

Lectotypification of *Bambusa pygmaea* Miq. and *Bambusa disticha* Mitford (Poaceae-Bambusoideae)

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Abstract. Original and current applications of the names *Bambusa pygmaea* Miq. and *Bambusa disticha* Mitford are considered. Similarities between these bamboos and dwarf clones of *Bambusa multiplex* (Loureiro) J. A. & J. H. Schult. are discussed, possible synonymy is considered, and *B. pygmaea* and *B. disticha* are neotypified.

Of all the bamboos, none have presented more problems to the taxonomist than the dwarf species from Japan, especially those with variegated cultivars. Descriptions were brief, typification is generally lacking, specimens are scarce or fragmentary, and lists of later synonymy of names and combinations at different ranks and in different genera seem almost endless. Species concepts remain narrow, even after considerable lumping, and the characters that separate species are minor, variable, and frequently overlap. Nevertheless, these bamboos have remained popular in horticultural use around the world. The smallest, unvariegated cultivars are often simply known in horticulture as ‘little green runners’, or are given the names *Pleioblastus pygmaeus* or *Arundinaria pygmaea* without further study.

Although the species under consideration here are sometimes placed in *Arundinaria* or *Sasa*, in Japan they are placed in *Pleioblastus* Nakai sect. *Nezasa* Koidzumi. They can be distinguished from *Arundinaria* Michx. by the closure of culm buds and the occurrence of multiple, level branch primordia when growing vigorously, and from *Sasa* by having only 3 stamens and leaf margins that do not wither in winter. They are separated from other sections of *Pleioblastus* by their broader leaves, and leaf sheaths with horizontal shoulders and short ligules (Suzuki 1978).

Bambusa pygmaea was described by Miquel (1866) while in Leiden writing his provisional Flora of Japan. He listed it as a Japanese bamboo cultivated in Bogor Botanic Garden in Java. It was described as less than 1 ft tall, with densely distichous, pale blue leaves 1-1.5 ins long, and was placed in the tropical, 6-stamened genus *Bambusa*. The epithet was transferred into the temperate, 3-stamened genera *Arundinaria* (Makino 1899) and *Pleioblastus* (Nakai 1933), and into the temperate 6-stamened genus *Sasa* (Rehder 1927). No type has been designated. The National Herbarium of the Netherland’s catalogue of collections has no entry for *Bambusa pygmaea*, and no extant original material has been located at Leiden for this name. It is now applied loosely to several temperate, low-stature, spreading bamboos in Japan and China, and in western horticulture. Several authors (Lawson 1968, Bell 2000, Meredith 2001) have commented on the uncertainty of the identification of bamboos cultivated under this epithet.

Most authorities seem agreed, however, that the name *B. pygmaea* should be associated in some way with distinctive temperate, running bamboos with closely inserted, apparently opposite leaves, loosely

described as distichous, to which the later name, *Bambusa disticha* Mitford was given (Mitford 1896). One of these bamboos, the smallest, is now usually treated as a variety of *B. pygmaea* Miq. It is known as *Pleioblastus pygmaeus* var. *distichus* (Mitford) Nakai in Japan and the US (Suzuki 1978, Meredith 2001), *Sasa pygmaea* var. *disticha* (Mitford) C. S. Chao & G. G. Tang in China (Keng & Wang 1996), and *Arundinaria pygmaea* var. *disticha* (Mitford) C. S. Chao & Renvoize in the UK. A larger 'distichous-leaved' bamboo in widespread cultivation receives varying treatments, usually being identified simply as Miquel's species *Bambusa pygmaea* Miq., in one of the three temperate genera.

Although Miquel (1866) had described *Bambusa pygmaea* as a very small bamboo from Japan, less than 1 ft tall and with leaves 1.5 inches long, Mitford (1896) applied the name to a somewhat larger plant, with leaves up to 5 inches long. It would now appear that he may well actually have even been referring to *Sasa ramosa* Makino & Shibata, but it is far from clear which species he really had in mind. He described his new species, *B. disticha*, as a very small bamboo from Japan less than 2ft tall and with leaves up to 2¼ inches long. Mitford's application of the name *B. pygmaea* and his description of a new, but very similar species led to the subsequent close association of these two names, with the confusing application of the epithet *pygmaea* to the larger of the two bamboos.

