

## Studies on *Barbula flavicans* D.G. Long and related taxa

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**Abstract.** *Barbula flavicans* D.G. Long replaces *Barbula consanguinea* (Thwaites & Mitt.) A. Jaeger sensu Eddy. This is a variable species. The types of several mainly Asian taxa were studied. Fifteen taxa are proposed as new synonyms of *Barbula flavicans*. *Barbula* (?) *anceps* Cardot is *Barbula arcuata* Griff.

In Eddy (1990), Saito (1975, as *Barbula subcomosa* Broth.) and Sollman (2000), it is stated that *Barbula consanguinea* is a variable species. Seen in this context, the author has studied the types, especially, and if possible, additional non-type materials of several Asian taxa belonging to the section *Hydrogonium* (Müll. Hal.) K. Saito of the genus *Barbula* Hedw. To clarify the taxonomic confusion.

***Barbula flavicans* D.G. Long**, J. of Bryology 18: 356. 1994.

Type: 'Nepal, Wallich (BM!)'

Syn.: *Tortula flavescens* Hook. & Grev., Edinb. J. Sc. 1: 297. 1824. *hom. illeg. nec Tortula flavescens* (With.) P. Beauv. 1805, *non Tortula flavescens* Brid. 1806; - *Barbula flavescens* (Hook. & Grev.) Brid., Bryol. Univ. 1: 831. 1826. *hom. illeg. non* Roehling 1813; - *Tortula fuscescens* Hook. & Grev. in Wallich, Num. List Herb. E. Ind. Comp. no. 7567, 1832, *nom. nud.* (orthographical error for *T. flavescens* Hook. & Grev.); - *Barbula fuscescens*

Müll. Hal. Syn. Musc. 1: 831, 1849, *nom. inval.* (Art. 34.1).

Notes.

1. For relevant literature, see especially Long (1994: 356-357) and also Townsend (1993: 672).

2. All the *Barbula* (*Tortula*) *flavescens* and *Barbula* (*Tortula*) *fuscescens* collections at Herb. BM that I studied - in total 13 numbers - including material from the Herb. Hooker are identical. They all bear axillary gemmae. All these collections are referred here to *Barbula flavicans* D.G. Long.

### New Synonyms of *Barbula flavicans* D.G. Long

The following names are proposed as new synonyms of *Barbula flavicans* D.G. Long. They are listed in chronological order of the publications.

***Barbula tenuirostris* Brid.**, Bryol. Univ. 1 (suppl.): 826. 1826 (1827). *syn. nov.*

Type: Nepal, *Wallich*, fruiting, Hb. Hooker (BM!). Homotypic syn.: *Tortula angustifolia* Hook. & Grev., Edinb. J. Sc. 1: 298. 1824; *Barbula angustifolia* (Hook. & Grev.) Müll. Hal., Syn. 1: 603. 1849, *hom. illeg. non* Brid.

Notes.

1. *Barbula tenuirostris* Brid. and *Tortula angustifolia* Hook. & Grev. are based on the same (type) material.

2. In Hooker's herbarium there is a reference to *Barbula tenuirostris* Brid. written in between brackets on the type sheet.

3. Wilson annotated the above collection „closely allied to *T. (Tortula) flavescens* (capsule not seen)“. This taxon is here treated as *Barbula flavicans* D.G. Long.

4. All collections from Herb. BM named *Barbula (Tortula) angustifolia* that I studied are identical. Axillary gemmae are constantly present. All these materials are here referred to *Barbula flavicans* D.G. Long.

5. There is no original material of *Barbula tenuirostris* Brid. present at Hb. B-Bridel, according to H. Sipman at Hb. Berlin (pers. comm., dated 29 Jan. 1997).

