

Grimmia montana Bruch & Schimper - Bryol. Eur. 3: 128. 1845.

Type: Germany, Donnersberg, leg. W.Th. Gümbel, April 1843, lectotype, designated by Cao & Vitt (1986), BM!

Synonyms: *Grimmia alpestris* var. *holzingeri* (Card. & Thér.) Jones, *G. arctophila* Kindb., *G. brachyodon* Aust., *G. brachyphylla* Card., *G. donniana* var. *holzingeri* (Card. & Thér.) Wijk & Marg., *G. fragilis* Schimp., *G. holzingeri* Card. & Thér., *G. jamesii* Aust., *G. laxa* C. Müll., *G. microtricha* C. Müll. & Kindb., *G. pseudo-montana* Card. & Thér., *G. schiedeana* C. Müll.

Distribution: Afr.1. Am.1.2. As.1,2,5. Eur.

Description

Grimmia montana usually grows in blackish, hoary cushions or patches. Moistened the plants are green, becoming black when dried up. The leaves are appressed and straight when dry, erecto-patent when moist, linear-lanceolate, concave-keeled above, the costa slightly projects on dorsal side, the hair-points are short to rather long, slightly to strongly denticulate, the margins are plane, usually incurved above. The distal areolation is more or less bistratose, the mid-leaf cells are rounded, thick-walled, the basal marginal cells are quadrate with thickened transverse walls, the basal juxtacostal cells are short to long-rectangular with incrassate straight to sinuolate walls. The sexuality is dioicous, male plants grow in separate cushions, smaller than female plants, hair-points are short to nearly absent, 2-4 perigonia are formed on one stem; female plants with capsules on straight setae are occasionally present, they are exserted, ovoid, brown with thick-walled exothecial cells without stomata at the base of the urn, the operculum is obliquely rostellate to rostrate.

Discussion

G. montana is a widespread species of exposed acidic rock in the northern hemisphere: Europe, Asia, and North America. As the name indicates, it is a mountainous species, however, it was found at nearly sea-level, on a granite boulder, in The Netherlands (Greven 1993). In the European Alps, *G. montana* is scarcely spread and rarely found at high altitudes. In Britain, *G. montana* is rare and decreasing (Smith 2004). The species is extremely variable in its morphology and in the Index Muscorum (Wijk et. al. 1962) nine varieties are enumerated, three from North America: var. *brachyodon* (Aust.) Lesq. & Jam., var. *idahensis* Ren. & Card., and var. *truncata* Lesq. & Jam., and six from Europe: var. *abnoba* Schmidt, var. *epilosa* Grav. ex Delog., var. *fragilis* Loeske, var. *longicapsula* Besch., var. *longifolia* Card., and var. *obtusata* B.S.G.

The rarity of *Grimmia montana* in the U.K. and some more European countries, contrasts sharply with the abundant occurrence in northern Portugal and adjacent Spain. The two most northern Portuguese provinces, Trás-os-Montes e Alto Douro and Beira Alta with respectively Parque Natural da Serra do Alvão and Serra da Estrêla are probably the cradle of *Grimmia montana*. Travelling through these areas, you see everywhere the black cushions of *G. montana*, present in large quantity and here, in the course of evolution, a number of varieties have developed.

One of these is var. *fragilis* Loeske, characterized by homomallous, ± 3 mm long leaves with broken apices, the basal areolation is uniform, in mid-leaf and apex, the areolation is bi- to tristratose, the leaves taper to long and slender apices, which break off at weak (one cell thick) places, visible in transverse sections. The broken-off leaf tips serve as vegetative reproduction. Loeske (1930) recognized this variety at specific level. “*Gr. fragilis* ist ein Endemiscus Iberiens”. However, I prefer recognition as a variety. *G. montana* var. *fragilis* is very common in Serra da Estrêla, but was not encountered in Trás-os-Montes e Alto Douro.

Apart from a frequent unistratose mid-leaf leaf areolation, the hair-points are extremely variable, var. *epilosa* has mucous leaves. The degree of denticulation varies from nearly smooth to dentate, or even ciliate. Loeske (1930) remarked: “Die Art variiert, wie alle Guembelien, durch den Grad der Verdickungser-scheinungen in der Lamina und die Schwankungen des Zellnetzes im Blattgrun-de”.

In August 1995, I found on an excursion with Jesus Muñoz, in Spain, León, Laguna del Lago, alt. 2200 m, a peculiar form of *G. montana* with ciliate hair-points. I stored this material as *Grimmia montana* var. *plumosa*, with a remark to study this form in the future.

