

Bryophytes of Uganda. 5. *Bryocrumia* L.E.Anderson (Hypnaceae), a monotypic moss genus new to Africa

Brian J. O'Shea¹ and William R. Buck²

¹141 Fawnbrake Avenue, London SE24 0BG, U.K.

²Institute of Systematic Botany, New York Botanical Garden, Bronx, NY 10458-5126, U.S.A.

Abstract. A number of collections from Africa identified as *Phyllodon scutellifolius* or *Glossadelphus serpyllifolius* belong to *Bryocrumia vivicolor*, previously known only from America and Asia. *Phyllodon scutellifolius* is known only from one (possibly two) collections from Madagascar, and *Glossadelphus serpyllifolius* is a synonym of *Bryocrumia vivicolor*.

Amongst recent collections from Uganda (Wigginton *et al.* 1999) were a number of collections of a moss from wet rocks in forest, stones in streams and wet rocks in a waterfall. The moss was identified by M.J. Wigginton as *Glossadelphus serpyllifolius* P.de la Varde, based on the original publication (Potier de la Varde 1955). This moss was described from a 1948 collection of Dr. Olov Hedberg from the Mobuku Valley, quite low on the eastern flanks of the Rwenzori Mountains, Uganda; the description and illustration are succinct but clear and explicit.

In a review of *Glossadelphus*, Tixier (1988) included *G. serpyllifolius* in the synonymy of *G. scutellifolius* Besch. (\equiv *Phyllodon scutellifolius* (Besch.) W.R.Buck), but without giving any reasons, and apparently without examining the type of *G. serpyllifolius*, which is in Potier de la Varde's herbarium in PC, nor the type of *G. scutellifolius*, which is in BM, with an isotype in PC. This has resulted in a number of recent

African collections of Potier de la Varde's plant being identified as *Phyllodon scutellifolius*. Tixier (1988) also included *Glossadelphus vivicolor* (Broth. & Dixon) Broth. in the synonymy of *G. scutellifolius*, but this species is now treated as *Bryocrumia vivicolor* (Broth. & Dixon) W.R.Buck (Buck 1987). The type specimen of *Phyllodon scutellifolius* has been examined, and *Glossadelphus serpyllifolius* is clearly a separate species. The material recently collected in Uganda agrees perfectly with Potier de la Varde's type collection and his published description and illustration of *G. serpyllifolius*, but not at all with *G. scutellifolius*. In addition, the type specimen of the Indian *Glossadelphus vivicolor* (\equiv *Bryocrumia vivicolor*) has also been examined, and this also agrees remarkably well with the Uganda collections.

All three taxa belong in the traditional rather lax concept of *Glossadelphus*. The genus *Bryocrumia* was separated from *Glossadelphus*

	<i>Taxiphyllum</i> M.Fleisch.	<i>Phyllodon</i> Schimp. in Bruch, Schimp. & W.Gümbel	<i>Bryocrumia</i> L.E.Anderson
Leaf shape	Narrowly ovate to lingulate	Elliptic to oblong-ovate, from a contracted base, strongly concave	Elliptic to oblong-ovate, from a contracted base, flat
Leaf apex	Acute (sometimes bluntly)	Truncate	Bluntly obtuse to broadly rounded
Leaf areolation	Cells pointed	Cells blunt to rounded	Cells blunt to rounded
Leaf papillae	Absent, but cells sometimes slightly prorate	Present, obvious, and cells often prorate	Absent, but cells very slightly prorate
Leaf decurrency	Not decurrent	Not decurrent	Slightly decurrent
Alar cells	Sparsely differentiated	Not differentiated	Differentiated with several rows of rectangular cells

Table 1: Characters distinguishing *Taxiphyllum*, *Phyllodon* and *Bryocrumia*

and *Taxiphyllum* by Anderson (1980), and subsequently Buck (1987) separated *Phyllodon*, pointing out that *Glossadelphus* was a synonym of *Phyllodon*, and thus species currently in *Glossadelphus* should either be moved into *Phyllodon*, or transferred elsewhere. The three genera *Taxiphyllum*, *Phyllodon* and *Bryocrumia* 'lack clear definition' (Anderson 1980), but can be distinguished as shown in Table 1.

Contrary to descriptions, all three genera have a discrete short double costa, although this isn't always easy to see, but stands out best in cleared specimens, for instance mounted in Hoyer's solution. The African plant thus falls within the concept of *Bryocrumia*, a genus with only one species.

