

Syntrichia glabra, a new moss from Germany

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SUMMARY

Syntrichia glabra J.-P.Frahm & M.T.Gallego is described as new from Germany. It is characterized by small size, dark green colour, distant leaves with a short reflexed hyaline hair-point and transparent upper laminal cells with very low papillae. It has been found three times in xerothermic habitats, such as dry, hot rocks and rocky outcrops in vineyards. The new combination *Syntrichia densa* (Velen.) J.-P.Frahm is made.

KEYWORDS: *Syntrichia glabra*, *Syntrichia densa*, Pottiaceae, taxonomy, Germany.

INTRODUCTION

During studies of the xerothermic bryophyte vegetation in the valleys of the Rhine, Mosel and Ahr in autumn 1999, the first author found a distinct small *Syntrichia* in several localities, which could not be named. The plants were differentiated from all other known species in Central Europe by their:

- relatively small size, plants < 1.6 cm, leaves < 3 mm long; (Fig. 1b, e);
- dark green colour;
- somewhat distant slightly reflexed leaves (Fig. 1a);
- a hair-point, which is relatively short as compared with other species of *Syntrichia*, only 1/10–2/5 of leaf length, and which is conspicuously reflexed (Fig. 1e);
- an upper lamina, which is conspicuously so transparent that the areolation is visible;
- extremely small and low papillae on the upper laminal cells (Fig. 2a d). The lack of large dense papillae causes the plants to need a long time to become turgescerent when dry plants are soaked in water. In contrast, species of *Syntrichia* with large papillae become moistened immediately.

The specimens were compared with the relevant literature, for example the *Tortula* monograph by Kramer (1980). Kramer's key leads to *Tortula submontana* Broth., a species described from Mongolia. However, a comparison with the type specimen in the Brotherus Herbarium at the Botanical Museum Helsinki (H-BR) revealed that *Tortula submontana* is not much different from *Syntrichia intermedia* Brid. (= *Tortula intermedia* (Brid.) De Not.,

Syntrichia montana Nees). Subsequently, specimens were sent to Philipp Sollman (Zevenaar, The Netherlands) and Richard Zander (Buffalo, N.Y.) for identification, but with no result. Next, material was sent to the second author, who is preparing a treatment of the species of this genus, but also without positive result. Finally, a short description and illustration was published in a bryological newsletter (Frahm, 1999), but without any response from the readers. Therefore, the specimens were regarded as a species unknown from Europe.

Owing to the failure to find a name for these specimens and due to the distinct circumscription of this taxon, we describe it here as a new species, *Syntrichia glabra*. The name refers to the surface of the upper lamina, which has only very low papillae and is almost smooth.

DESCRIPTION OF *SYNTRICHIA GLABRA*

Syntrichia glabra J.-P.Frahm & M.T.Gallego sp. nov.

Plantae 8–16 mm altae. Folia sicca contorta, humida patentia, apice recurvata, lingulata nec non constricta in media parte, 1.6–2.5 mm longa et 0.7–1.2 mm larga, apice rotundata vel emarginata. Margines crenulatae, moderate recurvatae in parte media et basali folii. Nervus excurrens in pilum hyalinum spinulosum recurvatum, 0.2–0.9 mm longum, in sectione transversali cum 1–3 stratis medianis laxis et 2–5 stratis dorsalibus stereideis, 75–100 µm largus. Cellulae laminae in parte superiore rotundae-hexagonales, 12.5–15 µm largae, cum 1–2(4) papillis haud elevatis, cellulae iuxtacostales in parte inferiore

rectangulares, hyalinae, $45\text{--}60 \times 12.5\text{--}15 \mu\text{m}$, cellulae marginales elongatae, angustiores. Sporogonium ignotum.

Holotype: Germany. Rheinland-Pfalz Kreis Kreuznach, nature preserve Trollmühle north of Dorsheim ca 200 m alt., W.-exposed open rocks of basic breccia, *Frahm* 4 December 1999 no. 3695 (BONN).

