Syntrichia bogotensis (Bryopsida, Pottiaceae) New for Macaronesia

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Abstract. The neotropical moss Syntrichia bogotensis (Hampe) R. H. Zander is reported for the first time for Macaronesia on the basis of six collections from Madeira Island (Portugal). This species has previously been known only from tropical America. The principal distinctive characters that separate it from the two nearest species, S. andicola and S. norvegica, are discussed. The species is illustrated, its distribution is mapped, and its name lectotypified. A key to the Madeiran taxa of Syntrichia is provided.

Keywords. Bryophyte, distribution, Madeira, Pottiaceae, Syntrichia bogotensis.

In the course of a study of Syntrichia specimens from Portugal deposited in MADJ, we observed that some of the samples, identified as Tortula princeps De Not., Tortula norvegica (E. Weber) Lindb., Tortula sp., and Barbula aciphylla Bruch & Schimp., from Madeira, were not attributable to any previously known Syntrichia for the area. Also, the same species was found in two samples that had been identified as Tortula subulata Hedw. deposited in s. After studying syntypes deposited in s and rc, we concluded that the specimens from Madeira were Syntrichia bogotensis (Hampe) R. H. Zander.

Syntrichia bogotensis is a neotropical species on date only known from Mexico, Central America (Guatemala), and western South America (Bolivia, Colombia, Ecuador, Peru, and Venezuela) (Allen 2002; Churchill et al. 2000; Churchill & Linares 1995; Delgadillo et al. 1995; Mishler 1994). The world distribution of the species based upon current literature reports and new records is given in Figure 1. The citation from Venezuela was not included in the general distribution map of Syntrichia bogotensis because we were not able to find the locality on which this record is based. Since Madeiran climatic conditions support the growth of warm-temperate and tropical taxa, this disjunct distribution between Neotropical and Macaronesian floras is not surprising. In addition, only in the Macaronesian Islands does subtropical vegetation appears at this latitude, linking tropical Africa with Europe (Frahm 1995).


This species is characterized by orange to reddish or red-brown hair points, that are occasionally sharply toothed at their bases; plane leaf margins (Figs. 2A-C) that are only sometimes slightly recurved near the middle of the leaf; a transverse section of the costa with 1–3(4) rows of stereids and the absence of hydroids; upper and middle laminal cells 12–26 μm wide (Fig. 2E) with (4)6–18(20) bifurcating non-pedicellate papillae per cell that are 2.5 μm high; and a peristome basal membrane with 1–2(4) cell rows and 50–95 μm in height. Detailed descriptions of S. bogotensis, with illustrations, are given by Mishler (1994) and Allen (2002). The Madeiran specimens have no sporophytes, but show all the gametophytic characters of the American specimens.

Two of the four specimens from MADJ were collected on trees (Tilia sp.) at 600–1,300 m, and two were collected at about 1,800 m, probably on soil, although the labels of the specimens do not describe their substrate. On the label of B72688 from s, neither the ecology nor the elevation is mentioned. The other sample from s (B72687) was an epiphyte on Ocotea foetens (Aiton) Baill. All specimens of Syntrichia bogotensis found in Madeira grow at lower elevations than those from tropical America where, according to Delgadillo et al. (1995) and Churchill et al. (2000), localities can reach more than 4,000 m. Other bryophytes, such as Plagiochila papillosa Steph. (that has a neotropical distribution and was recently reported for
Macaronesian Islands) also appear at lower elevations than in tropical America (Heinrichs et al. 2002) because the highest elevation on Madeira Island is 1,861 m.

Some of the morphological characters shown by Syntrichia bogotensis, such as the size and papillosity of the upper and middle laminal cells and the color and ornamentation of the hair-point are also found in S. andicola (Mont.) Ochyra and S. norvegica F. Weber. These three species also share an obvious and particular character within the genus, which sets apart this group of taxa from the rest of the species of Syntrichia (Gallego 2002; Mishler 1994)—namely the costa structure on the upper third of the leaf, where the dorsal steroids disappear. The transverse section of the costa is composed of the following: ventral epidermis, guide cells, and leaf cells similar to those of the lamina (Fig. 2B). On the other hand, in the middle and lower part of the leaf, the costa is composed of ventral epidermis, guide cells, and dorsal steroids (Fig. 2D).

Syntrichia norvegica has longer hair-points that are not toothed at the base, leaf margins recurved from the base to upper third of the leaf (Fig. 2F), and a higher peristome membrane than S. bogotensis. This former species is a terricolous and saxicolous taxon which appears in Europe, Asia, Macaronesia (only in Madeira), North and South Africa, and North (Düll 1984) and Central America (Düll 1992; Mishler 1994), but not in neotropical areas (Churchill et al. 2000; Delgadillo et al. 1995). It is relatively common in the Mediterranean region (Gallego 2002), where it grows at high elevations (1,800–3,500 m).

