

New synonyms in *Grimmia* (Grimmiaceae)

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SUMMARY

Progress in the worldwide study of *Grimmia* has led to a decrease in the number of accepted taxa in the genus. After type examination, the following taxa are newly reduced to the synonymy of the species in parentheses: *Grimmia orbicularis* var. *persica* and *G. moxleyi* (= *G. orbicularis*); *G. brevirostris* (= *G. hamulosa*); *G. brittoniae* (= *G. funalis*); and *G. hermannii* (= *G. muehlenbeckii*). A lectotype is designated for *Grimmia hamulosa*.

KEYWORDS: Musci, *Grimmia* Hedw., Bryophyta, North America, Iran.

INTRODUCTION

For the preparation of a synopsis of the genus *Grimmia* I have studied types of many taxa that proved to be synonyms of previously described taxa. Some of these names were rarely used, but others are species considered endemic, rare or even threatened and worth protecting. This is specially true for three North American species described by R. S. Williams. World study of the genus demonstrates that some of the allegedly endemic species are in fact widely distributed in areas with similar environmental conditions, or else identical to other taxa described previously from the same area.

TAXONOMIC RESULTS

Grimmia funalis (Schwägr.) Bruch & Schimp., *Bryol. Europ.* (fasc. 25–28: 17, pl. 11) 3: 119, Tab. 247. 1845. Type: Um die Schneekoppe L[udvi]g ex parte. (Lectotype, designated by Geissler & Maier (1995: 500), G!).

Grimmia brittoniae R. S. Williams, *Bull. Torrey Bot. Club* 27: 316, Pl. 19. 1900. Type: U.S.A. Montana. Columbia Falls, 2 April 1894. *Robert Statham Williams* 223. (Lectotype, here designated, NY!; isolectotypes, NY! 3 replicates). **Syn. nov.**

Grimmia brittoniae was described by Williams (1900) from specimens collected in Montana (USA). The species has been generally accepted in North American floras (Lawton, 1971; Jones, 1933) and checklists (Crum, Steere & Anderson, 1973; Anderson, Crum & Buck, 1990). Recently, Greven & Spribille (1999) have published a

detailed paper on *G. brittoniae* including its known distribution and conservation status.

During a visit to the Farlow herbarium in 1997 to study Latin American *Grimmia*, I was asked by Dr Benito Tan for my opinion on this taxon, because *G. brittoniae* was at that time a candidate for inclusion in the list of threatened USA bryophytes. Since then, an examination of the many duplicates available from the type locality as well as material recently collected by Spribille, showed two characteristics never reported from this taxon: the leaves are spirally imbricated and appressed around the stem when dry, and there are many filiform shoots with strongly differentiated leaves. These leaves are smaller, cymbiform, and carinate (Fig. 1a). Contrary to what is stated by Greven & Spribille (1999) in the description of the taxon, the lamina is mainly bistratose (Fig. 1b) in most specimens, and hair-point lengths of 3–4 mm should be considered the extreme, not the rule. Materials distributed by Crum and Anderson in their *exsiccata* as *G. brittoniae* (and studied by Greven & Spribille) have much shorter hair-points; less than 2 mm. Further features of the species are the recurved leaf margins, proximal marginal cells with transverse walls thicker than longitudinal walls, proximal juxtacostal cells rectangular and nodulose (Fig. 1c), curved seta, and dioicous sexual condition.

These characters are shared by *G. funalis*, a rare taxon in North America which had been reported previously from Labrador and the Arctic Archipelago (Ireland *et al.*, 1987). However, the last locality (Smith's Sound, leg. Hayes, cf. Macoun & Kindberg, 1892, p. 67) is actually believed to be in Greenland, from where more collections are known. The only difference between the two taxa

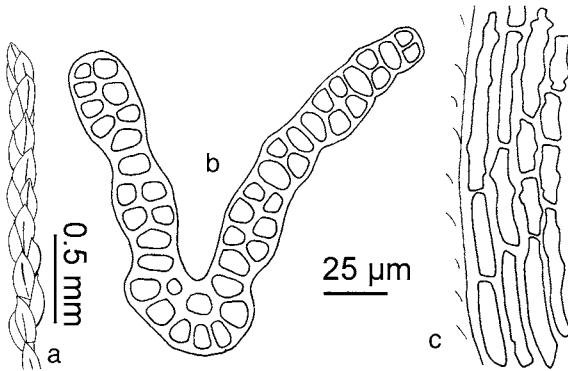


Figure 1. *Grimmia funalis*. **a:** Filiform young shoot. **b:** Transverse section at distal part of leaf. **c:** Proximal juxtacostal leaf cells. (*Williams s/n*, Musci acrocarpi boreali-americi, n° 283, PC).

would be the allegedly longer hair-points of *G. brittoniae*. Although that is correct for many of the known collections of *G. brittoniae*, others, also duplicates from the same locality and date, have hair-points equal to or shorter than 2 mm, a length commonly seen in *G. funalis*.

