A new combination in *Bambusa* (*Gramineae–Bambusoideae*)

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Summary. A new combination, *Bambusa membranacea* (Munro) Stapleton & N. H. Xia, is made for a widespread and economically important bamboo from Burma, Indo-China, and Yunnan Province of China. On encountering this species in Yunnan, it was seen that all its vegetative characteristics were those of *Bambusa* Schreber rather than *Dendrocalamus* Nees. This prompted a more detailed analysis of herbarium material. It was found that despite having some floral characteristics of *Dendrocalamus*, prophylls subtending the synflorescence were consistently 2-keeled. This has been adopted as the principal criterion for separating the two genera. To improve consistency in vegetative and floral circumscription of the genera, it is felt desirable to transfer this species.

Delimitation of the genera *Bambusa* and *Dendrocalamus* has recently been revised in the course of an enumeration of the Himalayan species (Stapleton 1994). All material from both genera at Kew was inspected, and further Chinese species of *Bambusa* have now also been considered (Xia 1995). Field examination of species from both genera in Yunnan Province of China confirmed the attribution of most species of *Bambusa* and *Dendrocalamus* encountered there. However, the position of *Dendrocalamus membranaceus* Munro is unsatisfactory.

The synflorescence of this species is often a dense capitate cluster, similar to that of the type species of *Dendrocalamus*, *D. strictus* (Roxb.) Nees. Despite this, field examination revealed many vegetative characteristics usually only seen in combination in species of *Bambusa*. These include relatively small stature, small leaves, strong development of leaf sheath auricles and oral setae, uniformly narrow branches without a strongly dominant central branch, thin wax on new culms, thick culm walls, and a scarcity of aerial roots.

Munro (1868), when describing the species noted that it was unique in the genus in its possession of a completely glabrous lemma, a characteristic he included in his description of *Bambusa*. He also remarked upon its unusually small leaves. A more detailed examination of flowering specimens of this species has shown that even when possessing strongly capitate branching, each synflorescence is always enclosed in a broad, 2-keeled prophyll. This was proposed (Stapleton 1994) as the principal character for the separation of *Bambusa* from *Dendrocalamus*, and has been followed in a review of the Chinese and Sino-Himalayan species of *Bambusa* (Xia 1995). It is more consistent and informative than other characters such as disarticulation of the rhachilla, nature of the pericarp, or density of the synflorescence. Prophylls of

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Bambusa and *Dendrocalamus* have been illustrated (Stapleton 1994) to demonstrate this distinction. Detailed dissections of synflorescences of Himalayan species had previously been prepared, and the prophylls of all *Bambusa* and *Dendrocalamus* species at K were also investigated briefly (Stapleton 1991).

Application of modern inflorescence terminology in the bamboos has recently been discussed (Stapleton 1997), and all bamboo synflorescences were shown to be simple and polytelic. The clusters of spikelets that can develop into capitate structures are interpreted here as individual synflorescences, as the buds from which they arose were subtended by normal foliage leaves. An alternative would be to interpret each cluster as a paracladium along with higher orders of paracladia, but there would then be no main florescence, as all clusters would be lateral to the main axis. In that case the prophyll described here as 2-keeled would be found subtending each paracladium, rather than the synflorescence itself.

It is not clear exactly why Munro described *B. membranacea* as a *Dendrocalamus* species. He may have been influenced by the lack of lodicules. Unfortunately the presence of lodicules is variable, and many *Dendrocalamus* species possess lodicules either regularly or sporadically.

Gamble (1896) stressed the similarity of the more capitate synflorescences of *B. membranacea* to those of *Dendrocalamus strictus*, and he seems to have used that character to separate *Bambusa* and *Dendrocalamus* himself. However, although *Bambusa* species usually have substantially looser synflorescences than those of *Dendrocalamus* species, older synflorescences and those of vigorous growth often develop into dense capitate structures. The synflorescence of this species is highly variable in its density. Many collections, including the lectotype, have loose spicate synflorescences, very similar to those of the type species of *Bambusa*, *B. bambos* (L.) Voss. One sheet of the lectotype from Bentham's herbarium was mis-determined and stored at K as *B. spinosa* Roxb., a synonym of *B. bambos*, and had managed until now to masquerade successfully as that species.