Bryocrumia was created as a genus by Anderson (1980) because he believed that the taxon named *Glossadelphus andersonii* did not appear to fit well in *Glossadelphus*, and nor was it a good fit for the only alternative, *Taxiphyllum*. Subsequently, Buck (1987) discovered that the Indian *Taxithelium vivicolor* was 'almost identical' to *Bryocrumia andersonii*, and that 'it may indeed prove to be synonymous but from the limited material available it is slightly more robust', and he transferred it to the genus. He also commented that 'an explanation is elusive

for a disjunction between southern India and South Carolina'. Subsequently further specimens have been found in both North and South Carolina as well as China, and the African collections complete the picture, of a taxon that requires high levels of moisture for large parts of the year, growing in or by water. The present distribution suggests a relict presence of a plant much more widely distributed in the past, but still able to grow in some abundance where the conditions remain suitable (see Figure 1). *Bryocrumia vivicolor* was based by Brotherus and Dixon on a collection made by L.J. Sedgwick, and as Dixon was the recipient of Sedgwick's collections, the specimen in BM from Dixon's herbarium should be made the lectotype, and any specimen in H-BR is likely to be an extract from this.

Bryocrumia vivicolor (Broth. & Dixon) W.R.Buck, Mem. New York Bot. Gard. 45: 522. 1987.

Basionym: *Taxithelium vivicolor* Broth. & Dixon in Dixon, Rec. Bot. Surv. India 6(3): 86, f.1:4a-h. 1914; *Glossadelphus vivicolor* (Broth. & Dixon) Broth. in Engl., Nat. Pflanzenfam. ed. 2, 11: 444. 1925.

Type: INDIA: Maharashtra. On stones in the bed of a torrent, Mahabaleshwar, 1220 m, Jan 1909, Sedgwick [23] (BM -lect. nov.,

BM000661471!).

Paratype: INDIA: Tamil Nadu. Shembaganur, 1911, *Foreau* (BM BM000661472 !)

= *Glossadelphus andersonii* E.B.Bartram, Bryologist 54: 81, f.1-6. 1951; *Taxiphyllum andersonii* (E.B.Bartram) H.A.Crum, Bryologist 68: 220. 1965; *Bryocrumia andersonii* (E.B.Bartram) L.E.Anderson, Phytologia 45: 66. 1980; *syn. fide* Anderson, Crum & Buck (1990). Type: U.S.A. South Carolina: Oconee Co., Lower Falls, Whitewater River, about 3 miles NW of Jocassee, moist vertical rock, cool ravine, hemlock-hardwood community, 460 m, 6 Jun 1950, *L.E. Anderson 9237* (FH - holotype; DUKE !, NY - isotypes !).

= *Glossadelphus serpyllifolius* P.de la Varde, Ark. Bot. ser. 2, 3: 193. f.33. 1955.

Type: UGANDA. Rwenzori: Mubuku valley, at a small stream in montane rain forest, 2100 m, 19 Mar 1948, *Hedberg 329c p.p.* (PC !) **syn. nov.**

Habitat: wet rocks in forest, streams, rivers and waterfalls, to 2300 m in Yunnan, 2680 m in Uganda, but more usually 1000-1600 m in the tropics, and 400-500 m in the Carolinas.

Distribution: U.S.A. (North Carolina, South Carolina), Zaire, Uganda, Kenya, India (Maharashtra, Tamil Nadu), Sri Lanka (Nuwara Eliya), China (Yunnan).

Additional description/illustration: Crum & Anderson 1981: 1187 (as *B. andersonii*). N.B.: African specimens are closer to illustrations of Dixon (1914) than those of Crum & Anderson (1981).