***Barbula sordida* Besch.**, Bull. Soc. Bot. France 41: 80. 1894. *syn. nov.*

Type: (Vietnam), Annam, Prov. de Hanoi, Vo-xa, mont. Chua Hac, fruiting, with gemmae, 25 Jan. 1888, *H. Bon 3615*, Hb. Bescherelle (PC, holo!). Syn.: *Hydrogonium sordidum* (Besch.) P. C. Chen, Hedwigia 80: 239. 1941.

Notes.

1. According to Chen (1941: 239) this taxon is very near *Barbula consanguinea* (Thwaites & Mitt.) A. Jaeger (sensu Eddy).

2. *Barbula sordida* is here treated also as a synonym of *Barbula flavicans* D.G. Long.

***Barbula scleromitra* Besch.**, Bull. Soc. Bot. France: 81. 1894. *syn. nov.*

Type: Vietnam (Nord), Prov. de la Ha Noi, Kien Khê, fruiting, with gemmae, 14 Sept. 1887, R.P. 3515, *H. Bon*, det. Bescherelle (PC, lecto!, selected here).

Notes.

1. The protologue mentions two collections without indicating a holotype.

2. In the above material, very interesting capsule shape variation is present, varying from about cylindrical to more of less cupiform.

3. The above collection is here treated as *Barbula flavicans*.

***Barbula majuscula* Müll. Hal.**, Nuov. Giorn. bot. Ital. n. ser. 5: 182. 1898. *syn. nov.*

Type: China interior, Prov. Schen-si-mer, prope Shan-gen-ze, in alveo fluminis Lao-y-huo, non fruiting, with gemmae, 15 Mar 1897, *J. Giraldi*, det. Müll. Hal. no. 1825, Bryotheca E. Levier (BM, iso!).

Syn.: *Hydrogonium majusculum* (Müll. Hal.) P. C. Chen, Hedwigia 80: 242, 1941.

***Barbula subcomosa* Broth.**, Hedwigia 38: 211. 1899. *syn. nov.*

Type: Japan, Kiushiu, Kanagawa, ad rupes, fruiting, with gemmae, 7 Oct. 1860, *Wichura 1400* (BM, iso!).

Syn.: *Hydrogonium subcomosum* (Broth.) P.C. Chen, Hedwigia 80: 236. 1941.

Notes.

1. The holotype in Hb. H-BR. was not available for study.

2. Although Chen (l.c., p. 237) gives *Wichura 1400-a* as type, the protologue states only *Wichura 1400*.

3. *Wichura 1400-a* at Hb. S-G.Roth was studied. This collection also belongs here.

4. *Wichura 1400-b* (Hb. H-BR.) was also examined. This material is also a *Barbula flavicans* D.G. Long.

4. Some capsules in the type material are somewhat asymmetrical.

***Barbula louisiadum* Broth.**, Öfv. Finska Vet. Soc. Förh. 42: 97-98. 1899 (1900).

Type: (Louisiane Arch.), Louisiades, Rossel Island, ad terram, non fruiting, with gemmae, April 1898, *W. Micholitz s.n.*, Hb. Broth. (H no. 027.60.02, holo!).

Syn.: *Hydrogonium louisadum* (Broth.) Schultze-Motel, Willdenowia 7: 55. 1973.

Notes.

1. This collection was annotated by D.H. Norris (May 1986) as *Barbula subcomosa* Broth. See also Norris & Koponen (1989: 119).

2. Eddy (1990: 178) placed this taxon into the synonymy of *Barbula consanguinea* (sensu Eddy). I agree with this conclusion. This taxon is here treated as a new synonym of *Barbula flavicans* D.G. Long.

***Barbula obtusissima* Broth. & Paris**, Oefv. Finsk. Vet. Soc. Foerh. 48: 11. 1906, *hom. illeg. et syn. nov.*

Type: Nova Caledonia, ad amnem Dumbea, ad terram, non fruiting, with gemmae, 10. 1904, leg. *Le Rat* (25) (Hb. H-BR no. 12.92.003, holo!).

