

# New data on distribution, morphology and habitat of *Brachythecium mildeanum* (Schimp.) Schimp. (Brachytheciaceae, Bryophyta) in the Iberian Peninsula

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## Resumen

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*Nuevos datos sobre la distribución, morfología y habitat de Brachythecium mildeanum (Schimp.) Schimp. (Brachytheciaceae, Bryophyta) en la Península Ibérica.*

En base a la revisión de numerosos ejemplares, se aportan nuevos datos sobre morfología, hábitat y distribución de *Brachythecium mildeanum* (Schimp.) Schimp., especie que ha sido usualmente confundida en la Península Ibérica con *Brachythecium rutabulum* (Hedw.) Schimp. y *B. rivulare* Schimp.

**Palabras clave:** *Brachythecium*, Península Ibérica, morfología, distribución, hábitat.

## Abstract

New data of morphology, habitat and distribution, based on samples reviewed, are provided for *Brachythecium mildeanum* (Schimp.) Schimp. In the Iberian Peninsula this species has usually been confused with *Brachythecium rutabulum* (Hedw.) Schimp. and *B. rivulare* Schimp.

**Key words:** *Brachythecium*, Iberian Peninsula, morphology, distribution, habitat.

## Introduction

*Brachythecium mildeanum* (Schimp.) Schimp. is a widely distributed species known from Europe, Asia, North America (Smith 2004) and Australia (Hedenäs 2002). In the Iberian Peninsula it has been reported from Andorra (Casas 2005), Spain [Navarra (Allorge 1955), Sierra Nevada: Granada (Gil García & Varo 1973), Ávila (Vicente et al. 1986), Guadalajara (Riestra et al. 1987), Madrid (Mazimpaka et al. 1988), Albacete (Guerra et al. 1989), Salamanca (Benito et al. 1995), Pirineos: Huesca, Lleida, Girona (Casas 2000, Casas et al. 2006, Casas et al. 2009)] and Portugal [Beira Alta (Teles 1970), Estremadura (Sérgio et al. 1988), Trás-os-Montes e Alto Douro (Sérgio & Schumacker 1992), Beira Baixa (Sérgio et al. 2002)].

During a revision of the genus *Brachythecium*, for *Flora Briofítica Ibérica* project, we found that

many of the samples reported as *Brachythecium mildeanum* in the literature are misidentifications, mainly of specimens of *B. rutabulum* (Hedw.) Schimp. and *B. rivulare* Schimp. In this paper we present a revision of the chorological reports of *B. mildeanum* in the Iberian Peninsula. In addition, a description based on Iberian material as well as a review of the differential characters and data about the habitat of the species in this area are provided.

## Material and Methods

The present study is based on a revision of 525 specimens of *B. mildeanum* and *B. rutabulum* deposited in the following institutional herbaria: BCB, FCO, GDA, LISU, MA, MACB, MUB, S, SALA and VIT. In “specimens studied” only the specimens corresponding to *B. mildeanum* are

listed. Microscopic examination was made with an Olympus-BH2 light microscope, while mi-

crophotographs were obtained with an Spot insight QE camera mounted on this microscope.

