

Tropical Bryology 5: 55-59, 1992

The distribution and synonyms of *Breutelia microdonta* (Mitt.) Broth. with additional notes on certain taxa of *Breutelia*

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Abstract. *Breutelia microdonta* (Mitt.) Broth., described originally from Brazil, is the oldest name for a disjunct widespread tropical species that includes as synonyms *B. angustifolia* Rehm. ex Sim of Southern Africa and *B. merrillii* Broth. of the Philippines. *Breutelia kilaueae* (C. Muell.) Broth. of Hawaii is considered a synonym of the austral Pacific species *B. affinis* (Hook.) Mitt., and *B. brachyphylla* Broth. of Ecuador is reduced to synonymy under the North Andean *B. squarrosa* Jaeg. *Breutelia anacolioides* Herz. of Bolivia is removed to *Philonotis* as a synonym of the North Andean *P. incana* (Tayl.) H. Robins. Differences in spore ornamentation offer an additional character distinguishing *Breutelia* from *Philonotis*.

In 1869 Mitten described as new *Bartramia microdonta* based on a Weir collection from Brazil. He mentioned the similarity between this species and two species from Southern Africa, *Bartramia quadrata* Hook. and *Bartramia capensis* (R. Br.) Wijk & Marg. Despite the delicate stature of the plants, the plicate leaves and distinct alar cells made retention in *Bartramia* s.s. untenable, and it fell to Brotherus (1895) to publish the new combination, *Breutelia microdonta* (Mitt.) Broth.

Following a review of the relevant literature and an examination of several critical collections, I have come to a different conclusion regarding the taxonomy of this species. Mitten's comparison of *Bartramia microdonta* with *Bartramia quadrata* (= *Bartramia capensis* fide Magill, 1987) and *Bartramia capensis* was based evidently on superficial morphology. The delicacy and general habit of the plants are

reminiscent of *Bartramia*; however, as noted above, the microscopic details of the leaf support placement of the species in *Breutelia*. In addition, *Bartramia capensis* is autoicous while *Breutelia microdonta* is dioicous. The plants of Southern Africa which match, in all major respects, the morphology of *Breutelia microdonta* are treated under the name *Breutelia angustifolia* Rehm. ex Sim. (Sim, 1926; Magill, 1987) which should be regarded as a synonym of *Breutelia microdonta*.

In 1908 Brotherus described a new species of moss from the Philippines under the name *Breutelia merrillii*. He compared the plants to *Breutelia sieberi* (Hornsch.) Mitt., a species now considered to be a synonym of *Breutelia pendula* (Hook.) Mitt. Although no fuller explanation was given for the comparison, Brotherus may have taken note of the elongated upper laminal cells and reduced number of alar cells in both species. Both Dixon (1926) and

Sainsbury (1955) pointed out the considerable variability of *Breutelia pendula* in which length of upper laminal cells and number of distinct alar cells vary independently. *Breutelia merrillii*, "an unusually small, delicate species of the genus (Bartram, 1939)," could scarcely be confused with the more robust *Breutelia pendula*. *Breutelia merrillii*, in fact, is the morphological equivalent of *Breutelia microdonta*.

The following description and synonymy combine information from the literature with observations of cited specimens:

Breutelia microdonta (Mitt.) Broth., Bih. K. Svensk. Vet. Ak. Handl. 21 Afd. 2(3): 27. 1895.

Bartramia microdonta Mitt., J. Linn. Soc. Bot. 12: 263. 1869.

Breutelia merrillii Broth., Philipp. J. Sci. 3: 21. 1908 *syn. nov.*

Breutelia angustifolia Rehm. *ex Sim*, Trans. Roy. Soc. S. Afr. 15: 312. 1926 *syn. nov.*

Plants delicate, 1-5 cm high, in loose tufts. Stems simple or sparingly branched, tomentose below, axillary hairs of 2 cells with apical cell globose. Leaves spreading to wide-spread wet or dry, narrowly ovate-lanceolate, long-acuminate, 1.8-3.2 mm long. Margins narrowly to moderately recurved from mid leaf to base, serrulate above, entire to denticulate below, often with a strong intramarginal plication extending from base to mid leaf or above, sometimes with plications weak or absent. Alar cells few, distinct, quadrate to short rectangular, confined to extreme basal corners of leaf, upper laminal cells linear, 4-5 μ wide, 20-50 μ long, papillose at one or both ends, sometimes with most cells smooth. Costa excurrent, extending into stylus like and often flexuose tip. Dioicous. Perichaetial leaves slightly larger and longer than stem leaves. Setae slender, 10-23 mm long, capsules subglobose to globose, furrowed, 2-2.5 mm long, peristome double, exostome teeth lanceolate acuminate, 275 μ long, papillose below, vertically striolate above, occasionally with irregular perforations above, endostome segments ca. $\frac{1}{2}$ the length of and adherent to teeth. Spores subreniform, 20-40 μ in greatest diameter, warty.

Illustrations. Griffin (1984a, figs. 12-19), Magill (1987, fig. 124, 15-22).

Distribution. Eastern Brazil, Eastern Venezuela, Guadeloupe, Southern Africa, Philippines.