Syn.: *Didymodon obtusissimus* Broth., Nat. Pfl. ed. 2, 11: 528. 1925, *hom. illeg.*

***Barbula yunnanensis* Copp.**, Bull. Séanc. Soc. Sci. Nancy 3, 12(4): 15. 1911, *syn. nov.*

Type: (China), Yunnan, fruiting, with gemmae, 1910, leg. *R.P. Maire s.n.*, comm. G. Bonati, Hb. A. Coppey, stamped: Hb. J. Cardot (PC, iso!).

Notes.

1. The collection at PC bears the text, sp. nov.  
2. I consider the collection above as the isotype material. No fruiting plants were present. According to the protologue, at least some fruiting plants should be present. Furthermore, the material agrees well with the type literature.  
3. This collection represents clearly a common form of *Barbula flavicans*.

***Barbula lobayetensis* R.S. Williams**, Bull. Torrey Bot. Club 42: 573. 1915. *syn. nov.*

Type: Philippines, Luzon, Tayabas Prov., Lobayet, on earth, fruiting, with gemmae, May 1909, *J.B. Leiberger 1258* (NY, holo!).

Notes.

1. The citation of the type collection in Norris & Koponen (1989: 119) is not quite correct.

These authors placed this taxon into synonymy of *Barbula subcomosa* Broth. I agree with them. The correct name is here treated as *Barbula flavicans*.

2. The type material (above) contains a note - likely in the handwriting of R.S. Williams - 'near *B. (Barbula) consanguinea*, but leaves more pointed'.

***Barbula dharwarensis* Dixon** („*dharvarensis*“), J. Indian Bot. 2: 182-183. 1921. *syn. nov.*

Type: (India), Nigadi, 7 miles W. of Dharwa (W. Ghats), non fruiting, with gemmae, earth bank in compound of resthouse, 1919, *L.J. Sedgwick*, Hb. Dixon, ref. no. 5703 (BM, holo!).

Notes.

1. The plants in the type packet are in a bad condition.  
2. A few non type collections bearing similar name were studied; they proved to belong to other taxa, e.g. *Barbula javanica* Dozy & Molke and *Trichostomum* sp.

***Trichostomum birmense* Broth. in Brühl**, Rec. Bot. Surv. India 13 (1): 128. 1931. *nom. nud.*

Material studied: (Burma), Birmania sup., Maymyo, Wetvin Hill, (near Mandalay), on rock, with gemmae, 2775 ft, 13 Dec. 1923, *R. Sarup s.n.*, det. Brotherus, no. 5667 (BM!).

Note.

1. This collection is here referred also to *Barbula flavicans* D.G. Long.

***Barbula subdenticulata* Dixon**, J. Siam Soc. Nat. Hist. Suppl. 9 (1): 17-18. 1932. *syn. nov.*

Type: (Thailand), Siam, Udawn, Loi Wang, Supung, on rocks in deciduous forest, by stream, fruiting, with gemmae, alt. c. 300 m., Mar. 1924, A.F.G. Kerr (78), hb. Dixon, BM!

Notes.

1. The type material is here considered as *Barbula flavicans* D.G. Long.

***Barbula obscuriretis* Dixon**, J. Siam Soc. Nat. Hist. Suppl. 9: 18. 1932.

Type: (Thailand), Siam, Payap, Doi Sutep, old plaster wall, fruiting, c. 600 m., 13 Nov 1922, *A.F.G. Kerr* (34), Hb. Dixon (BM).

Notes.

1. This taxon was placed in synonymy of *Barbula consanguinea* by Eddy (1990: 178). I agree with this. I have studied only the non-type materials named *Barbula obscuriretis*.

***Hydrogonium hygrophilum* Hilp.**, Beih. Bot. Centralbl. 50 (2): 629-630. 1933. *syn. nov.*

Type: (Sri Lanka), Ceylon, Perandeniya, im bot. Garten an Wasserrinnen, non fruiting, with gemmae, 800 m., 8 Feb. 1898, *M. Fleischer* [Musci Frond. Archipelagi Indici et Polynesiaci: Serie X (no. 451-500), 1908, no. 461] (L, iso!).