It has been stated many times that hair-point length is widely variable in *Grimmia*, and *G. funalis* is not an exception (Greven, 1995, p. 77; Loeske, 1913, p. 155; 1930, p. 153 "Die Länge der Haarspitzen wechselt bei dieser Art in hohem Grade..."; Muñoz, 1998a, p. 359; 1998b, p. 371; 1999, p. 119). Other species also show longly pilose expressions, that have been occasionally described as different species. *Grimmia nivea* Dusén, for example, is extremely pilose *G. plagiopodia* Hedw., as can be inferred from the name (Ochyra, 1993; Muñoz, 1999). Another unusual feature occasionally seen is a strongly toothed hair-point, with the teeth very long, seemingly plumose, as in *G. montana* (Spain. León: Candín, *Ederra & de Miguel s/n*, NAU; U.S.A. California: Grant Lake, *Whittemore 563*, herb. Whittemore) and *G. longirostris* (Mexico. Chihuahua, *Whittemore 2845*, herb. Whittemore). Conversely, virtually every pilose species in the genus shows mucicous expressions that have often been described as different taxa (e.g., *G. hausmanniana* De Not. and *G. catalinensis* E. B. Bartam var. *mulica* E. B. Bartram are mucicous expressions of *G. longirostris* Hook., cf. Muñoz, 1998a).

I do not concur in considering hair-point length alone as worthy of credit whilst ignoring the set of shared characters between the two taxa and, accordingly, *G. brittoniae* is here considered a mere synonym of *G. funalis*.

Specimens seen in addition to the type: U.S.A. Montana: Flathead Co., near Columbia Falls, *Williams s/n* [Holzinger, Musci acrocarpi boreali-american, fasc. 12, n° 283] (FH, JE, MO, NY, PC); *idem* Badrock Canyon, ca. 7.5 km E. of Columbia Falls, *Spribille 6653* (IBA); Sanders Co., Snake Creek, Cabinet Mts., *Schofield 12025* [Crum & Anderson, Mosses of North America, n° 236] (FH, IBA, MO, NY, PC).

Grimmia hamulosa Lesq., *Mem. Calif. Acad. Sci.* 1: 14. 1868. Type: Gravelly soil. Mt Dana, California. (Bolan-

der). (Lectotype, here designated, NY!; isolectotypes, FH! 2 replicates).

Grimmia brevirostris R.S. Williams, *Bryologist* 23(4): 52, pl. 3 figs 1–9. 1920. Type: California. On granite rocks, mountains adjacent to Buck's valley, Plumas Co. Alt. 6500 ft. John B. Leiberg, 1900 July. (Lectotype, here designated, NY!). **Syn. nov.**

The type of *G. brevirostris* is characterized by acuminate, mucicous, homomallous leaves that are bistratose distally, a costa mostly filling the distal part of the leaves, and, contrary to what is stated in the protologue, with bent setae.

The protologue of *G. brevirostris* lacks any discussion on the affinities of the new species or comparison with other taxa in the genus. The only reference to its relationships is the infrageneric placement in *Guembelia* as a consequence of the cucullate calyptrae. Subsequently, Jones (1933, p. 26) simply repeated part of the description without any discussion of the species affinities. In the list of mosses of California, Koch (1950, p. 14) listed four new localities for this species, and under the entry of *G. unicolor* he stated: "The strikingly similarity of this moss to the endemic *G. brevirostris* is suggestive." This was the first comparison of *G. brevirostris* with any other *Grimmia*. Sayre (1952, p. 258) considered *G. brevirostris* a synonym of *G. unicolor* without further discussion, probably considering Koch's opinion correct. Her view was followed by Crum, Steere & Anderson (1965). It was reinstated as a distinct species by Crum, Steere & Anderson (1973), but again without explanation. The situation in the latest list of North American mosses (Anderson, Crum & Buck, 1990) is the same.

From the foregoing, it seems evident that *G. brevirostris* has been a rather poorly known taxon. Indeed, there are no new records of this taxon after its original description except by Koch (1950). Its placement under *G. unicolor* is surprising, because the two taxa are not especially similar. *Grimmia unicolor* has acute, more or less cucullate, mucicous leaves, a costa that does not fill the distal part of the leaf, and costa undifferentiated from the laminal cells.

On the contrary, the type of *G. brevirostris* is identical in every respect with specimens of *G. hamulosa*, including the types of this name, and it is accordingly considered a synonym of this taxon.

Grimmia muehlenbeckii Schimp., *Syn. Musc. Eur.* 212. 1860. Type: [Austria. Tirol] Trafoi, Jul. 1840. (Holotype, BM!).

Grimmia hermanii Crum, *Michigan Bot.* 13: 171. 1974. Type: U.S.A. Upper Peninsula of Michigan. Keweenaw County. On boulder in woods below Falls, Manganese River gorge, Copper Harbor, July 14, 1973. *F.J. Hermann 25446*. (Isotypes, CANM 226826!, F!, FH!). **Syn. nov.**

Grimmia hermanii was compared with *G. muehlenbeckii* (as *G. trichophylla* var. *tenuis*) when first described (Crum, 1974, p. 172). The latter author stressed the smaller size,

the lack of strongly spinulose hair-points, and the different structure of basal juxtacostal cells of the new species.