Syntrichia bogotensis is closely related to S. andicola, a tropical alpine species widely distributed in the Neotropics from Mexico to Argentina, that occurs on soil at higher elevations (above 3,000 m). The sporophytes of both species are similar, but the gametophytes basically differ in the curvature of the leaf margins and ornamentation of the leaf apex—S. andicola has strongly revolute margins from the leaf base to the upper third and a usually dentate apex. According to Mishler (1994), there is a geographical and ecological differentiation between S. bogotensis and S. andicola, since the former grows on wood at lower elevations (1,800–3,000 m). The main differences between Syntrichia bogotensis, S. andicola, and S. norvegica are shown in Table 1.

Other Syntrichia taxa that have been recorded from Madeira are: S. calcicola J. J. Amann, S. fragilis (Taylor) Ochyra, S. laevipila Brid., Syntrichia montana Nees, S. norvegica, S. ruralis (Hedw.) F.
Weber & D. Mohr var. ruralis, S. ruralis var. ruraliformis (Besh.) Delogne, and S. princeps (De Not.) Mitt. Syntrichia calcicolata and S. montana were reported by Düll (1992) and Smith (1978), respectively, from Madeira. The report of S. calcicolata has not been confirmed and the record of S. montana has been disregarded by Smith (2004) himself.

Specimens examined.—Syntrichia bogotensis: PORTUGAL. MADEIRA. Pico Ruivo, sopé de ladeão a Fonte ou nascente que abastece a casa do Pico Ruivo, Nóbrega, 11.07.1984 (MADI 5663); Ribeira do Pogo, Serra da Agua, Nóbrega & Paulo, 6.11.1985 (MADI 5058); Guada do Pico Ruivo, Nóbrega, 13.03.1990 (MADI 6489); Margem direita da Ribeira Seca do Fialal, 1,300 m, Nóbrega, 23.10.1990 (MADI 6704); Sao Jorge, Cova do Sino, Nóbrega, 22.08.1945 (s B72688); Nóbrega 45 (s B72687). Syntrichia fragilis: PORTUGAL. MADEIRA. S. Vicente, Ribeira
Table 1. Diagnostic characters and habitat of *Syntichia norvegica*, *S. bogotensis*, and *S. andicola*.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Leaf margins</th>
<th>Leaf apex</th>
<th>Peristome membrane</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>S. norvegica</em></td>
<td>Recurved 1/2 to 3/4 of the leaf length, rarely plane</td>
<td>Usually without teeth</td>
<td>8 (10) cell rows: 250–350 µm length</td>
<td>Mainly on soil and rocks. At medium to high elevations (1,500–3,500 m)</td>
</tr>
<tr>
<td><em>S. bogotensis</em></td>
<td>Plane</td>
<td>Occasionally with teeth</td>
<td>1 (2) cell rows: 50–95 µm length</td>
<td>Mainly on trees. At medium to high elevations (600–2,450 m)</td>
</tr>
<tr>
<td><em>S. andicola</em></td>
<td>Recurved to 3/4 of the leaf length</td>
<td>Usually with teeth</td>
<td>1 (2) cell rows: 50–70 µm length</td>
<td>Mainly on soil. At high elevations (2,700–4,900 m)</td>
</tr>
</tbody>
</table>

KEY TO THE MADEIRAN TAXA OF *SYNTICHIUM*

1. Costa in upper third of leaf without dorsal stereids; hair point hyaline, sometimes brown at base.
2. Leaf margins plane, sometimes slightly recurved near midleaf; leaf apex tapered to pointed or to short acusulus, occasionally sharply toothed at base; basal membrane of peristome formed of 1–2(4) rows of cells, 50–95 µm high
3. S. norvegica

4. Leaf margins recurved from base to upper third, rarely to middle; middle laminal cells 15.0(17.5) × 12.5–15.0(17.5) µm; juxtapostomal basal cells forming clearly differentiated hyaline area up to 19–25(33)% of leaf length
5. Leaf margins recurved from base to apex, sometimes near apex; middle laminal cells (5.0)7.5–10.0(15.0) × 5.0–10.0(12.5) µm

6. Leaf apex not hyaline, generally rounded, not tapers into hair point.

7. Hair point smooth, sometimes weakly spinulose; margins bordered or not, when bordered formed by 2–5 columns of thicker walls and less papillate cells, sometimes smooth, brown or yellowish; sometimes with broad leaf stems on stem apex or at base of upper leaves, often forming a rosette in upper leaves; dioicus or autogamous

8. *S. laevigata*

9. Hair point spinose to strongly spinose; margins unbordered; without vegetative diaspores; dioicus or syncocious

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**LITERATURE CITED**


---. 1992. Distribution of the European and Macaro-


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