In publishing *B. disticha* Mitford (1896) was trying to clear up confusion between two superficially similar but unrelated bamboos, both having miniature cultivars with fern-like leaves. Just as *B. pygmaea* before it, his hardy, leptomorph-rhizomed, 3 stamened *B. disticha* had previously been cultivated under the name *Bambusa nana* Roxb., an Indian synonym of the tender Chinese species *Bambusa multiplex*, which has pachymorph rhizomes and 6 stamens, miniature cultivars of which are often used as bonsai plants.

In fact, a close inspection of Miquel's description of *B. pygmaea* reveals that it fits *Bambusa multiplex* very well indeed. Leaves glaucous and pale, pubescent beneath with ciliate-scabrid margins, and 4-3 lateral nerves each side of the midrib when the leaves are only 1-1.5 inch long would appear to describe those of *B. multiplex* rather than a miniature clone of any *Pleioblastus* species. Miquel also made no mention of transverse veins in *B. pygmaea*, although they are very prominent in smaller *Pleioblastus* species, and he noted them in his descriptions of other hardy bamboos in the same publication. It is also noteworthy that *B. multiplex* had been extensively planted in Bogor Botanic Garden. Many collections of *B. multiplex* from Bogor are to be found in herbaria, earlier specimens of smaller clones bearing an unpublished name, *Bambusa plicata*, suggesting that they were not all recognized as *B. multiplex*, and Miquel had such material at his disposal.

Consequently it can be assumed from Miquel's description that *Bambusa pygmaea* should be treated as a synonym of *B. multiplex*, and should be neotypified from material of that species growing in Bogor at that time. However, there are two collections at K of a dwarf Japanese bamboo also cultivated in Bogor at that time, one from Hooker's herbarium labelled *Bambusa pygmaea* Miq., and one labelled *Arundinaria pygmaea* Kurz. They suggest that Miquel may have had other material, as well as that of

B. multiplex, from which he described *B. pygmaea*. Both clearly represent a dwarf bamboo with closely spaced leaves of less than 1.5 inches, the leaves densely pubescent underneath. However, they have tessellate venation with prominent transverse veins, and only 2-3 veins on each side, rather than 4-3, and more ciliate rather than scabrous margins. The quality of the collections is so poor that it is difficult to see these details, and it would be difficult to describe a species from this material alone. The collections are fragmentary, coated with both soil and fungus, and having very faded leaves of a pale blue colour, indicating that they were dried in the sun for a substantial period of time. What is noteworthy is that they clearly have arisen from leptomorph rhizomes, and cannot be *B. multiplex*. Thus there was a temperate, running miniature bamboo from Japan cultivated at Bogor after all.

It would have been understandable for Miquel (1866) to consider collections from the smallest cultivar of *B. multiplex* to be the same species as the running temperate bamboo. In that way he might have described it at least in part from collections of *B. multiplex*. However, this does not appear quite as likely considering that he was well aware that different cultivars of *B. multiplex* existed, himself enumerating both *Bambusa floribunda* with greatly diminished leaves, and also a separate species, '*Arundinaria? species incerta, A. glaucescens accedere videtur*', with larger leaves of 4-12 inches.

Thus it would appear that Miquel did describe *B. pygmaea* from material of a temperate, running *Pleioblastus* species from Japan growing at Bogor after all. The identity of this species at first seems difficult to establish from such poor material, but the important characteristics are discernible, and given that Bogor was a staging post for plants on their way from Japan to Europe, it is most likely that the species was soon, if not already, in more widespread cultivation.

Conditions in Bogor would not be ideal for temperate bamboos such as these, and a stunted form of growth could be expected. Although the leaves are very faded indeed, close analysis reveals surprising, but unmistakable bands of variegation on many leaves. As well as pubescent abaxial leaf surfaces, the collections show long-ciliate proximal leaf edges, glabrous leaf sheaths with ciliate margins, sparsely pilose leaf blade adaxial surfaces, glabrous culm sheath fragments lower down the miniature culms, and thin, parallel oral setae with angular bends. Comparing these characteristics to those of Mitford's *Bambusa disticha* and the 3 variegated species brought back to Europe at that time (table 1), there is little doubt that these specimens are actually from the species that Miquel (1866) published simultaneously with *B. pygmaea* (Miquel 1866), but from material growing in Europe, as *Bambusa variegata*, and which Van Houtte had previously published validly as *B. fortunei* (Stapleton 1999).