Paratypes: Germany, Rheinland-Pfalz Kreis Mayen-Koblenz, Nettetal between Trimbs and Welling, on soil in horizontal fissures of schist, alt. 180 m, grid 5609D, *Frahm* 20 November 1999 no. 3653 (BONN); Kreis Koblenz, Rhine valley, Bopparder Hamm between Boppard and Spay alt. 70 m, grid 5713B, S-exposed steep slopes with vineyards and rocky outcrops, *Frahm* 13 November 1999 no. 3608 (BONN, MUB)

Plants 8–16 mm high (Fig. 1), dark green. Stems branched, without central strand. Leaves twisted when dry, patent, only the apex weakly recurved when moist, lingulate to lingulate-spatulate, lingulate-elliptical, unistratose, not constricted at the middle, 1.6–2.5 mm long and 0.7–1.2 mm wide; apex rounded to emarginate; margins crenulate, slightly recurved from base to 1/3 of distance from leaf apex, not bordered. Costa $75\text{--}100 \mu\text{m}$ wide, excurrent as a hyaline hair-point, reflexed, 0.2–0.9 mm, spinulose; costa in transverse section with 1–3 guide cell layers, 2–5 crescent-shaped dorsal stereid layers without substereids and without hydroids; on the ventral side simple papillae. Upper laminal cells hexagonal to rounded-hexagonal, $12.5\text{--}15 \mu\text{m}$ long and $12.5\text{--}15 \mu\text{m}$ wide, with 1–2(3) simple mammillae per cell, $< 2.5 \mu\text{m}$ high, sometimes almost smooth; middle laminal cells quadrate or quadrate-rectangular, $12.5\text{--}15 \mu\text{m}$ long and $(10\text{--})12.5 \mu\text{m}$ wide, with 1–2(4) simple mammillae per cell, $< 2.5 \mu\text{m}$ high, sometimes 1–3 low and bifurcate papillae in old leaves; paracostal basal cells hyaline, rectangular, $45\text{--}60 \mu\text{m}$ long and $12.5\text{--}15 \mu\text{m}$ wide; marginal basal cells photosynthetic, rectangular, $25\text{--}50 \mu\text{m}$ long and $10\text{--}12.5 \mu\text{m}$ wide. Dioicous. Sporophytes unknown.

DIFFERENTIATION

Specimens of *Syntrichia glabra* were sent to several bryologists, who received part of the collections for study as *Syntrichia virescens* (De Not.) Ochyra or *S. calcicola* J.J. Amann. Indeed, the plants resemble *Syntrichia virescens* somewhat in size and colour. However, they do not grow in dense tufts, but loose turfs, have no central strand in the stem, a shorter hyaline hair-point and a transparent lamina.

With respect to the upper laminal cells the leaves resemble those of *Syntrichia calcicola*. However, the leaves of *S. calcicola* (Fig. 2e), although known by their low papillae and transparent lamina, are even more densely papillose as compared with the new species. Furthermore, they are keeled (Fig. 2f) and erect patent, not squarrose, and usually yellowish green, not dark green.

