
The identity of *Braunia alopecura* (Brid.) Limpr. with *Braunia secunda* (Hook.) Bruch & Schimp.

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Zusammenfassung:

Braunia alopecura, welches früher für ein Südalpenendemismus gehalten wurde und dessen Verbreitung später auf die Kapverden und jüngst den Indohimalaya ausgedehnt wurde, hat sich als identisch mit der neotropischen *Braunia secunda* erwiesen. Dies ist ein weiterer Fall für eine amerikanische Art in den Südalpen und mögliche Fernverbreitung.

Abstract:

Braunia alopecura, originally regarded as species endemic to the Southern Alps, later known in addition from the the Cape Verde Islands and recently reported from the Indohimalaya, has revealed to be identical with the neotropical *Braunia secunda*. This is another case of an American species in the Southern Alps and in Europe in general, as well as an example of possible long distance dispersal.

Braunia alopecura was described in 1819 by Bridel as *Leucodon alopecurus*. Schimper introduced the genus *Braunia* for this species in 1846 and described it as *B. sciuroides*. Later, Limpricht published the new combination *Braunia alopecura*. The species was described from southern Switzerland and later only known from there (“die wenigen Exemplare, die wir besitzen, stammen aus der südlichen Schweiz” Schimper 1846). Later, Milde found the species in the surroundings of Merano in Alto Adige, Italy. Therefore *Braunia alopecura* was regarded as endemic species of the southern Alps, until in 1969, Bizot discovered that the specimens from the Cape Verde Islands formerly named as *Hedwigidium imberbe* belong to *Braunia alopecura* (Frahm 2013b). In a revision of the Chinese species of *Braunia* (He & De Luna 2004), the species was listed from “China, Cape Verde Is., France, Germany, India, Iran, Italy, Kuwait and Switzerland”, however, only the southern Alps of Italy and Switzerland, the Cape Verde Island and China remained after a critical examination (Frahm 2013b).

A study of the ranges of rare species in the southern Alps (Frahm 2012, 2013d) revealed that most of them (*Bruchia flexuosa*, *Ptychomitrium incurvum*, *Haplocladium angustifolium*, *H. virginianum*, *Frullania* spp.) have a closed range in North America but are in Europe only locally found in the southern Alps. These examples initiated a comparison of neotropical material of species of *Braunia* with *B. alopecura*. Material from the Cape Verde Island with African species had been compared before, however, without success.

The comparison of *B. alopecura* with neotropical species revealed the identity with *B. secunda*. Both species share the following character states (figs. 1-4):

- a. a leaf margin which is generally flat or only slightly revolute at leaf base,
- b. the leaf apex which is shortly apiculate and not gradually contracted, at margins slightly erose dentate,
- c. the lamina, which is minutely papillose over the lumen that it looks opaque,
- d. the longitudinal plicate leaves,
- e. "branches often" curved leaves sometimes homomallous.
- f. straight not reflexed leaf tips,
- g. leaves without hair points,
- h. leaves in wet state very distant.

Schimper (1836-51) knew only three species of *Braunia* worldwide, but Brotherus (1926) listed already 22 species. He illustrated *B. secunda* with reflexed leaf tips, which is apparently an error and a confusion with *B. squarrosula*. Apparently the number of character states and their possible combinations are lower than the number of species. Therefore it can be expected that a revision of the genus would end in a considerable loss of species.

Most interestingly, Schimper (1836-51) in his *Bryologia Europaea* had already suggested the identity of both species more than 160 years ago: „Ob *Hedwigia* (= *Braunia*) *secunda* wirklich von unserer europäischen Art spezifisch verschieden ist, können wir nicht mit Bestimmtheit ermitteln, da uns von letzterer gehörig vollständige Exemplare zum Vergleich fehlen. Auf jeden Fall ist die Ähnlichkeit auffallend groß."

Therefore *Braunia alopecura* has to be regarded as synonymous with *B. alopecura*

Braunia secunda (Hook.) Schimper in Bruch, Schimper & Gumbel, *Bryol. Eur.* 3: 161, 1846
Hedwigia secunda Musci Exot. 1: 46, 1818. Type: In regni Mexicani montosis apricis, juxta Toluccam..., Humboldt et Bonpland (isotype E).