In 2005, during a study on saxicolous plant communities in northern Portugal, *G. montana* plants with ciliate hair-points were found by the Portuguese botanist Helena Hespanhol. Because she could not identify these plants, she sent a sample to Muñoz, who replied that in 1990, he had collected comparable plants in north-western Spain, close to the Portuguese border. The plants were considered by him as a form of *Grimmia montana*. From the new records from northern Portugal, he concluded that it was more than a form and successively, it was published as a *G. horrida* **spec. nov.** (Muñoz et al. (2009). Although clearly related with *G. montana*, the new species differs by ciliate hair-points, a merely unistratose

lamina and a rather uniform basal cell pattern. In the protologue, the new species was compared with *Grimmia incurva*, but this species does not occur in this region, and it differs in various characters. In August 2009, I refound this peculiar form of *G. montana* in quantity, in fissures of slate rock at altitudes of 1100 - 1300 m, in the Serra do Marão, west of Vila Real. The differences with *Grimmia montana*, which is extremely common in this area, growing in the same habitat, could already in the field easily be noticed because in *G. montana* var. *montana* the hair-points are nearly smooth and frequently homomallous. In *G. horrida*, the hair-points are curved to curled and ciliate. Although the species was abundantly present, no sporophytes were seen; it propagates by shoots, arising from the rhizoids. In the vicinity of Vila Real, many localities were investigated and *Grimmia horrida* was found on slate rock only (in Muñoz et al. 2009, it was described from schist, probably incorrect). The taxon has a preference for fissures on north-facing outcrops above 1000 m, in all localities it was associated with *Grimmia montana* var. *montana*. I collected many samples and found frequently *G. montana* plants with all characters of *G. horrida*, with exception of the ciliate hair-points. Because these ciliate hair-points are the only differentiating character of *G. horrida*, recognition at specific level is not supported by sufficient morphological characters, and herewith, I rename this taxon as *Grimmia montana* var. *horrida* (Muñoz & Hespanhol) Greven.

A third peculiar form of *G. montana* was found in Parque Natural do Alvão, Visgas do Ermolo, steep slate rock, alt. 737 m, locality 41° 22'48" N - 7° 51'50" W. In the field, the greyish cushions with nearly muticous leaves, light green and glaucous when wetted looked very peculiar, and in the first instance, I thought to have found a new species. However, detailed study revealed that these plants with their leaf lamina merely unistratose, covered with a waxy layer (visible in transverse sections), and basal leaf cells uniform, should also be treated as a variety of *Grimmia montana*, herewith described as *Grimmia montana* var. *glauca* H.C. Greven. *Species folia glauca a congeneribus diversa.*

Specimens examined

Andorra: Llorts, Refuge de Ferrerales, alt. 1450 m, leg. A. Sotiaux; **Belgium:** Prov. de Luxemburg, l'Ancien Moulin de Rèn 's iwe, leg. H.C. Greven, nr. 2276; Malmédy, Bevercé, leg. H.C. Greven, nr. 2277, 2278; **Corsica:** Col de Verde, alt. 1720 m, leg. H.C. Greven, nr. 2938, 2944; Col de Vergio, alt. 1600 m, leg. H.C. Greven, nr. 2942; Mte. Cinto, alt. 1550 m, leg. H.C. Greven, nr. 2939-2941; Mte.