Habitat. Terrestrial, usually on open moist soils in shady to exposed habitats.

Specimens examined. BRAZIL. Espírito Santo: Parque Nacional do Caparo, Vital & Buck 11769 (SP, NY, FLAS); Paraná: Serra do Capivari, Nicolack & Ribas 27 (MBM, FLAS); Rio de Janeiro: Parque Nacional de Itatiaia, Schäfer-Verwimp & Verwimp 11167 (FLAS & herb. Schäfer-Verwimp); Sao Paulo, Serra da Bocaina, Vital 7272 (SP, FLAS). VENEZUELA. Bolívar: SW base of Mt. Roraima, Buck & Brewer 15689 (NY, FLAS). GUADELOUPE. Mt. de la Soufrière, Beine *s.n.* (FLAS, NY). SOUTHERN AFRICA. Transvaal: MacMac, MacLea *sub* Rehman 538 (PRE - holotype for *Breutelia angustifolia*), Magaliesberg, Magill 3026 (PRE, MO, FLAS), Kanongat, Oliver 7368 (PRE, FLAS), Middelberg, Van Rooy & Perold 675 (PRE, FLAS). PHILIPPINES. Luzon: Mt. Data, Merrill 4873 (FH - type for *Breutelia merrillii*), Mt. Sto. Tomas, Williams 1875 (FH).

The delicate stature of plants of *Breutelia microdonta*, a feature to which several authors have made reference, is perhaps the outstanding characteristic of the species. The disjunct range is similar to that of such wide-spread tropical species as *Bryum coronatum*, *Floribundaria floribunda*, *Herpetineuron toccocae*, *Plagiomnium rhyrachophorum* and *Trachypus bicolor*; however, this is the first report of a disjunction of this magnitude in *Breutelia*.

Additional New Synonymy in *Breutelia*

Breutelia kilaueae (C. Muell.) Broth. - This Hawaiian endemic is in all major respects the morphological equal of *Breutelia affinis* (Hook.) Mitt. Bartram (1933) suggested a possible relationship but stopped short of making the new synonym. An examination of Shauinsland's original collection (FH) of *B. kilaueae* confirms Bartram's suspicion. *Breutelia kilaueae* should be treated as a synonym of the variable *Breutelia affinis*.

Breutelia brachyphylla Broth. - The type (H), an Allioni collection from Ecuador, is in no way different from *Breutelia squarrosa* Jaeg., a species widespread and frequent in the Northern Andes. Brotherus (1920) mentions the rather short, subsquarrose leaves with a narrow costa and scarcely distinct alar cells. These features are all found in and help define *Breutelia squarrosa* (cf. Griffin, 1984b).

Breutelia anacolioides Herz. - This species, based on Herzog 3311 (S) from Bolivia, cannot be distinguished in any critical way from *Philonotis incana* (Tayl.) Robins., a rare species of the Northern Andes, and should be considered a synonym of the latter. Diagnostic characters include the rectangular inner basal cells of the leaf, the lack of evident plications, the very scabrous costa, the coarsely papillose upper laminal cells, the stout, short (8 mm) seta and the erect, symmetric capsule. Robinson (1977) discussed the removal of this species from *Breutelia* and its realignment in *Philonotis*. While Bartram (1949) chose to cluster under *Breutelia* those species that have plicate leaf bases and distinct alar cells, Robinson (1977) considered that "the lack of shorter cells across the leaf base would seem to furnish the most natural concept of *Breutelia*." Even this character is not without problems. If shorter basal cells excludes a species from *Breutelia*, then a taxon like *Breutelia affinis* would have to be considered a candidate for removal from the genus. A partial resolution of the question of how to distinguish problematic species of *Breutelia* from *Philonotis* might come by way of an examination of spore ornamentation types. The predominant ornamentation type in *Breutelia* is a warty or areolate-tuberculate pattern (Figs. 1-3), while the spores of *Philonotis* are mainly papillose (Figs. 4-6). In the case of *Breutelia affinis*, which on the basis of the shorter inner basal cells might be realigned under *Philonotis*, the spores are warty and suggest a closer affinity with *Breutelia*.

A survey of tropical and South Hemisphere taxa in *Breutelia* and *Philonotis* highlights the difficulty of using traditional characters to separate certain species of the two genera. In a species like *Philonotis andina* (Mitt.) Jaeg., the leaves develop

rather enlarged alar cells and plications or rugosities in the basal part of the leaf. *Breutelia jamaicensis* (Mitt.) Jaeg. lacks the characteristic leaf shape of the genus (Robinson, 1977) plus has few if any plications, develops shorter inner basal cells in the lower part of the leaf and has papillose spores. All of these features support its placement in *Philonotis* as Cardot (1911) argued effectively many years ago. Cases such as these which present combinations of morphological states not or rarely seen in north temperate floras serve to underscore the need for new and more discriminating characters if we are to understand these genera on a global scale.

Acknowledgements. I express appreciation to the following herbaria for the loan or exchange of specimens cited in this paper: FH, H, herb. Schäfer-Verwimp, MBM, MO, NY, PRE, S, SP, TENN.

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