Phyllodon scutellifolius (Besch.) W.R.Buck has probably been collected only once, from the island of Nossi Comba, just off the north west coast of Madagascar, as all references to this taxon (Crosby & Schultze-Motel 1983) refer back to the type collection (Bescherelle 1880a: 311; 1880b: 38; Wright 1888: 267; Renault 1898: 243; Renault & Cardot 1915: 474). Appearing to contradict this point of view, though, Tixier (1988) refers to a collection in PC from Sainte-Marie, an island off the east coast of Madagascar,

also collected by Marie. However, as Edouard Auguste Marie was resident as a French colonial civil servant on Nossi Bé (an island adjacent to Nossi Comba), there may have been confusion caused by his name, although there is independent evidence that he did collect on Île Sainte-Marie (Dorr 1997). A duplicate of the collection labelled from Sainte-Marie is at NY in the Mitten Herbarium. However, the only specimen available from PC appears to be the one seen by Renault & Cardot (1915) (who stated that there was one small specimen, and described a plant that sounds the same as the BM specimen), and appears from the label data to be an extract from Bescherelle's original Nossi Comba specimen, even sharing the same associated *Callicostella* (see below). Bescherelle's herbarium is in BM, and the specimen there, which must be regarded as the type, is labelled '*Taxithelium scutellifolium* Besch. Nossi Bé, M. Marie' in Bescherelle's handwriting. Nossi Comba is a small island off the south end of Nossi Bé, and although Bescherelle is precise about the location in the protologue, on other occasions he includes both islands under the name of Nossi Bé (Bescherelle 1880b). In order to further confirm whether or not this plant is the holotype, the other taxon mentioned in the protologue as collected with it, *Hookeria nossiana*, was also investigated. The plant was actually described as *Hookeria lacerans* var. *nossiana* (now *Callicostella fissidentella*) elsewhere in the same paper (Bescherelle 1880a) and there are specimens of that taxon also in BM. Although it was possible to find *Callicostella* in the *Phyllodon* specimen, it was not possible to find *Phyllodon* in the *Callicostella* specimen, so the evidence is inconclusive, but nevertheless the BM specimen must be regarded as the holotype, and the PC specimen as an isotype. This confirms the taxonomic view of Buck (1987), placing *Taxithelium scutellifolium* in *Phyllodon*.

Phyllodon scutellifolius (Besch.) W.R.Buck, Mem. New York Bot. Gard. 45: 521. 1987.

Basionym: *Taxithelium scutellifolium* Besch., Ann. Sci. Nat. Bot. sér. 6, 10: 311; *Glossadelphus scutellifolius* (Besch.) M.Fleisch., Musci Fl. Buitenzorg 4: 1352.

Type: MADAGASCAR: Nossi Comba, associé à *Hookeria Nossiana*, août 1879, *Marie s.n.*

(BM - holotype, BM000661470 !; PC - isotype!)

Specimens examined

Bryocrumia vivicolor

USA: **North Carolina.** Jackson County: Upper Falls, Whitewater River, near Bohaynee, [35°02'N, 83°01'W,] 25 Aug 1949, *L. E. Anderson 8652a* (DUKE); Transylvania County: Toxaway Creek, in Toxaway Gorge, 8 mi SW of Rosman, [35°05'N, 82°54'W,] 29 Jul 1952, *L. E. Anderson 11088a, 11089a* (DUKE), East Fork, Thompson River, 5 mi SE of Bohaynee, [35°03'N, 82°59'W,] 30 Jul 1952, *L. E. Anderson 11106a* (DUKE). **South Carolina.** Oconee County: Lower Falls, Whitewater River, ca. 3 mi NW of Jocassee, [35°00'N, 83°00'W,] 6 Jun 1950, *L. E. Anderson 9237* (Type of *Glossadelphus andersonii*) (DUKE, NY), *9242a* (DUKE), Lower portion of Coley Creek emptying into Thompson River cove portion of Lake Jocassee, [35°01'N, 82°58'W,] 15 Jul 1987, *L. E. Anderson & C. Gaddy 25052* (DUKE); Pickens County: Eastatoe River, near Rocky Bottom, [35°03'N, 82°49'W,] 25 Aug 1976, *L. E. Anderson 22264a* (DUKE).

ZAIRE: **Kivu.** Stone in waterfall in montane rain forest, between Pinga and Peti, about 120 km NW of Goma, [1°00'S 28°43'E,] 18-23 Aug 1991, *F. Müller Z575* (Hb. F. Müller) (see also Müller 1995)