d'Oro, alt. 1400 m, leg. H.C. Greven, nr. 2943, 2945; Lac de Melo, alt. 1140-1720 m, leg. H.C. Greven, nr. 2946-2948; **England**: Cumberland, Skiddaw, Dead Crag, alt. 500 m, leg. E.J. Warburg; Cumberland, Wasdale, Buckbarrow, alt. 300 m, leg. E.J. Warburg; **France**: Cantal, Alpepierre, Les Prés Marty, leg. Ph. de Zuttere, nr. 20714, The Vosges, Lièpvre, alt. 291 m, leg. H.C. Greven, nr. 2775; The Vosges, Le Hundskopf, alt. 1237 m, leg. H.C. Greven, nr. 2776; The Vosges, Col des Croix, alt. 700 m, leg. H.C. Greven, nr. 2777; The Vosges, Col de la Schlucht, alt. 1130 m, leg. H.C. Greven, nr. 2778; The Vosges, La Bresse, alt. 750 m, leg. H.C. Greven, nr. 2279; Pyrenees, Plau de Chousse, La Pierre St. Martin, alt. 900 m, leg. H.C. Greven, nr. 2257; Pyrenees, Bigorre, Gavarnie, alt. 1380 m, leg. H.C. Greven, nr. 2253, 2249, 2250, 2251; Pyrenees, Ste. Engrace, alt. 900 m, leg. H.C. Greven, nr. 2252; **Germany**: Ahreifel, Kr. Ahrweiler, Ahrtal, west of Schuld, alt. 240 m, leg. R. Düll; Monschau, Dreistegen, leg. H.C. Greven, nr. 2254; Harz, Braunlage, Voigtsfelde, alt. 500 m, leg. H.C. Greven, nr. 2255; **Iceland**: Stykkusholmur, leg. W. Labey; Hraun, leg. Davidsson; **Norway**: Lomseggen, leg. Zetterstedt; Opdal, Vangsfjeldet, leg. Chr. Kaurin; Kongsvolt, leg. Kindberg; **Spain**: Pyrenees, Pic de Cortaplana, alt. 1200 m, leg. H.C. Greven, nr. 2261; León, Cantabrian Mts., municipal of Cabrillanes, south of Riologo, Laguna del Lago, quartzite rock, alt. 2200 m, leg. H.C. Greven nr. 2675, 03 August 1995; **Portugal**: Serra da Estrela, Penhas Dourados, alt. 1450 m, leg. H.C. Greven, nr. 2282, 2284, 2287, 2288, 2290, 2296- 2299; Serra da Estrela, Covao da Ametade, alt. 1500 m, leg. H.C. Greven, nr. 2283, 2292; Serra da Estrela, Manteigas, alt. 700 m, leg. H.C. Greven, nr. 2285; Serra da Estrela, Barragem do Cavao, alt. 1600 m, leg. H.C. Greven, nr. 2291; Serra da Estrela, Lagoa Covao, alt. 1900 m, leg. H.C. Greven, nr. 2286, 2289, 2293-2295; Trás-os-Montes e Alto Douro, Serra do Marão, Seixinhos, 29 TNF 9363, leg. H. Hespanhol, 03-07-2005, PO 4991 B; Trás-os-Montes e Alto Douro, Serra do Marão, road to Antenas no alto do Marão, 41°14'58''N - 07°53'46''W, alt. 1290 m, fissures in north-facing slate rock, leg. H.C. Greven nr. Port 11, 06 - 08-2009; Trás-os-Montes e Alto Douro, Serra do Marão, Parque eólico de pena Suar, 41°17'27''N - 07°55'24''W, alt. 1174 m, fissures in north-facing slate rock, leg. H.C. Greven nr. Port. 10, 08-08-2009; **Sardinia**: Monti del Gennargentu, Barranco Spina, alt. 1520 m, leg. H.C. Greven, nr. 2269, 2271, 2280; Monte Arbu, alt. 1290 m, leg. H.C. Greven, nr. 2281; Punta la Marmora, alt. 1310 m, leg. H.C. Greven, nr. 2270, 2272; **Scotland**: Berwickshire, Lurgie Craigs, alt. 185 m, leg. D.G. Long, nr. 21700; Berwickshire, Hareheugh Craigs, alt. 200 m, leg. D.G. Long, nr. 19808; **Slovakia**: Bzenica, Sabotiste, leg. H.C. Greven, nr. 2273; Ziat n/ Hronon, Krimnica, leg. H.C. Greven, nr. 2258; Jastrabska skala, alt. 900 m, leg. H.C. Greven, nr. 2259, 2260; **Canary Islands**: Tenerife: Valle de la Orotava, Las

Cumbrias, alt. 1600 m, leg. H.C. Greven, nr. 2265, Barranco del Aqua, alt. 1400 m, leg. H.C. Greven, nr. 2266, Las Canadas, Boca de Tauce, alt. 2000 m, nr 2267, 2268, 2262, 2263, 2264; La Palma, caldeira, alt. 2300 m, leg. H. Lauer, nr. Ka 105; **Sweden**: Lappmark, Jokkmokk, Pelloreppe, leg. Arnell; Lappmark, Marsliden, leg. Hülphers; Norliden, Vilhelmina, leg. Hülphers; Lappmark, Kvikkjokk, Pelloreppe, leg. Arnell; **The Netherlands**: Drenthe, Drouwen, hunebed, leg. H.C. Greven, nr. 2274; **Canada**: British Columbia, Stump Lake, south of Kamloops, conglomerate boulder, leg. H.C. greven nr. 3029, 29-06-1998; British Columbia, 10 km west of Kamloops, hot south-facing outcrop, alt. 555 m, leg. H.C. Greven nr. 3032, 08-07-1998; British Columbia, Monck Prov. Park, alt. 650 m, leg. H.C. Greven nr. 3030, 29-06-1998; British Columbia, 5 km west of Kamloops, alt. 460 m, leg. H.C. Greven nr. 3033, 08-07-1998; British Columbia, Gold Co., 5 km east of Cache Creek, alt. 475 m, leg. H.C. Greven nr. 3031, 08-07-1998; British Columbia, Fraser River Canyon, Erroc, alt. 80 m, leg. H.C. Greven nr. 3034, 09-07-1998;

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