Syn.: *Barbula hygrophilum* (*hygrophila*) M. Fleisch. in Hilp., Beih. Bot. Centralbl. 50 (2): 632. 1933. *nom. nud.*

***Trichostomum philippinense* Iwatsuki & Tan**, Kalikasan, Philipp. J. Biol. 8 (2): 195. 1979. *syn. nov.*

Type: Philippines, Luzon, Ilocos Sur Prov., Tirad Pass, Mt. Tirad, Sitio Sisim, Barrio Mabatano, Conception, through secondary forest, on rock, non fruiting, with gemmae, s. alt, 7 May 1953, *J.V. Santos 5701*, det. E.B. Batram (FH, holo!).

Homotypic syn.: *Trichostomum brevifolium* Bartr., Philipp. J. Sci. 87: 277-278. 1959, *hom. illeg.*; *Trichostomum bartramii* Iwatsuki & Tan, Misc. Bryol. Lichénol. 7: 7. 1977, *hom. illeg.*

Notes.

1. There is an annotation made by B.C. Tan in 1984, -, „This is better placed in *Barbula* close to *B. obscuriretis* Dix.“. I agree with him.

#### Taxa not available for study -

***Semibarbula ranuii* Gangulee**, Nova Hedwigia 8: 148. 1964.

Type: India, Ranchi Distr., prope cataractus, near Hudru Falls, in regione Chotanagpur, Presidency College, fruiting, Oct. 1956, *Gangulee 2400* (CAL, holo).

Notes.

1. The type collection in Hb. CAL was not available for study. Apparently no duplicates of this taxon were distributed.

2. Compare also the short text in Gangulee (1972: 721) below: Distribution.

3. Judging from the protologue (including plates), this taxon is very likely identical with *Barbula flavicans* D.G. Long.

#### Other related taxa -

##### ***Barbula seramensis* H. Akiyama**

Recently, Akiyama (1996) described, illustrated and discussed a new species, *Barbula seramensis* H. Akiyama, which is related to the rather variable *Barbula flavicans* D.G. Long.

Seen in this context, I have checked the types of taxa cited above and none of these match the new species of Akiyama. I conclude that *Barbula seramensis* is a rather clear cut taxon next to *Barbula flavicans*.

While working with unnamed or partially named Pottiales material made on loan from the herbarium at New York Botanical Garden, I came across three collections which were identified by me in October of 2003 as belonging to *Barbula seramensis*. These collections fit well the text, figure and key characters presented in Akiyama (1996). No axillary gemmae were found in these materials. They are not mentioned either in the original publication of *Barbula seramensis* (Akiyama, 1996).

The data for these new materials of *Barbula seramensis* are as follows:

(1) Indonesia, Java, Buitenzorg, fruiting, s. date, *Kurz 919.916*, mixed with *Hyophila involuta* and *Bryum* (Hb. NY);

(2) Indonesia, Java Occid., Prov. Preanger, Tjipeum, Bandung, Halioven waterfall, fruiting, c. 500 m., *Sm. Harsar sn.*, 27 Feb. 1913 (Hb NY);

(3) Indonesia, Java, Pasangrahan, Kamodjan, c. 200 m., fruiting, *M. Fleischer (54)*, 6 June 1913, with *Weissia*, *Philonotis* and others (Hb NY).

