

## TAXONOMIC AND PHYTOGEOGRAPHICAL NOTES ON SOME POTTIACEOUS MOSSES FROM CHINA AND INDIA

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**Abstract.** Five species of the Pottiaceae are recorded for the first time from China, namely *Anoetangium sikkimense* M. N. Aziz & Vohra, *Bryoerythrophyllum noguchianum* (Gangulee) K. Saito, *Didymodon hastatus* (Mitt.) R. H. Zander, *D. stewartii* (E. B. Bartram) R. H. Zander and *Syntrichia ruraliformis* (Besch.) Cardot. *Hydrogonium dixonianum* (P. C. Chen) Redf. & B. C. Tan from Sichuan and *Merceopsis spathulata* Dixon & P. de la Varde from SW India are briefly taxonomically assessed and these names are reduced to synonymy with *Barbula aquatica* Cardot & Thér. and *B. javanica* Dozy & Molk., respectively.

**Key words:** Bryophyta, phytogeography, China, India, Pottiaceae, taxonomy, new synonyms, first records for China

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### INTRODUCTION

Over the last years the author identified the pottiaceous material of the large collections made by Sabine and Georg Miehe (Marburg, Germany) and David G. Long and his co-workers (Edinburgh, United Kingdom) in the Himalayas. A substantial part of this material was collected on the Chinese side of the Himalayas.

I found it worthwhile to publish the results, especially regarding the species that were newly collected for the country, using the recent checklist (Redfearn *et al.* 1996) as a baseline. The taxa present in this checklist and in the publication of Li *et al.* (2001) do not coincide for some reason.

The authors citations in botanical names follow Brummitt and Powell (1992).

All the identified material is preserved in the herbaria in Leiden (L) and/or Edinburgh (E).

The taxa below are given in alphabetical order of the genus.

### LIST OF SPECIES

#### 1. *Anoetangium sikkimense* M. N. Aziz & Vohra

This species was recently described and illustrated from India by Aziz and Vohra (1988) and subsequently it was redescribed and re-illustrated

in their recent monograph of the Pottiaceae in this country (Aziz & Vohra 2008). This is an infrequent, widely distributed but scattered species, endemic to the Sino-Himalayan region, including NW India, Kashmir, Sikkim and Nepal and here it is reported for the first time from China. In total I saw 23 collections from the Himalayas. It is worth noting that in the Brotherus herbarium (H) I saw several collections from the Himalayas misnamed as *Anoetangium thomsonii* Mitt. which actually represent this species.

SPECIMENS EXAMINED. CHINA, YUNNAN PROVINCE, Diqing Pref., Sang Shang Ya, E of Xiaozhongdian, valley with dense *Abies* forest, on rock, 27°42'N, 99°48'E, alt. 3875 m, not fruiting, 16 June 1993, *D.G. Long 24.453-B* (E, L), det. Ph. Sollman, 2008; Site 06–22, Gongshau County, Bingzhongluo Xiang, E. slope of Gaoligong Shau, Nu Jiang (Salween) catchment, valley on SW slope of Gawagapu Mountain, rocky alpine valley with rocky slopes and cliffs above snow patch, in large cushions on cliff, 27°59'16.8"N, 98°28'27.4"E, alt. ca 3940 m, not fruiting, 20 Aug. 2006, *D.G. Long 35.917* (E, L), det. Ph. Sollman, 2008.

#### 2. *Bryoerythrophyllum noguchianum* (Gangulee) K. Saito

This species was originally described by Gangulee (1972) as *Bryoerythrophyllum yunnanense*

(Herzog) P. C. Chen var. *noguchianum* Gangulee and subsequently this variety was raised to species by Saito (1975) as *B. noguchianum*. Aziz and Vohra (2008: 234) reduced *B. noguchianum* to synonymy with *B. wallichii* (Mitt.) P. C. Chen. In my opinion this taxonomic conclusion is incorrect.

Saito (1975: 254) raised this taxon at species level. He mentions only that *B. noguchianum* seems somewhat similar to *B. wallichii*. There are good differences between the two taxa in general size, leaf shape, marginal dentation and bordering the leaves, the form of the apex.