Braunia alopecura (Brid.) Limpr., *Laubm. Deutschlands* 1:824, 1888, *syn. nov.*

Leucodon alopecurus Brid. *Muscologia Recentiorum Supplementum* 4: 135. 1819[1818]. Type: "in Helvetia locis accuratis non designatis, Schleicher s.n. (According to He & De & Luna, the holotype shall be in JE, which cannot be, since the herbarium Bridel is in B, isotype BM

The name of *Braunia alopecura* is only slightly younger than that of *B. secunda*. Due to the longer history of bryological exploration in Europe, the names of European species are usually older than those from overseas. Superficially both species have been described in the same year (in 1818). According to Margadant (1968) volume 4 of the *Muscologia Recentiorum Supplements* was published either on Dec. 31, 1818 or in January 1819. Therefore the publication date is sometimes indicated with "1818 [1819]". The date of publication of Hookers *Musci Exotici* (the fascicle with p. 46) is May 30 oder June 1, thus definitely several months earlier than Bridels *Muscologia*.

Dalton et al. (2013) distinguish *Braunia alopecura* from *B. secunda* by plane (vs. recurved) leaf margins, lamina cells with numerous conspicuous papillae (vs. few inconspicuous), shorter capsule and shorter seta. However, I cannot see any vegetative differences between both species in Italian and Mexican material (cf. figs. 1-4). The revolute leaf margin is relativized by the description of *B. secunda* in Sharp et al. (1994): "Margins only revolute near the base or sometimes in the lower ½ or nearly to the apex." The papillae are described as numerous and low. The record of *B. secunda* by Dalton et al. (2013) goes back on *B. macrocephala* (Müll.Hal.) A. Jaeger, described from Tamil Nadu in India, of which the type has not seen, which was synonymized by Dixon with *B. secunda*. Beside it is questionable from which specimen the description of *B. secunda* is taken, if material dfrom India has not been seen. In my opinion the description of *B. secunda* with revolute margins and few inconspicuous papillae fits most likely *Hedwigidium imberbe* or perhaps

another species of *Braunia*. *Hedwigidium imberbe* (which was often confused with species of *Braunia*) differs from *Braunia alopecura* by recurved leaf margins, leaves gradually narrowed into the apex and few and low papillose and therefore translucent, not opaque laminal cells. Beside, the authors seemed to have doubts in the inclusion of *B. secunda* in their publication. The abstract lists 5 species of Hedwigiaceae, 2 species of *Braunia* and three species of *Hedwigia*. In the treatment, however, three species of *Braunia* are described, amongst *B. secunda*, which lacks in the abstract.

The name “*secunda*” refers to “branches often curved” (Sharp et al. 1994) or “leaves sometimes homomallous” (Schimper 1836-51), which seems, however, not typical for this species.

Braunia secunda is a frequent species on the New World and widely distributed from Northern Argentina to Arizona and in the Dominican Republic (Sharp et al. 1994), and formerly regarded as neotropical species. Now it is known – in addition – as *B. alopecura* – from Nepal and Bhutan to Eastern China, the Cape Verde Islands and the southern Alps (Frahm 2013b) (fig. 5). It is sometime also reported from “Africa” (which may refer to the Cape Verde Islands). Another record of *B. secunda* from Saudi Arabia was published before as *B. alopecura* (cf. Kürschner & Frey 2011).