UGANDA: **Kabarole:** Mubuku valley, at a small stream in montane rain forest, 2100 m, 19 Mar 1948, *Hedberg 329c p.p.* (PC). **Rukungiri.** Bwindi-Impenetrable Natl. Park, Buhoma, Munyaga River Trail (loc. 72), 0°58'50"S, 29°36'36"E, boulder in stream just outside forest edge, 1400 m., 1 Feb 1996, *J.W. Bates U2340a* (E); Bwindi-Impenetrable Natl. Park, Waterfall Trail, from track S from Buhoma (loc. 70), 1°00'28"S, 29°37'41"E, wet rocks in upper waterfall, 1700 m, 7 Feb 1997, *B.J. O'Shea U5528a* (E), *M.J. Wigginton U8336a* (E); Bwindi-Impenetrable Natl. Park, Kigina R., W of track S from Buhoma (loc. 73), 1°01'33"S, 29°37'09"E, rocks in small forest stream, 1620 m, 8 Feb 1997, *B.J. O'Shea U5563* (E), *M.J. Wigginton U8356c* (E), *U8358a* (E), *U8359b* (E, NY 456549). **Kisoro.** Mgahinga Natl. Park, mid slopes (89b), 1°22'09"S, 29°36'05"E, steep shaded moist rock in gully, by forest path in bamboo zone, 2680 m, 10 Feb 1997, *M.J. Wigginton U8392a* (E).

KENYA: **Central.** Kiambu Distr., submerged in river, Chania River, Thika, [1°03'S, 37°05'E,] 23 Oct 1934, *G. Taylor 1177* (BM BM000662591).

INDIA: **Maharashtra.** On stones in a stream, Mahabaleshwar, [17°56'N, 73°42'E,] Jan 1909, *L.J. Sedgwick s.n. 27a* (= 23) (?) (BM - holotype,

BM000661471); stones in stream in Evergreen, Mahabaleshwar, 5 Nov 1918, *L.J. Sedgwick 4751* (BM BM000661476); stones in stream, Mahabaleshwar, 6 Nov 1918, *L.J. Sedgwick 4775* (BM BM000661481); Lingmala Falls, Mahabaleshwar, ca. 1350 m, 10 Mar 1962, *A.E. Norkett 10178a* (BM BM000662590). **Tamil Nadu.** Palni Hills, Shembaganur, [10°15'N, 77°31'E,] 1911, *Foreau* (BM - paratype, BM000661472); Palni Hills, Perumalmalai Shola, 2000 m, [10°15'N, 77°31'E,] 5 Apr 1926, *G. Foreau 222* (BM BM000661480); Palni Hills, Tiger Shola, 19 Jan 1927, *G. Foreau 651* (BM BM000661479).

SRI LANKA. **Nuwara Eliya.** Nuwara Eliya, rock in stream, [6°58'N, 80°46'E,] 26 Feb 1913, *C.H. Binstead 204* (BM BM000661478); Nuwara Eliya, smooth rocks in shade near waterfall, Feb 1913, *C.H. Binstead 354* (BM BM000661477).

CHINA. **Yunnan.** Yangbi County, W slope of Diancang Mt. Range, vicinity of Xueshahne above village of Zhongshan, 25°43'N, 100°02'E, 2600-2800 m, 15 Jun 1984, *P. L. Redfearn et al. 278* (NY 456548); Yangbi County, W side of Diancang Shan Mt. Range, vicinity of Dajiuping, 25°50'N, 99°59'E, 2600 m, 2 Jul 1988, *P. L. Redfearn & Y.-G. Su 971* (NY 456547); Yangbi County, Diancang Shan Mountain Range, vicinity of Malutang, 25°46'N, 100°01'E, 2700 m, 23 Jun 1984, *P. L. Redfearn & Y.-G. Su 467* (DUKE).

Phyllocladon scutellifolius

MADAGASCAR: Nossi Bé. *Marie s.n.* (BM - holotype, BM000661470; PC - isotype); Île Ste.-Marie, *Marie s.n.* (NY 456552).

Acknowledgments

We thank Molly McMullen at Duke University Herbarium for sending us the locality data of *Bryocrumia* from that herbarium, and Catherine Rausch for providing specimens from PC.

References

- Anderson, L.E. 1980.** *Bryocrumia*, a new genus of Hypnaceae (Musci). *Phytologia* **45**: 63-66.
- Anderson, L.E., Crum, H.A. & Buck, W.R. 1990.** List of the mosses of North America north of Mexico. *Bryologist* **93**: 448-499.
- Bartram, E.B. 1951.** *Glossadelphus andersonii*, a new genus to the United States moss flora. *Bryologist* **54**: 81-82.