About 23 collections were identified from China. Fruiting plants were very rarely seen. This is a Himalayan endemic. The plant grows often mixed in with other material. I have not seen problematic collections between *B. wallichii* and *B. noguchianum*.

SELECTED SPECIMENS EXAMINED. CHINA. YUNNAN PROVINCE, Diqing Pref., between Geza and Xia Geza, steep wooded riverbank, on dead branch on riverbank, 28°05'48"N, 99°45'55"E, alt. 3100 m, fruiting, 31 May 1993, *D.G. Long 23.903* (E, L), det. Ph. Sollman, 2002. XIZANG PROVINCE, SE Tibet, Tsangpo Vy., Nangxian-Mai, Vy., 10 km W of Gyemdong High Camp 13', 28°56'N, 93°14'E, undisturbed *Betula-Abies* forest on N-facing steep boulder slope, on wood, alt. 3750 m, fruiting, 5 Aug. 1994, *G. Miehe & U. Wündisch 94-149-39* (L), det. Ph. Sollman, 2004. QINGHAI PROVINCE, Huzhu County: Jiading Xiang, near Langshidang village, Langshidanggou valley, *Betula* woodland on valley slope, on log, 36°55'23"N, 102°22'44"E, alt. ca 2680 m, fruiting, 23 July 1997, *D.G. Long 27.194* (E, L), det. Ph. Sollman, 2002.

### 3. *Didymodon hastatus* (Mitt.) R. H. Zander

So far, *Didymodon hastatus* was considered to be endemic to northern India where it is widely scattered in the Himalayan region including Kashmir, Himachal Pradesh, Uttarakhand and Sikkim (Aziz & Vohra 2008). The species was described by Gangulee (1972) but it seems that this author included also some elements of a *Bryoerythrophyllum* species in his description. It is confirmed by the specimens misnamed by this author which I saw in the herbarium at New York (NY). However, the illustration presented by Gangulee (1972: 697) looks correct. This tiny

moss seems to have been generally overlooked and during the course of examination of the collections from China, I detected about 80 specimens of *Didymodon hastatus*. The species is here reported for the first time from China and it seems to be endemic to the Sino-Himalayan region.

SELECTED SPECIMENS EXAMINED. CHINA, XIZANG PROVINCE, SE Tibet, Yamco Yumco, above Dzamtschü, open W-facing slope between *Juniper* trees: forb-rich *Artemisia* dwarf-scrub-ground mosses, veg. record no. 95 – 16, not fruiting, 28°58'N, 90°27'E, alt. 4450 m, 9 Dec. 1995, *G. & S. Miehe 95-52-36-B* (L), det. Ph. Sollman, 2009. QINGHAI PROVINCE, Kunlun Shan, Northern declivity, Kun, 20°W, loess and scree, grass dominated high alpine community, alt. 4650 m, veg. rec. no. 9391, not fruiting, 35°4'N, 94°3'E, 2 Aug. 1993, *G. & S. Miehe 9391/14: 2-1* (L), det. Ph. Sollman, 2009. XINJIANG PROVINCE, S of Taxkorgan, W of Karakorum Highway, open cushion and rosette plant formations, in the free gelifluction belt or on solifluction lobes in the alpine belt: highest mat fragments on snow bench, alt. 4640 m, veg. rec. no.: 583 – 585, not fruiting, 37°03'N, 75°27'E, 05 Aug. 1991, *G. & S. Miehe no. 5855* (L), det. Ph. Sollman, 2009; Kunlun-Aksai Chin, Kunlun: upper Tiznap valley SE of Kudi, open subalpine *Krschenimmikovia* dwarf-scrub and alpine cushion plant communities and steppe, alt. 3700–4410 m, veg. rec. no. 92–7717.1, not fruiting, 36°35'–39'N, 77°06'–11'E, 16– 20 June & 10 July 1992, *G. & S. Miehe (7512.5)* (L 047.49.81), det. Ph. Sollman, 2009.

