

## The taxonomic status of *Bryum arachnoideum* C. Müll. and *B. lanatum* (P. Beauv.) Brid.

Jan-Peter Frahm

Botanisches Institut der Universität, Meckenheimer Allee 170, 53115 Bonn

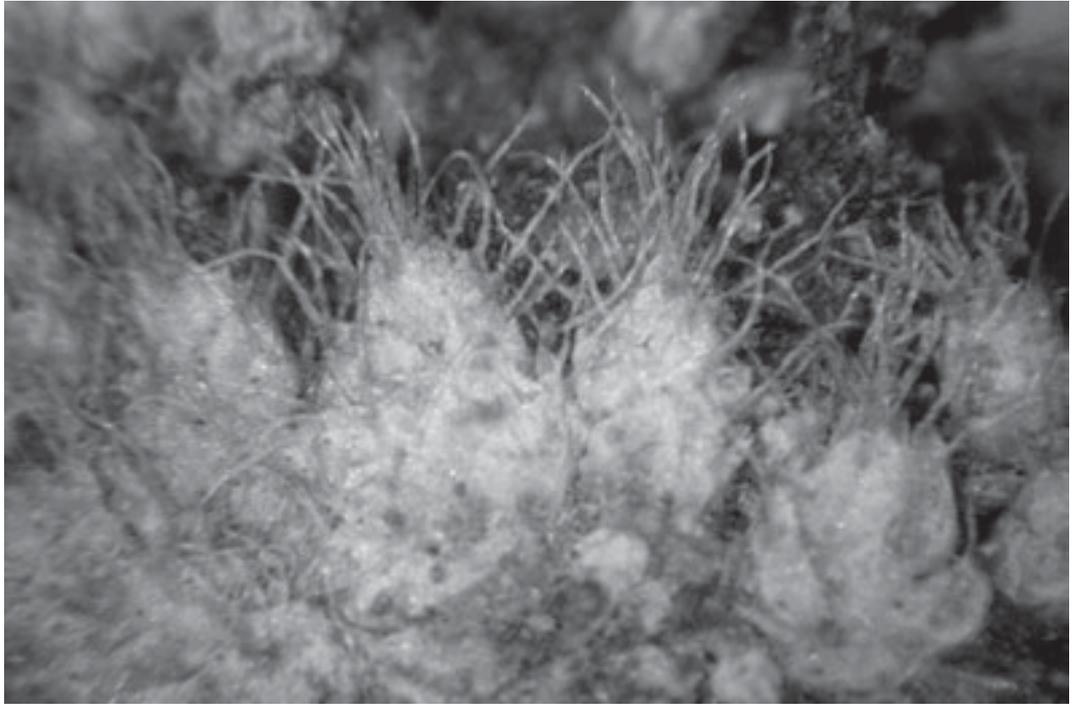
**Abstract:** A study of an isotype of *Bryum arachnoideum* C. Müll., a poorly understood species described from tropical Africa, revealed that this species is distinct from *B. argenteum* Hedw. var. *lanatum* (P. Beauv.) Hampe. The differences between both species are listed. All specimens from tropical Africa named as *B. arachnoideum* by the author must be attributed to *B. argenteum* var. *lanatum*. The differences between *B. argenteum* var. *argenteum* and var. *lanatum*, both morphologically and ecologically, are so important that it is proposed to treat var. *lanatum* on a species level as *B. lanatum* (P. Beauv.) Brid.

The complex of *Bryum*-species with silvery appearance and leaves with hyaline apex (*Argyrobryum* sensu Ochi 1972) is very confusing. It consists mainly of the highly variable cosmopolitan *Bryum argenteum*, which has been described under dozens of different names, but also of a number of other species, which are often only known from their types.

During studies on African mosses, I came across with specimens, which belonged to this complex, which were characterized by small plants with leaves having a longly excurrent costa which was conspicuously recurved. The plants were collected in dry areas (savannas) in Ivory Coast (Frahm & Porembski 1994), Benin (Frahm & Porembski 1998), Malawi (Frahm et al. 1996) and Rwanda (Frahm in Chuah-Petiot 1966) and were named as *B. arachnoideum* based on the key and illustration (there is no description) by Ochi (1972).

Ochi (1972) wrote that the type of *B. arachnoideum* was based on sterile material, but sterile material appears to be so called “*lanatum*” forms of *B. argenteum*, but has a stronger, longer excurrent costa often with denticulate tip. The type of *B. dolioriforme*, however, a synonym of *B. arachnoideum*, has capsules different from *B. argenteum*: the capsule is shorter, with the neck shorter than the urn. So it is almost impossible to identify sterile specimens, however, all the many specimens studied by me were sterile. To clarify this problem, the type of *B. arachnoideum* was studied.

The type of *B. arachnoideum* is from Kenya, Kitui in Ukamba, Hildebrandt s.n.” The holotype is destroyed in B, an isotype exists in H, which is here designated as lectotype. The type specimen was revised to *Brachymenium angolense* Welw. & Duby (?) by H. Ochi in 1969 and four more specimens named *B. arachnoideum* by Brotherus



**Fig. 1:** *Bryum arachnoideum*, part of the lectotype specimen (H-BR).

**Tab. 1:** Differentiation of *Bryum lanatum* and *B. arachnoideum*

	<i>Bryum lanatum</i>	<i>Bryum arachnoideum</i>
Plants	silvery, julaceus but slender	whitish to yellowish-white, julaceus, with broad imbricate foliate stems
Leaves	ovate	almost orbicular
Costa	excurrent, the excurrent part 1/3 of the length of the lamina, hyaline, reflexed.	excurrent, the excurrent part as long as the lamina, yellowish, straight, erect patent, stellate at stem tips