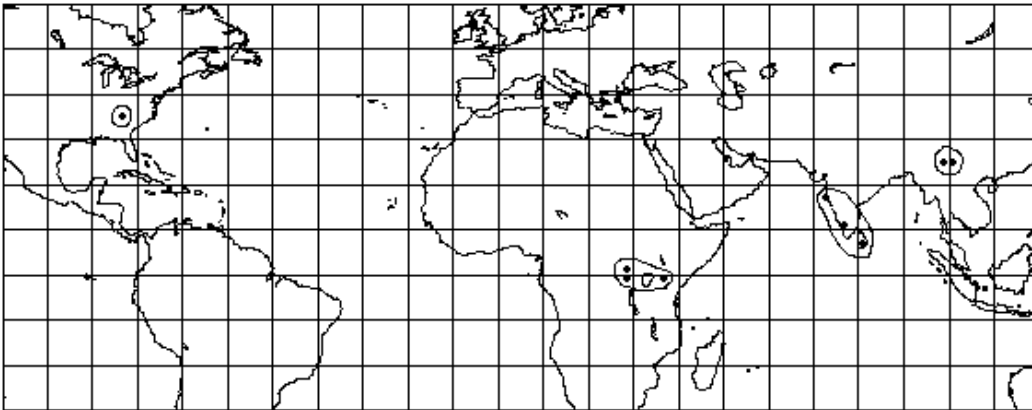


Figure 1. World distribution of *Bryocrumia vivicolor*

- Bescherelle, É. 1880a.** Florule bryologique de la Réunion et des autres îles austro-africaines de l'océan Indien (Deuxième partie). *Annales des Sciences Naturelles, Botanique, sér. 6*, **10**: 233-332.
- Bescherelle, É. 1880b.** Florule bryologique de l'île de Nossi-Bé. *Revue Bryologique* **7**: 17-40.
- Buck, W.R. 1987.** Notes on Asian Hypnaceae and associated taxa. *Memoirs of the New York Botanical Garden* **45**: 519-527.
- Crosby, M.R., Schultze-Motel, U. & Schultze-Motel, W. 1983.** Katalog der Laubmoose von Madagaskar und den umliegenden Inseln. *Willdenowia* **13**: 187-255.
- Crum, H. 1965.** A re-evaluation of *Glossadelphus andersonii*. *Bryologist* **68**: 219-220.
- Crum, H.A. & Anderson, L.E. 1981.** *Mosses of Eastern North America*. New York: Columbia University Press.
- Demaret, F. & Potier de la Varde, R. 1977.** Contribution à l'étude des mousses du Ruwenzori. *Bulletin du Jardin Botanique National de Belgique* **47**: 409-434.
- Dixon, H.N. 1914.** Report on the mosses collected by Mr. C.E.C. Fischer and others from South India and Ceylon. *Records of the Botanical Survey of India* **4(3)**: 75-89.
- Dorr, L. J. 1997.** *Plant collectors in Madagascar and the Comoro Islands*. Kew: Royal Botanic Gardens.
- Müller, F. 1995.** Neue und bemerkenswerte Moosfunde aus Zaire. *Tropical Bryology* **10**: 81-90.
- Potier de la Varde, R. 1955.** Mousses récoltées par M. le Dr. Olov Hedberg, en Afrique orientale, au cours de la mission suédoise de 1948. *Arkiv för Botanik, Serie 2*, **3(8)**: 125-204.
- Renauld, F. 1898[1897].** *Prodrome de la flore bryologique de Madagascar, des Mascareignes et des Comores*. Monaco: Imprimerie de Monaco.
- Renauld, F. & Cardot, J. 1915.** Les mousses de Madagascar. In: Grandidier, A. & Grandidier, G. (eds.) *Histoire physique, naturelle et politique de Madagascar* **39**: 1-560.
- Tixier, P. 1988.** Le genre *Glossadelphus* Fleisch. (Sematophyllaceae, Musci) et sa valeur. *Nova Hedwigia* **46**: 319-356.
- Wigginton, M.J., Porley, R.D. & Hodgetts, N.G. 1999.** Bryophytes of Uganda. 1. BBS Tropical Bryology Group expeditions, 1996-1998. Introduction and collecting sites. *Tropical Bryology* **16**: 165-177.
- Wright, C.H. 1888.** Mosses of Madagascar. *Journal of Botany* **26**: 263-268.