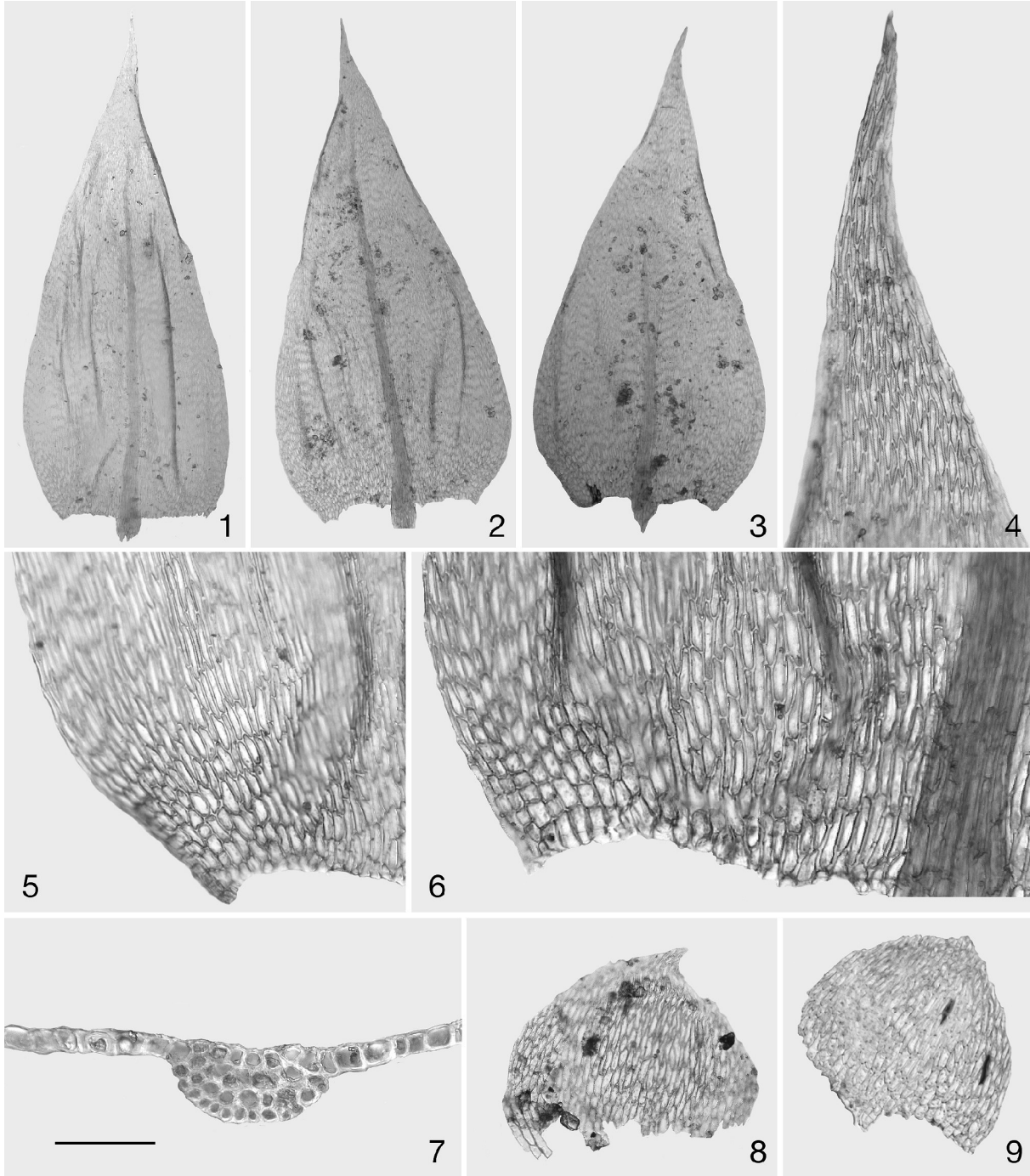


Figura 1. *Brachythecium mildeanum* (1-9, VIT 32653). 1, 2, 3: filidios de caulidios principales; 4: ápice de un filidio; 5: células alares; 6: células alares y basales; 7: sección transversal del nervio; 8, 9: seudoparafilos. Escala: 1, 2, 3 = 0.5 mm; 4, 5 = 160  $\mu$ m; 6 = 100  $\mu$ m; 7 = 75  $\mu$ m; 8, 9 = 0.2 mm.

Figure 1. *Brachythecium mildeanum* (1-9, VIT 32653). 1, 2, 3: stem leaves; 4: stem leaf apex; 5: alar cells; 6: alar and basal cells; 7: section of the costa; 8, 9: pseudoparaphyllia. Bar: 1, 2, 3 = 0.5 mm; 4, 5 = 160  $\mu$ m; 6 = 100  $\mu$ m; 7 = 75  $\mu$ m; 8, 9 = 0.2 mm.

## Results

*Brachythecium mildeanum* (Schimp.) Schimp., Bot. Zeitung (Berlin) 20: 452. 1862 (Figs. 1: 1-9)

*Hypnum mildeanum* Schimp., Syn. Musc. Eur: 694. 1860 (basionym).

Type citation: “in fossis aquosis loci turfosi *Bruch dicti* prope *Nimkau* Silesiae ubi clar. Milde detexit atque pulchris speciminibus communicat”.

*Plants* medium-sized to large, green or pale green. *Stems* erect, irregularly branched. *Branches* short, frequently erect. *Pseudoparaphyllia* foliose, orbicular, ending in a short apiculus. *Axillary hairs* with 1-2 distal hyaline cells and 1-2 pale brown basal cells. *Stem leaves* erect, not or rarely weakly plicate, concave, mostly triangular, sometimes ovate triangular, gradually narrowed to an acuminate apex, 2.1-2.75 x 1.1-1.5 mm, not or hardly decurrent, margins entire, occasionally with scattered teeth near apex, sometimes recurved near base. *Costa* single, ending  $\frac{3}{4}$ - $\frac{1}{2}$  way up leaf, with 3-4 layers of guide cells, stereids absent, abaxial and adaxial superficial cells slightly differentiated. *Median lamina cells* linear, 57.5-92.5 x 7.5-11.25  $\mu$ m, smooth. *Basal lamina cells* rectangular, 37.5-55 x 12.5-25  $\mu$ m, thin-walled or slightly incrassate. *Alar cells* shortly to longly rectangular, sometimes quadrate, 25-45 x 12.5-25  $\mu$ m, in ovate group, extending from margin  $\frac{1}{4}$  of distance to costa, indistinctly delimited towards other basal cells. *Branch leaves* smaller than stem leaves, triangular to ovate-triangular, gradually

narrowed to a short acuminate apex, other characters similar to stem leaves. *Autoicous*. *Sporophytes* not seen.