**Tab. 2:** Differentiation of *B. argenteum* and *B. lanatum*

	<i>Bryum argenteum</i>	<i>Bryum lanatum</i>
Plants	robust, usually in dense patches	small, slender, usually in very loose tufts
Costa	not reaching the apex	excurrent in a hyaline point which is reflexed when dry
Habitat	mostly man-made, recently with stronger nitrogen emissions also epiphytic and on rocks	dry grasslands, earth-covered rocks and savannahs



**Fig. 2:** Aspect of *Bryum lanatum* (Ivory Coast, Porembski 19, BONN)

were revised by him to *B. argenteum* or *Brachymenium angolense*. Nevertheless Ochi treated *B. arachnoideum* as a good species in his survey of the African Bryoideae (Ochi 1972), however, did not cite three of the five specimens, neither under *Bryum arachnoideum*, *B. argenteum* or *Brachymenium angolense*.

The study of the type of *B. arachnoideum* (fig. 1) reveals several differences between this species and *B. argenteum* var. *lanatum* (fig. 2), which were not evident from the key and the illustration in Ochi (1972) and which are comprised in tab. 1.

The study of the type reveals also, that all specimens named as *B. arachnoideum* by Frahm (1993, 2000), Frahm & Porembski (1994, 1998), Frahm et al. (1996) and Frahm in Chuah-Petiot (1966) belong to *Bryum argenteum* var. *lanatum*. The latter is not treated by Ochi (1972), but according to our experience widespread in

savannah regions. Species names such as *Bryum penicillatum* Hampe, *Bryum squarripilum* C. Müll. etc., which refer to the character of recurved or stellate hairpoints listed by Ochi (1972) as synonymous with *B. argenteum* suggests that they consist of *B. argenteum* var. *lanatum*. *Bryum lanatum* was already described by Palisot de Beauvais in 1805 (as *Mnium*), later transferred to *Bryum* by Bridel in 1817 but later reduced to the rank of a variety of *Bryum argenteum* by Hampe in 1839. Therefore this epithet seems to be the oldest.

*Bryum argenteum* var. *lanatum* is almost cosmopolitan. It occurs in Europe, where it is highly characteristic for exposed habitats such as dry calcareous grassland, dry slopes, vineyards, earth covered rocks and walls, always in warm regions. It is found in the Mediterranean and also the warmer parts of Central Europe (regions with viticulture). Thus the ecology is very different from that of *B. argenteum* s.str.,

which is characteristic for man-made habitats, rare elsewhere (e.g. below bird cliffs). Nevertheless both can grow in mixed tufts (Smith 1978, Frahm 1998). Such mixed tufts were observed in the Rhine- and Mosel area on earth covered cliffs from schist beside vineyards, where the nitrogen favours the occurrence of *B. argenteum* s.str. This shows that the var. *lanatum* is a distinct genotype.

Compared with many of the species described and recognized recently, the differences of *Bryum argenteum* var. *argenteum* and var. *lanatum* (tab. 2) are so important in quality and quantity, that the latter should be distinguished on a species level as *Bryum lanatum* (P. Beauv.) Brid.

This distinction of *Bryum argenteum* and *Bryum lanatum* includes also informations on the different ecology of both taxa. The enumeration of the separate taxa gives a vivid impression of the different habitats. It should be considered that species should not only be differentiated by a different morphology or anatomy (purely taxonomic species concept) but also by different ecological requirements and possibly also a different range. Some of the newly differentiated species do not fulfil this requirement. An example for species pair with morphological and ecological differentiation, which makes sense, is *Racomitrium canescens* (on base-rich rocks) and *R. elongatum* (on siliceous rocks). Another example is *Hypnum lacunosum*, a name which implicates (in Europe) – except for morphological and anatomical differences the habitat information chalk grassland. If this species would be treated as synonym of *H. cupressiforme* (as Touw & Rubers 1989 do), this information is lost and it is not even expressed whether this moss grows in soil, bark or rock.

### Acknowledgements

I wish to thank the curator of the bryophyte herbarium of the Botanical Museum Helsinki for the loan of specimens from the Brotherus-herbarium.

### References

- Chuah-Petiot, M.S. 1996.** Taxonomic Results of the BRYOTROP-Expedition to Zaire and Rwanda. 32. Bryaceae. Tropical Bryology 12: 59-62.
- Frahm, J.-P. 1998.** *Bryum argenteum* var. *lanatum*, eine verkannte Sippe. Bryologische Rundbriefe 30: 19-19.
- Frahm, J.-P. 2000.** Bryophytes. S 91-102 In: Barthlott, W. & Porembski, S., Inselbergs. Ecological Studies 146, Springer Verlag.
- Frahm, J.-P. & Porembski, S. 1994.** Moose von Inselbergen aus Westafrika. Tropical Bryology 9: 59-68.
- Frahm, J.-P., Porembski, S. 1998.** Laubmoose von Inselbergen in Benin. Tropical Bryology 14: 3-10.
- Frahm, J.-P., Porembski, S., Seine, R., Barthlott, W. 1996.** Moose von Inselbergen aus Elfenbeinküste und Zimbabwe. Nova Hedwigia. 62: 177-189.
- Ochi, H. 1972.** A Revision of African Bryoideae, Musci (First Part). Journal of the Faculty of Education, Tottori University, Natural Science 23(1): 1-126.
- Smith, A.J.E. 1978.** The Moss Flora of Britain and Ireland. Cambridge.
- Touw, A., Rubers, W.V. 1989.** De Nederlandse Bladmossen. Utrecht.