##### ***Barbula sumatrana* Baumgartner & Dixon**

This taxon seems to be known only from the type

**Table 1. Gametophytic character differences between *Barbula flavicans*, *Barbula seramensis* and *Barbula sumatrana*.**

<i>B. flavicans</i>	<i>B. seramensis</i>	<i>B. sumatrana</i>
upper part of the lamina commonly rather <i>flat</i> to weakly, widely incurvate	upper part of the lamina commonly rather <i>hollow</i> , to about tubulose (in some leaves)	upper part of the <i>hollow</i>
leaf margins <i>plane</i> in upper part from above of the leaves the leaf	leaf margins often <i>involute</i> in upper part of the leaves	leaf margins <i>recurved</i> base to 3/4 or 4/5 of length
axillary gemmae constantly <i>present</i> , known although sometimes scarce	axillary gemmae not known	axillary gemmae not
when moist, leaf apex region often <i>straight</i> or nearly so	when moist, leaf apex often <i>curved</i> to <i>hooked</i> (hamate)	when moist, leaf apex <i>somewhat curved</i>
when moist, many leaves circa <i>plane</i> leaves <i>keeled</i>	when moist, many leaves <i>keeled</i>	when moist, many

locality. For this paper, the type material of *Barbula sumatrana* Baumgartner and Dixon was also studied. The data for the type collection are as follows: (Indonesia), Sumatra, prope Padang, fontes calcarei, ad lacum media Singkarak, non fruiting, c. 400 m., 6 March 1929, coll. C.F. Rutner 44, comm. J. Baumgartner (Hb. Dixon, BM!).

Furthermore, I came across in the loan material from Hb NY a Griffith's collection which was badly labelled: „Tortuloides ubiquo on banks“, s. date, Griffith no. 125. 147 (in Hb W. Mitten, NY). This material was compared with the type of *Barbula sumatrana* (see above). They match well. Mixed in this collection are several plants of *Barbula arcuata* Griff. in fruiting and with gemmae. Very likely the plants of this collection come from the Indian Himalayas, near Simla. The nearest Griffith number I found is no. 129, which was collected near Simla (India). As such, *Barbula sumatrana* looks to be more widespread than was thought.

I strongly oppose the suggestion of Eddy (1990,

p. 176, below) that the cell ornamentation in *Barbula sumatrana* should approach that of *Barbula pseudoehrenbergii* Fleisch. and its most related taxa. *Barbula flavicans*, *Barbula seramensis* and *Barbula sumatrana* are obviously (closely) related. They share especially the rather dense, pluripapillose lamina cells, which obscure the cell lumen. To see the differences in the cell wall ornamentation, one needs to examine the lamina papillae, if possible, in the growing shoots. The differences of the three taxa is shown in Table 1.

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**Additional note -**

***Barbula (?) anceps* Cardot**, Beih. Bot. Central bl. 19 (2): 102. 1905, syn. nov.

Type: Formosa, Kushaku, non fruiting, leg. Faurie no. 130, 6 June 1903 (Hb. J. Cardot, PC, holo!).

Syn. *Hydrogonium anceps* (Cardot) Herzog & Nog., J. Hattori Bot. Lab. 14: 60. 1955.

This collection fits *Barbula arcuata* Griff. rather easily, as described, illustrated and discussed especially by Saito (1975). The lamina cells in the type material are smooth to slightly mammillate, with 1 of 2 tiny, low conical papillae on a cell, but not obscuring the lumen. The leaf shape is often triangular, tapering from a broader, cordate/hastate base, to a small, acuminate apex. The leaf margins are commonly recurved, from above base to near apex. The leaf apex is often slightly denticulate. In some leaves the apex is somewhat small and blunt. I found no gemmae in this collection. A few rhizoidal tubers are, however, present, as described and illustrated by Whitehouse (1976) for *Barbula arcuata*.

**Saito, K. 1975.** A monograph of Japanese Pottiaceae (Musci). Journal of the Hattori Botanical Laboratory 39: 373-537.

**Sollman, P. 2000.** Studies on *Barbula consanguinea* (Thwaites & Mitt.) A. Jaeger sensu Eddy, a pan-tropical species. Tropical Bryology 19: 17-23.

**Townsend, C.C. 1993.** New records and a bibliography of the mosses of Pakistan. Journal of Bryology 17: 671-678.

**Whitehouse, H.L.K. 1976.** Does *Ceratodon purpureus* (Hedw.) Brid. have tubers? Journal of Bryology 9: 177-184.

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