### Diagnostic characters and differentiation

*Brachythecium mildeanum* is mainly recognized by its almost entire leaf margins, the triangular or ovate triangular leaves and the rectangular alar cells that form an indistinctly delimited group which is difficult to separate from the others basal cells. Since this species was confused with *Brachythecium rutabulum* and *B. rivulare* in the Iberian Peninsula their differentiating characters are presented in table 1. The information about the morphology of the seta was taken from Nyholm (1979), Smith (2004) and Cortini Pedrotti (2006).

### Habitat and distribution

In the Iberian Peninsula, *Brachythecium mildeanum* grows in flooded meadows or rush fields at elevations from 150 to 1850 m. It seems to be an indifferent species regarding the substrate, although habitat data on the label of some samples could indicate a preference for calcareous substrates. In general, it grows with different species of Poaceae, Juncaceae and Cyperaceae. This habitat is very constant in the Iberian Peninsula.

Before this revision, the distribution of *Brachythecium mildeanum* in the Iberian Peninsula was very imprecise. Based on the present data *B. mildeanum* is not confined to the mountains of the northern Iberian Peninsula, because it reaches

	<i>Brachythecium mildeanum</i>	<i>Brachythecium rutabulum</i>	<i>Brachythecium rivulare</i>
<b>Leaf shape</b>	Triangular or ovate-triangular	Ovate, broadly ovate or cordate	Ovate, triangular, or cordate
<b>Leaf margins</b>	Entire, sometimes with scattered teeth	Denticulate, rarely entire	Denticulate
<b>Alar cells</b>	Rectangular, numerous, forming an ovate group not differentiated from the others basal cells	Rectangular, or quadrate not very numerous, forming a triangular or ovate group not well differentiated	Rectangular, inflated forming an ovate and very well defined group
<b>Seta</b>	Smooth	Mamillose	Mamillose
<b>Habitat</b>	Flooded meadows	Tree bases, slopes in forest, fields, rocks, and in general in shaded and wet habitats	Water courses, flooded soils

Tabla 1. Principales diferencias entre *Brachythecium mildeanum*, *B. rutabulum* y *B. rivulare*.

Table 1. Main differences among *Brachythecium mildeanum*, *B. rutabulum* and *B. rivulare*.

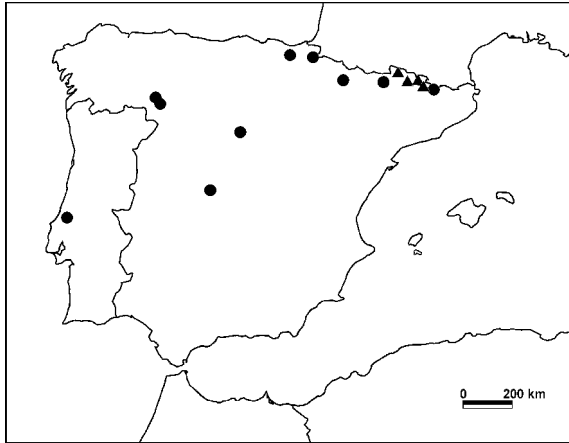


Figura 2. Distribución de *Brachythecium mildeanum* en la Península Ibérica basado en citas bibliográficas (▲) y material estudiado (●).

Figure 2. Distribution of *Brachythecium mildeanum* in the Iberian Peninsula based on literature records (▲) and studied material (●).

some mountainous ranges in the centre of Spain and Estremadura in Portugal. Figure 2 shows the distribution of *B. mildeanum* in the Iberian Peninsula based on the studied samples. The literature records for which we were not able to study vouchers are also included.

### Iberian specimens studied

**Spain:** Gerona, La Molina, 7-4-1956, Casas (BCB 25091); Guipúzcoa, Villafranca de Ordizia, Aralar, 30TWN7462, 30-10-1995, Infante (VIT 1933); Huesca, Arguís, Sierra de Bonés, 30TYM0990, 2-6-2004, Infante & Heras (VIT 32653); Huesca, Castejón de Sos, Illiri, TBH9814, 31-5-2002, Heras & Infante (VIT 29388); León, Cabrillanes, La Babia, Fuente la Bruxa, 15-6-2005, Fernández Ordóñez (FCO 0309); Navarra, Baztan, Belate, 30TXN1266, 19-5-2006, Heras & Infante (VIT 35037); Segovia, Navares de las Cuevas, Sierra de Pradales, 30TVL3586, 7-1-2000, Heras & Infante (VIT 25815); Toledo, Garciotún, cerca de la presa del Arroyo de la Fresneda, 30TUK6045, 20-3-2004, García Mateo (MA 27166); Zamora, Galende, Ilanes, 29TP-G9362, 7-9-1999, Heras & Infante (VIT 24526).  
**Portugal:** Estremadura, Porto de Mós, Serra dos Candeiros, Arrimal, Lagoa, 5-7-1982, Casas et al. (LISU 154247).

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