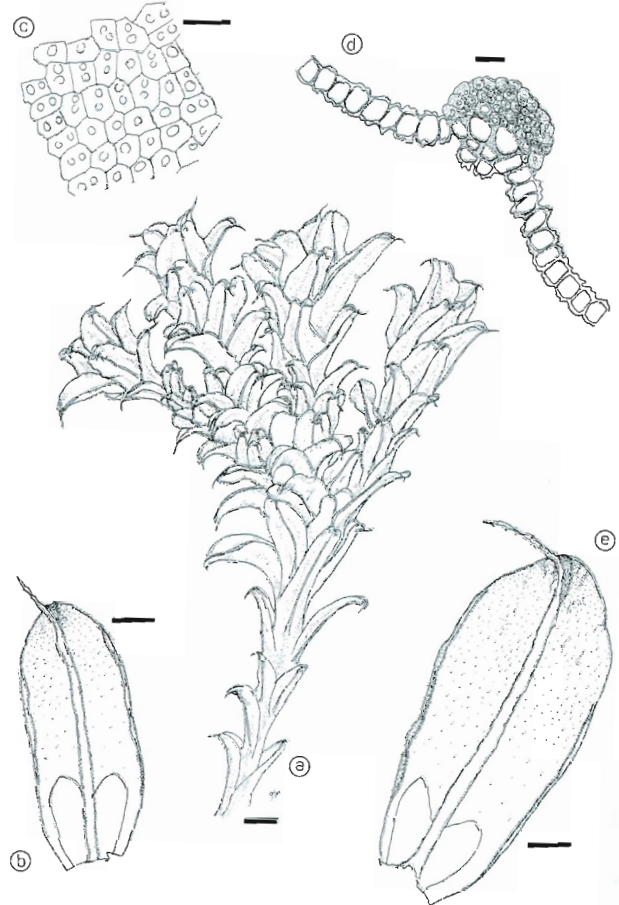


Figure 1. *Syntrichia glabra* J.-P. Frahm & M.T. Gallego. a, Habit of plant. b, e, Leaves. d, Cross section of leaf. c, Upper laminal cells. Scale bars: a, 0.7 mm; b, e, 300 μm ; c, d, 20 μm . (All from paratype n^o 3608, MUB.)

Syntrichia calcicola has been commonly misinterpreted and confused with a small taxon of the *Syntrichia ruralis* complex, which was originally described as *Tortula ruralis* var. *densa* Velen. The lectotypification of *Syntrichia ruralis* (Geissler & Frahm, 1995), however, required that this name only be applied to certain large forms of this complex with large, recurved leaves. For this reason, and because of the occurrence of mixed tufts, *Tortula ruralis* var. *densa* was raised to species level as *Tortula densa* (Velen.) J.-P. Frahm. (Frahm 1994). This also helped to separate *Syntrichia calcicola*, a species that is much rarer than *Tortula densa*. Since the species of *Tortula* subgenus *Syntrichia* are now treated as species of *Syntrichia*, a new combination is made here:

Syntrichia densa (Velen.) J.-P. Frahm *comb. nov.*

Tortula densa (Velen.) J.-P. Frahm, *Fragm. Flor. Geobot.* 39: 393, 1994

Tortula ruralis var. *densa* Velen., *Rozpr. Cesk. Akad. Ved. Tr.* 2,6: 166, 1897.

The use of *Syntrichia densa* has recently been accepted in the Netherlands by Sollman (1997) and in Luxembourg by Werner (1999).