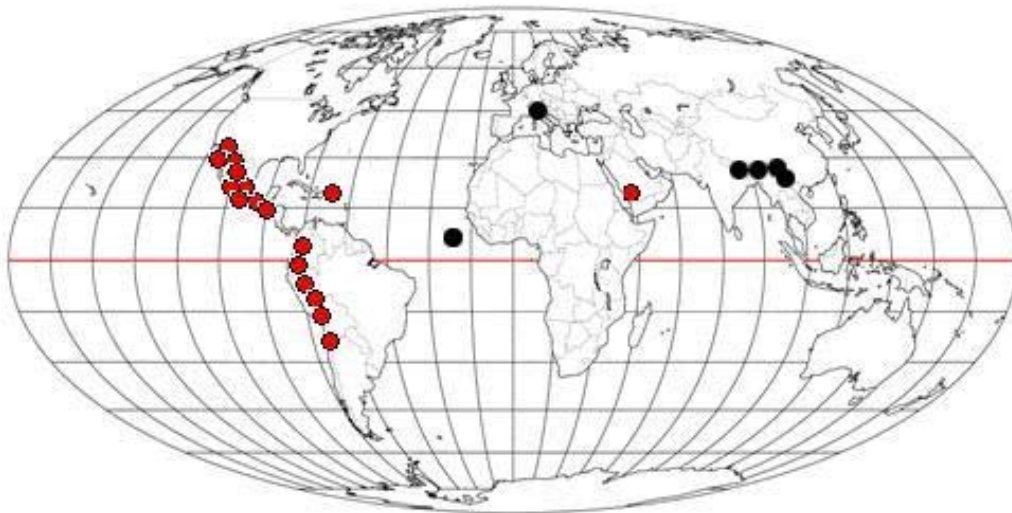
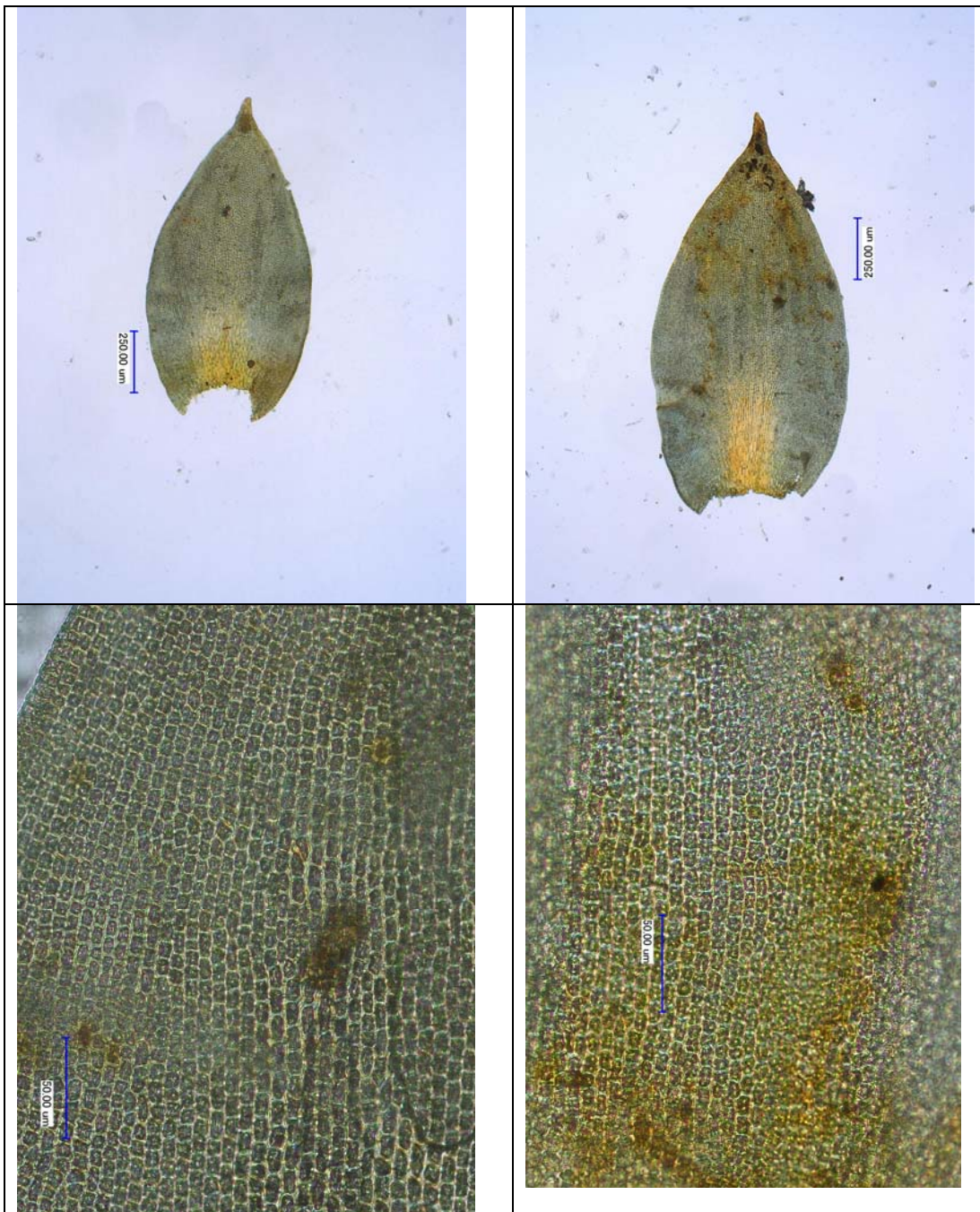


Fig. 5: The range of *Braunia secunda* (after Frahm 2013b, completed with red dots after the results of the present study; a doubtful record from India is omitted).

Thirty New World species of bryophytes have been found in Central Europe (Frahm 2013a), which show a closed range in overseas but are confined to single localities or small regions. A striking parallel is *Anacolia laevisphaera*, which has almost the same range in the Americas but is found in Europe in only a small region in Western Germany (Frahm 2005). This supports the hypothesis that there has been transatlantic long distance dispersal from the New World to Europe.

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Figs. 2-3. *Braunia alopecura*, Italy, Alto Adige, Merano, on partially shaded boulders of Gneiss in the Vellauertal ca. 500 m alt., leg. Frahm 17.9.1976 s.n. (hb. Frahm, BONN)

Figs. 4-5. *Braunia secunda*, Mexico, Chihuahua, Guachoic, S side of pass between Basiguare and Humira, leg. Robert Bye 7.10.1975 MEXU B-91984