### 4. *Didymodon stewartii* (E. B. Bartram) R. H. Zander

This species was described by Bartram (1955) from the northwest Himalayas in India as *Barbula stewartii* E. B. Bartram and it was subsequently transferred to *Didymodon* Hedw. (Zander 1993). Aziz & Vohra (2008) considered it to be conspecific with *D. constrictus* (Mitt.) K. Saito but this taxonomic conclusion cannot be accepted. I briefly discussed the taxonomic status of this species and showed its similarity *Didymodon icmadophilus* (Müll. Hal.) K. Saito and *D. rigidulus* Hedw. (Sollman 2010). *Didymodon stewartii* is widely distributed in the Himalayan region including Bhutan, India and Pakistan (Sollman 2010: 211). It is an altimontane species which commonly occurs in sterile condition. Herein, the species is recorded

for the first time from China. I saw about 40 collections from China.

SELECTED SPECIMENS EXAMINED. CHINA, YUNNAN PROVINCE, Zhongdian (Chungtien) District: hot springs above Nada village, on damp limestone rockface, alt. 3400 m, not fruiting, 27 Sept. 1990, *D.G. Long 18.631* (E, L), det. Ph. Sollman, 2007. XINJIANG PROVINCE, Kunlun-Aksai Chin, Kunlun: upper Tiznap valley SE of Kudi, open subalpine *Krascheninnikovia* dwarf-scrub and alpine cushion plant communities and steppe, alt. 3700–4410 m, veg. rec. no. 92–7710.7 + 8, not fruiting, 36°35'–39°N, 77°06'–11°E, 16–20 June & 10 July 1992, *G. & S. Miehe s.n.* (L 075.55.00), det. Ph. Sollman, 2009. XIZANG PROVINCE, SE Tibet, Upper Kyi Chu basin, S of Damxung, caespitose *Juniperus* scrub on upper S-facing slope, ground mosses, alt. 4660 m, veg. rec. no. 95 – 10, not fruiting, 30°38'N, 91°32'E, 7 Sept. 1995, *G. & S. Miehe 95-35-19-B* (L), det. Ph. Sollman, 2009. QINGHAI PROVINCE, Tibet, Yushu, grassland between *Juniperus tibetica*, alt. 4144 m, not fruiting, 32°17'N, 96°30'E, 29 Aug. 2002, *G. Miehe & (?) Sonam 02-57-36:2* (L), det. Ph. Sollman, 2009.

### 5. *Syntrichia ruraliformis* (Besch.) Cardot

Until recently this species was considered to be very rare in the Himalayan region and was known only from Nepal (Kramer 1980: 120). I reported it for the first time from China on the basis of the collection from the Tian Shan deposited in the Brotherus herbarium in H (Sollman 2005: 87). During the course of examination of the Asian collection of pottiaceous mosses I discovered very many specimens of this species from the Himalayas, including 28 numbers from China. This species has been collected very seldom with fruits.

SELECTED SPECIMENS EXAMINED. CHINA, XINJIANG PROVINCE, West Kunlun: upper Oytay valley, *Juniperus* forest, *Picea schrenkiana* forest (shady slopes), *Artemisia* dwarf-scrub and forb-rich steppe (sunny slopes), alpine *Cyperaceae* mats, alt. 2700–3900 m, not fruiting, veg. record no. 92.9170.1, 38°57'N, 75°11'E, 7 June 1992, *G. & S. Miehe s.n.* (L 075.5570), det. Ph. Sollman, 2009. QINGHAI PROVINCE, between Madoi and Bayanka La, vegetation on W-facing scree, alt. 5000 m, not fruiting, 34°7'N, 97°40'E, 03 Aug. 1998, *G. Miehe & J.Q. Liu 98-347-40:2* (L), det. Ph. Sollman, 2006. XIZANG PROVINCE, SW Tibet, Transhimalaya, NE of Moincer, 35° ENE, alpine steppe in scree, alt.

5250 m, veg. rec. no. 9641, not fruiting, 31°14'N, 80°56'E, 2 Sept. 1993, *G. & S. Miehe 9641/08:2* (L), det. Ph. Sollman, 2006.