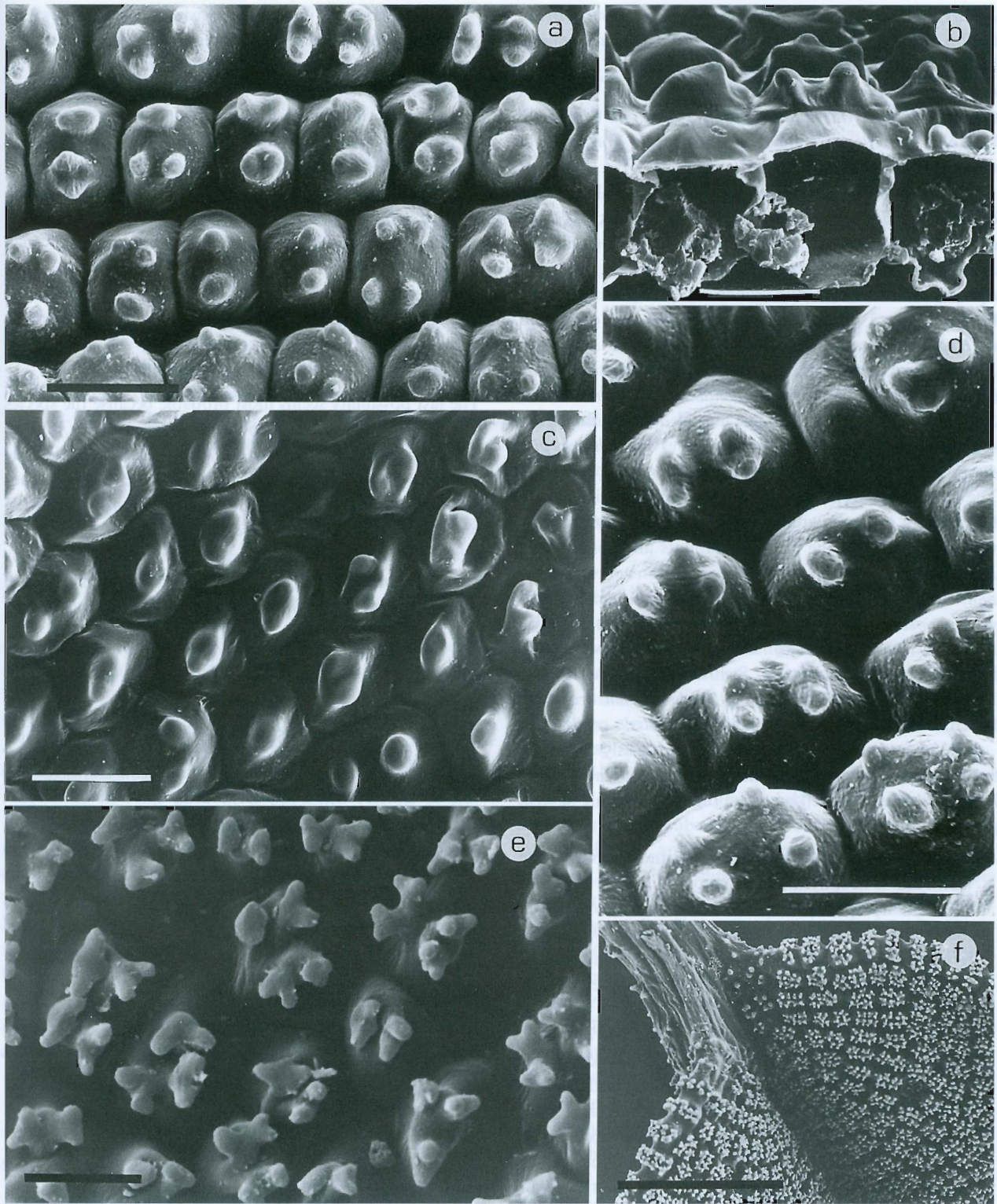


Figure 2. SEM of leaves of *Syntrichia glabra* and *S. calcicola*. **a**, Middle laminal cells of *S. glabra*. **b**, Cross-section of leaf of *S. glabra*. **c,d**, Upper laminal cells of *S. glabra*. **e**, Middle laminal cells of *S. calcicola*. **f**, Leaf apex of *S. calcicola*. Scale bars: **a–e**, 10 µm; **f**, 100 µm. (**a–d** from paratype n° 3608, MUB; **e–f** from MUB 4579.)

HABITAT AND DISTRIBUTION

Syntrichia glabra has so far been found only in the warmer parts of western Germany, in regions with viticulture. At the type locality, it is associated with other ther-

mophilous bryophytes, such as *Brachythecium albicans* (Hedw.) Schimp, *Bryum argenteum* Hedw. var. *lanatum* (P.Beauv.) Hampe, *Bryum subelegans* Kindb., *Bryum torquescens* Bruch ex De Not., *Cephaloziella divaricata* (Sm.) Schiffn., *Didymodon vinealis* (Brid.) R.H.Zander,

Encalypta vulgaris Hedw., *Hypnum lacunosum* (Brid.) Hoffm., *Phascum cuspidatum* Hedw. var. *mitraeforme* Limpr., *Pleurochaete squarrosa* (Brid.) Lindb., *Pterygoneurum ovatum* (Hedw.) Dixon, *Racomitrium canescens* (Hedw.) Brid., *Syntrichia subulata* (Hedw.) H.F.Web. & D.Mohr, *Tortella inclinata* (Hedw.F.) Jenn., *Tortula atrovirens* (Sm.) Lindb. and *Tortula canescens*.

The substrate of the paratype from Nettetel was less base-rich than elsewhere as indicated by the lack of *Pterygoneurum ovatum* and *Tortella inclinata*. It grew directly associated with *Tortula atrovirens*, *T. canescens*, *Phascum leptophyllum* and *Weissia condensa* (Voit) Lindb. The bryophyte flora on the surrounding rocks was composed of *Hypnum cupressiforme* Hedw., *Pleurochaete squarrosa*, *Pterogonium gracile* (Hedw.) Sm., *Rhytidium rugosum* (Hedw.) Kindb., *Syntrichia montana*, *S. ruralis*, and *S. densa* (Velen.) J.-P.Frahm, but also of acidophytes, such as *Dicranum scoparium* Hedw., *Polytrichum piliferum* Hedw. and *Racomitrium elongatum* Ehrh. ex Frisv. The second paratype was also found on base rich schist, but slightly covered with loess. The species composition was very similar to the previous habitats and consisted of *Barbula unguiculata* Hedw., *Bryum argenteum* var. *lanatum*, *Bryum caespiticium* Hedw., *Bryum subelegans*, *Didymodon vinealis*, *Homalotheicum sericeum* (Hedw.) Schimp., *Phascum leptophyllum*, *Pottia lanceolata* (Hedw.) Müll. Hal., *Pterygoneurum ovatum*, *Syntrichia ruralis*, *S. densa*, *Tortula atrovirens*, *T. canescens*, *Trichostomum crispulum* Bruch, *Weissia controversa* Hedw., and *Weissia condensa*.