Grimmia hermanii shares with *G. muehlenbeckii* the keeled leaves, recurved margins, and the presence of propagula originating on the apex of long, branched stalks arising at both sides of the costa in the leaf axils. A character not analysed by Crum (1974) and also shared by these two species is the costae bluntly angled distally. Regarding the differences stressed by Crum (1974), European populations of *G. muehlenbeckii* also show variation in size, hair-point length, and basal cell shape, and *G. hermanii* populations fall well into this range of variation. Accordingly, *G. hermanii* is here considered a new synonym of *G. muehlenbeckii*.

Grimmia muehlenbeckii is gametophytically similar to *G. trichophylla*, but in the latter the costa is semi-terete distally and the propagula are generated sessile on the lamina, which disintegrates as the propagula mature (Muñoz 1999, p. 178, Fig. 44). Moreover, the capsules of *G. muehlenbeckii* are ovoid and almost smooth, whereas *G. trichophylla* has ellipsoid, ribbed capsules.

Grimmia orbicularis Wilson, Engl. Bot. Suppl. 4: 2888. 1844. Type: [United Kingdom, near Bristol] St. Vincent Rock's (Lectotype, BM!).

Grimmia orbicularis var. *persica* Schiffn., Oesterr. Bot. Z. 47(4): 129. 1897. Type: J. Bornmüller: Iter Persico-turcicum 1892–93. N° 4448. Persiae australis prov. Faristan: in rupestribus calcar. montium ad Schiras. 1650–1700 m.s.m. 1892.X.25 legit et determ.: J. Bornmüller. (Lectotype, here designated, JE!; isolectotype, F!). **Syn. nov.**

Grimmia moxleyi R.S. Williams in Holz., Musci Acrocarpi Boreali-Americani et Europaei, fasc. 24 n° 600, 1926. Type: On sandstone conglomerate, between Big Rock Creek and Devil's Punch Bowl, Los Angeles Co., Calif. Coll. George L. Moxley, No. 1141. May 30–31, 1926. (Lectotype, here designated, NY!; isolectotypes, FH!, HBR!, MO! 3 replicates). **Syn. nov.**

Grimmia moxleyi was described from specimens collected in California. The name has been used since then for North American plants morphologically similar to *G. orbicularis*, but with mucous stem leaves and piliferous perichaetial leaves. In *G. moxleyi* the mucous leaf apices are obtuse, and their shape ranges from flat to cucullate (Crum, 1994, Fig. 301b; Jones, 1933, Plate 8 B3–4). When the leaves are cucullate, they seem, in lateral view, like boats. The setae are short, and the capsules emerge between the long hair-points of the perichaetial leaves, looking almost immersed. Contrary to what is stated by Crum (1994, p. 399), leaf margins are recurved for some way in mid-leaf, as shown by his illustration (Crum, 1994: Fig. 301b). Furthermore, the basal marginal cells are quadrate to rectangular with transverse walls thicker than the longitudinal walls, and his illustration (Crum, 1994, Fig. 301e) actually shows the basal part of a perichaetial leaf.

Besides examining many herbarium specimens, I had the opportunity to study populations of the so-called *G. moxleyi* growing next to more typical *G. orbicularis* in the Mohave Desert (Henderson, Nevada, U.S.A.). Although the presence or absence of hair-points in the stem leaves is a striking feature that separates plants of each type at once, there are plants of intermediate morphology (e.g., Sweet & Munz 7, FH), with many stem leaves mucous and identical to those in "typical" *G. moxleyi*, but also with many others piliferous. Similar variability was observed on *G. orbicularis* from Utah by Flowers (1973, p. 260, Figs 10–18), although his observations have been overlooked.

The same variability and intergradation in hair-point presence and associated leaf shape is commonly observed in plants all around the arid to desertic areas of northern Africa and in middle and central Asia. Indeed, *G. orbicularis* var. *persica* was described from plants morphologically identical to *G. moxleyi* from Iran. Both *G. moxleyi* and *G. orbicularis* var. *persica* are identical to *G. orbicularis* in leaf areolation, position of male buds and sporophyte features, including calyptrae shape and peristome teeth perforation, and I conceive them to be within the range of variation of *G. orbicularis*.

TAXONOMIC ADDITIONS AND CHANGES: *Grimmia funalis* (Schwägr.) Bruch & Schimp. (syn. nov. *G. brittoniae* R.S. Williams); *G. hamulosa* Lesq. (syn. nov. *G. brevirostris* R.S. Williams); *G. muehlenbeckii* Schimp. (syn. nov. *G. hermanii* Crum); *G. orbicularis* Wilson (syn. nov. *G. moxleyi* R.S. Williams, *G. orbicularis* var. *persica* Schiffn.).

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