### TAXONOMIC NOVELTIES

Detailed examination of the type material of *Barbula aquatica* Cardot & Thér. and *Hydrogonium dixonianum* P. C. Chen revealed that they are inseparable and must be considered conspecific, the former having priority. *Barbula aquatica* was described by Cardot and Thériot (in Thériot 1905) and this a totally neglected name which is missing from *Index Muscorum* (Wijk *et al.* 1959–1969). *Hydrogonium dixonianum* was originally described by H. N. Dixon (in Brotherus 1929) as *Barbula inflexa*. Because this name proved to be a later homonym of *B. inflexa* (Duby) Müll. Hal. and *B. inflexa* (Bruch) Kindb., Chen (1941) proposed the new epithet for it under the generic name *Hydrogonium* (Müll. Hal.) A. Jaeger as *H. dixonianum* P. C. Chen. Redfearn and Tan (1995) transferred this species to *Barbula* as *B. dixoniana* (P. C. Chen) Redf. & B. C. Tan and under this name the species is treated in the *Moss Flora of China* (Li *et al.* 2001).

### *Barbula aquatica* Cardot & Thér.

in Thér., Bull. Acad. Int. Géogr. Bot., Sér. 3, **15**: 40. 1905. TYPE CITATION: China, prov. Kouy-Tseou, chutes d'eau, *P.J. Cavalerie no. 1244*, fruiting, with gemmae, 8.8.1903, hb. J. Cardot. LECTOTYPE (chosen here): PC!

*Barbula inflexa* Dixon in Broth. in Hand.-Mazz., Symb. Sin. Nachtr. Bericht. 1929, *hom. illeg.* ≡ *Hydrogonium dixonianum* P. C. Chen, Hedwigia **80**: 250, *f.* 49.3–6. 1941 ≡ *Barbula dixoniana* (P. C. Chen) Redf. & B. C. Tan, Trop. Bryol. **10**: 66 1995. TYPE CITATION: China, Prov. Setschwan (Sichuan), ... , in mont. Daliangshan, terr. Lolo, ad orientum urbis Ningyüen regione calide ... prope vicum Lemoka, in rupibus ... irrigatis, substr. calceo, alt. ca 1935 m, 23. IV. 1914, *H. v. Handel-Mazzetti no. 1617* [sterile, with gemmae]. LECTOTYPE (chosen here): H-Brotherus!, *syn. nov.*

Dixon and Potier de la Varde (1927) described *Merceyopsis spathulifolia* Dixon & P. de la Varde from a single collection collected by G. Foreau

near Mangalore in the state of Karnataka in SW India. The species was subsequently transferred to *Barbula* (Zander 1993), whereas Aziz & Vohra (2008) accepted it as a member of *Hydrogonium* in their monograph of the Indian Pottiaceae. Examination of the type material of *M. spathulifolia* revealed that it is inseparable from the widespread Asian species *Barbula javanica* Doz. & Molk. Accordingly, the following new synonymy is proposed.

***Barbula javanica* Dozy & Molk.**

Ann. Sc. Nat. Bot. Sér. 3, 2: 300. 1844.

*Merceopsis spathulifolia* Dixon & P. de la Varde, Arch. Bot. 1: 164, pl. 4, f. 5. 1927 ≡ *Barbula spathulifolia* (Dixon & P. de la Varde) R. H. Zander, Bull. Buffalo Soc. Nat. Sci. 32: 151. 1993 ≡ *Hydrogonium spathulifolium* (Dixon & P. de la Varde) M. N. Aziz & Vohra, Pottiaceae India: 231, f. 93. 2008. HOLOTYPE: S.W. India. Kankanady, Mangalore, near sea level, fruiting, Coll. G. Foreau, ref. no. 19, 17 Nov 1925 – BM-Dixon 00096.34.16!, *syn. nov.*

ACKNOWLEDGEMENTS. I would like to thank the curators mentioned in the text for making available the requested material. I thank Georg and Sabine Miehe and David G. Long for sending their collections for identification. Also, I am grateful to the Curators of BM, E, L, NY and PC for kindly allowing me to examine herbarium material, and to Ryszard Ochra for helpful remarks on the manuscript.

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Received 9 January 2012