smooth or

weakly papillose and sporophytes with short setae (ca. 5.6 mm long) and capsules (ca. 2.0 mm long). All these characters fall within the range of variation of *Syntrichia fragilis*. In the protologue, Herzog (1916) said that *Tortula linguifolia* was close to *Syntrichia serripungens* (Lorentz & Müll. Hal.) R. H. Zander but with a different leaf shape and smaller capsule. The latter species shares with *S. fragilis* the fragility of the leaves but shows diagnostic characters that clearly separate it: the leaves are constricted near the middle, the costa is excurrent as an apiculus with the dorsal surface strongly papillose near the reflexed apex and the margins are weakly bordered.

Syntrichia prostrata (Mont.) R. H. Zander, Bull. Buffalo Soc. Nat. Sci. 32: 269. 1993; *Tortula prostrata* Mont., Ann. Sci. Nat. Bot., sér. 3, 4: 107. 1845. Protologue: [CHILE] "ad radices arborum cl. C. Gay legit. Herb. Mus. Par.". TYPE: [CHILE] "Chili" (lectotype here designated: PC!, isolectotype: PC!), *syn. nov.* = ***Syntrichia serrulata*** (Hook. & Grev.) M. J. Cano

Discussion. Of the two types found at PC, one is from the Montagne herbarium and the other is in the Thériot herbarium. We choose the former specimen as lectotype. This species is recognized by its lanceolate leaves not constricted at the middle and unistratose, usually bordered margins that are occasionally plane but usually weakly recurved at lower third or to midleaf, acute to acuminate and usually toothed apex, upper and middle laminal cells (5–)7.5–25 × 5–12.5 μm, and costa percurrent or excurrent in a mucro. All these characters are those of *Syntrichia serrulata*, a species recently transferred from *Hennediella serrulata* (Hook. & Grev.) R. H. Zander by Cano (2008) on the basis on the anatomy of the costa and curvature of the leaf margins. Montagne (1845) in the protologue compared *Tortula prostrata* with *Barbula speciosa* Hook.f. & Wilson, now *S. robusta* (Hook. & Grev.) R. H. Zander, a similar species with smaller laminal cells [usually (10–)12.5–27.5(–40) × (10–)15–20 μm in *S. robusta*] and leaf margins weakly recurved in the lower third or to midleaf, sometimes plane (usually clearly recurved to upper third or to midleaf in *S. robusta*). On the other hand, *S. robusta* is a larger plant than *S. serrulata* and shows a more greatly toothed leaf apex, although both share the horn-shaped basal hyaline area. We have no studied Neotropical specimens of *S. serrulata* but according to Delgadillo et al. (1995) *S. prostrata* (sub *T. prostrata*) is present in Ecuador.

Syntrichia ruralis var. **spiralis** (Herzog) R. H. Zander, Bull. Buffalo Soc. Nat. Sci. 32: 270. 1993; *Tortula ruralis* var. *spiralis* Herzog, Biblioth. Bot. 87: 49. 1916. Protologue: "Im oberen Chocayatal, ca. 4000 m, n° 3592". TYPE: [BOLIVIA] "In oberen Chocayatal", Jul 1911, *Herzog 3592* (holotype: JE!, isotype: S!), *syn. nov.* = ***Syntrichia princeps*** (De Not.) Mitt.

Discussion. Herzog (1916) distinguished this variety on the basis of smaller size, clearly spirally twisted leaves when dry, not squarrose when moist, and an emarginate leaf apex. The original material has the costa with a strongly papillose dorsal surface and cross section with hydroids, leaves patent when moist and weakly constricted at the middle, with spinose hair-point, emarginate apex, middle laminal cells 12.5 μm wide and an apparently dioicous condition. All these characters are present in the variability shown by *Syntrichia princeps*.

Syntrichia viridula (Müll. Hal.) R. H. Zander, Bull. Buffalo Soc. Nat. Sci. 32: 270. 1993; *Barbula viridula* Müll. Hal., Nuovo Giorn. Bot. Ital. 4: 114. 1897; *Tortula viridula* (Müll. Hal.) Broth., Nat. Pflanzenfam. I(3): 433. 1902. Protologue: not indicated. TYPE: "Bolivia, Cochabamba prope Choquecamata", Jun 1889, *Germain s.n.* (lectotype here designated: FI!-Levier; isolectotype: NY!), *syn. nov.* = ***Syntrichia lacerifolia*** (William) R. H. Zander

Discussion. We have located two syntypes that match exactly the description provided by Müller (1897). According to Stafleu and Cowan (1981) a number of Müller types (isotypes), from the Levier collections are at FI. The material deposited at FI is chosen as lectotype. In the protologue Müller (1897) compared *Syntrichia viridula* with *Tortula brunnea* (Müll. Hal.) Broth., recently synonymized with *S. fragilis* by Cano and Gallego (2008). Moreover, when Zander (1993) transferred *Barbula viridula* to *Syntrichia*, he specified that "the isotype at NY is

probably *S. fragilis*.'' *Syntrichia viridula* certainly is close to *S. fragilis* because both species share several morphological characters, including fragile leaves, mucronate leaf apex and size of the laminal cells. However, the original material of *S. viridula* shows leaves with lacerate lamina and the youngest leaves have deep lacerate splits, which are the most distinctive features of *S. lacerifolia* (broken leaf but without lacerate lamina and youngest leaves usually unbroken in *S. fragilis*).

Tortula goudotii var. **boliviana** Broth., Biblioth. Bot. 87: 48. 1916. Protologue: ''Asiento, Baumwurzeln, 3800 m, N° 2994''. TYPE: [BOLIVIA] ''Asiento'', 1911, *Herzog 2994* (holotype: H 4203 029!, isotype PC!), *syn. nov.* = ***Syntrichia andicola*** (Mont.) Ochyra

Discussion. The original material of *T. goudotii* var. *boliviana* proved to belong to the genus *Syntrichia*, because it shows a costa with crescent-shaped dorsal stereid rows and absence of dorsal surface cells of the costa, and red KOH leaf reaction. The type material exhibits unbordered leaves, with obtuse to acute and weakly toothed apex, recurved margins to the upper third, upper and middle laminal cells (12.5–)15–22.5(–25) µm wide, costa excurrent as an orange and weakly spinulose hair-point, without hydroids, and the dorsal stereids disappear on the upper third. All these gametophytic characters are diagnostic of *S. andicola*.

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