It is an interesting question how a previously unknown large *Syntrichia* species should be discovered in Central Europe, a relatively well-recorded region. There are several possibilities:

- The species has been introduced from another part of the world and is neophytic in Germany. This is the case with *Phascum leptophyllum* Müll. Hal. (*Tortula rhizophylla* (Sakurai) Z. Iwats. & K. Saito, and *Chenia rhizophylla* (Sakurai) R.H.Zander), which have been recently found in the same regions in Germany (Ahr-, Mosel-, Rhine valley). The latter was even found associated with the new *Syntrichia* in two of its three known localities. However, the new *Syntrichia* species is not known to specialists of the Pottiaceae from other parts of the world.
- The species occurs in other regions of Europe, for instance the Mediterranean, and has spread to Germany. This could be supported first by the restriction of the records to habitats in the warmest parts of Germany and secondly by the recent spread of several other Mediterranean species in the warmer parts of Germany such as *Tortula canescens* Mont., which is also associated with the new species in two out of three known localities. However, the *Syntrichia* species has

not yet shown up during the revision of herbarium specimens from the Iberian Peninsula by the second author.

- This taxon is a modification of a known species with smooth leaves. Similarly to the so called 'papillosissima forms' of some species of *Syntrichia*, which are characterized by extremely tall, branched papillae, and which are variously accepted at the species, subspecies or varietal level; there could theoretically also be 'glabra forms' with almost smooth laminas. However, our material differs also from known species in other characters such as the relatively short reflexed hair point, so that this argument is not considered further. Furthermore, the plants grow in exposed habitats, where modifications with smooth laminas make no sense.
- The species was just overlooked before.

The last possibility seems most probable because the species of *Syntrichia*, especially around *S. ruralis* (Hedw.) Brid., form difficult complexes. This has led to concepts that include everything in *S. ruralis*, as in North America. Here, Grout (1939) recognized four taxa [*Syntrichia montana*, *S. ruralis*, *S. princeps* De Not. and *S. ruraliformis* (Besch.) Card.], but Crum & Anderson (1981) merged all these species together as one. It appears likely that similar uncertainty in Central Europe has led to *S. glabra* being overlooked previously.

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REFERENCES

- Crum HA, Anderson LE. 1981. *Mosses of Eastern North America*. New York: Columbia University Press.
- Frahm JP. 1994. *Tortula densa* (Musci, Pottiaceae), eine übersehene Sippe aus dem *Tortula ruralis*-Komplex. *Fragmenta Floristica et Geobotanica* 39: 391–399.
- Frahm JP. 1999. Neue *Tortula*-Art in Deutschland? *Bryologische Rundbriefe* 32: 3–4.
- Geissler P, Frahm JP. 1995. Lectotypification of *Barbula ruralis* Hedw. (*Tortula ruralis* [Hedw.] Gärtn., Meyer & Scherb.). *Cryptogamie, Bryologie Lichenologie* 16: 157–164.
- Grout AJ. 1939. *Moss flora of North America north of Mexico*, vol. 1, part 4. Newfane: Hafner.
- Kramer W. 1980. *Tortula* Hedw. Sect. *Rurales* De Not. (Pottiaceae, Musci) in der östlichen Holarktis. Bryophytorum Bibliotheca, 21. Vaduz: Cramer.
- Sollman P. 1997. *Tortula densa* in Nederland. *Buxbaumia* 43: 6–10.
- Werner J. 1999. Première mise à jour critique de la check-list des bryophytes du Grand-Duché de Luxembourg. *Lejeunia* N.S. 161: 1–25.