The density of the synflorescence has been considered inherently unreliable for the separation of these two genera (Stapleton 1994). Such a conclusion is only supported by the frequent presence of densely capitate synflorescences in this species, in which so many other characters are typical of *Bambusa*. Characteristics of *B. membranacea* are compared to those of the type species of *Bambusa* and *Dendrocalamus* in Table 1.

Transferral of this species might seem somewhat unfortunate for such a widespread and economically important bamboo, but it improves the correlation between vegetative and floral circumscription of both genera. It also makes it much easier to distinguish between the two genera in the field.

Because of the superficial similarity between the dense, capitate synflorescences of *Bambusa membranacea* and those of *Dendrocalamus strictus*, many collections of the former have been mis-identified as the latter. While collections with vegetative material can be distinguished easily with the naked eye, those with only flowers are a little more difficult to separate. The glabrous or nearly glabrous fertile lemma with a shorter mucros usually distinguishes *B. membranacea* from *D. strictus* easily, but the keeling of the synflorescence prophyll can provide a definitive distinction in difficult cases.

TABLE 1. *B. membranacea* compared to the type species of *Bambusa* and *Dendrocalamus*.

	B. bambos	*B. membranacea*	*D. strictus*
culm surface	glossy, wax thin	glossy, wax thin	matt, wax furry
branch size	uniform	uniform	central dominant
aerial roots	basal nodes only	basal nodes only	common
culm sheath auricles	well-developed, with oral setae	well-developed, with oral setae	absent, no oral setae
maximum leaf length	23 cm	23 cm	30 cm
synflorescence prophyll	2-keeled	2-keeled	1-keeled
prophyll of buds at spikelet base	2-keeled	1 – 2-keeled	1-keeled
synflorescence branching	usually loosely capitate	loosely to strongly capitate	strongly capitate
spikelet disarticulation	variable	variable	variable
lodicules	present	absent	absent
lemma	glabrous	glabrous	pubescent

Bambusa bambos can be distinguished from this species by the presence of spine-like branchlets, apparent division of the spikelet into two ranks of florets, leaf sheaths with more elevated shoulders, shorter ligules and shorter oral setae, and more truncate leaf bases.

Infra-specific variation requires further investigation, although some cultivated ornamental forms have already been described (Hsueh & Li 1988). Considerable variation can be seen in the leaves of different collections, especially in pubescence of sheaths and blades, and in the development of leaf sheath auricles and oral setae. Munro cited three Burmese collections. These were made by Wallich at Trogla on the Salween River in Martaban, and by Brandis and Lobb in Tenassarim. The Brandis collection was mixed and also includes one of the two syntypes of *Oxytenanthera albociliata*. Munro seems to have considered the scanty damaged leaves dubious for both species, and it is not completely clear which species they should be a syntype of. The Lobb collection has more pubescent leaf sheaths and stronger development of auricles and oral setae than the others. This made Munro doubt the authenticity of these leaves in an annotation to the sheet, and Gamble (1896) did not cite the Lobb collection. Therefore the Wallich material is selected as lectotype, although it would certainly appear that all syntypes are conspecific, but as Munro suggested (1868), contain leaf sheaths of different ages. The descriptions given by Munro (1868) and Gamble (1896) contain sufficient latitude to cover all syntypes.

Bambusa membranacea (*Munro*) *Stapleton & N. H. Xia*, **comb. nov.**

Dendrocalamus membranaceus Munro in Trans. Linn. Soc. London 26: 149(1868). Type: Burma, Martaban, Trogla, *Wallich* Cat. 5029, 12 March 1827 (lectotype selected here, K!, isolectotype K-W!).

DISTRIBUTION. Burma; China, Yunnan Province; Laos; Thailand; Vietnam.

SELECTED SPECIMENS. BURMA. Martaban, Trogla, *Wallich* Cat. 5029, 12 March 1827 (K!, K-W!); Moulmein, 1857, *Lobb* s.n. (K!); Tenasserim, June 1879, *Beddome* s.n. (K!); *Brandis* No. 19 (K!). LAOS: Ban Thalat, 29 Oct. 1974, *Soderstrom* 2088 (US, K!). THAILAND. Chiengmai, Chiengdao, 24 April 1960, *Smitinand & Alsterlund* 6774 (K!). CHINA. Yunnan, Luchun, 15 Oct. 1995, *Stapleton* 1029(K!).

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