Compared to the clone of *Pleioblastus fortunei* currently cultivated in the UK, the Bogor specimens have slightly denser hairs on the adaxial surface of the leaf blades, and the variegation is not as uniformly expressed, but this may be one of several different clones of this species collected in Japan, possibly a less variegated cultivar that was not favoured in the west, and was not propagated. Several cultivars are known in Japan, some with less variegation, for example *P. fortunei* forma *albostriatus* Muroi & Okamura. It has also been noted that the stripes of *P. fortunei* become green in strong sunlight

(Okamura et al. 1991). This might explain why in the collections from Bogor, only younger leaves exhibit clear variegation, and the variegation has been completely overlooked in the determination of these collections.

	variegation	leaf abaxial	leaf adaxial	leaf sheath
<i>B. pygmaea</i> (cult. Bogor 1860s)	present	pilose	sparsely pilose	glabrous
<i>P. argenteostriatus</i>	white	glabrous	glabrous	glabrous
<i>P. fortunei</i>	white	pilose	sparsely pilose	glabrous
<i>P. auricomus</i>	yellow	pilose	tomentose	tomentose
<i>P. distichus</i> Mitford	none	glabrous	glabrous	sparsely tomentose
' <i>P. pygmaeus</i> var. <i>distichus</i> ' Hort.	none	glabrous	glabrous	glabrous

Table 1. Comparison of Bogor material of *B. pygmaea* with principle characteristics of *P. distichus* and variegated *Pleioblastus* species in cultivation at that time.

Taking this material as representative of *B. pygmaea* Miq., the name would be a synonym of *Pleioblastus fortunei*. Plants currently known as *Pleioblastus pygmaeus* var. *distichus* or similar combinations in different genera would become simply *Pleioblastus distichus* etc. This treatment is closest to that of Camus (1913), who placed *B. pygmaea* as a pubescent form of *Sasa variegata* (Miq.) Camus, while recognizing *Sasa disticha* (Mitford) Camus as a separate species. Following this approach *B. pygmaea* Miq. could be neotypified by the material at K from Hooker's Herbarium, collected in Bogor prior to 1867, if there is no original material at L.

However, *Bambusa disticha* Mitford has also not been typified. The origins of the plants from which Mitford described his species are not well documented, although herbarium collections of it were made at the time and it is still in cultivation. Mitford (1896) noted that the living plant had been identified as a relative of *Chusquea tessellata* from S. America, and original material has more recently been determined as a species of *Aulonemia* Goudot (Clark, in sched.). However, from analysis of trnL-F and ITS gene sequences (Ní Chonghaile 2002), it has been shown to fall within the Asian temperate clade of woody bamboos, rather than the tropical S American clade.

Three collections in K from the Bamboo Garden at Kew date from around the time of publication. All demonstrate the characters described by Mitford (1896), notably the pilose culm sheath base and nodes. This bamboo is still in cultivation at Kew, but it now reaches 1.3 m in height, with leaves up to 12 cm in length, and is therefore much larger than when described by Mitford (1896). In Japanese cultivation this bamboo would currently appear to be classified as *Pleioblastus pygmaeus* var. *distichus* forma

ramosissimus Suzuki (Suzuki 1978, Okamura et al. 1991). It is also less commonly, but probably very correctly, treated simply as *Pleioblastus distichus* (Mitford) Nakai (Okamura et al. 1991). A specimen, collected at Kew in 1897, which is from a large enough plant to show the distinctive leaf arrangement, is selected here as neotype.

Having established the identity of *Bambusa disticha* as the larger of the two ‘distichous-leaved’ bamboos in cultivation, it is clear (see Table 1) that the name is somewhat misapplied when used for the smallest bamboo with apparently distichous leaves, widely known as *Pleioblastus pygmaeus* var. *distichus*, or a similar combination in *Sasa* or *Arundinaria*. The smaller bamboo, having glabrous culm sheath nodes, cannot be the type variety of *Pleioblastus distichus*, which is how it is currently identified in horticulture. However, as it has glabrous leaves it would also be close to *Pleioblastus argenteostriatus*, differing only in its absence of variegation, and compression of branchlet internodes, giving ‘distichous’ leaf blades.

Suzuki (1978) keyed out species of *Pleioblastus* sect. *Nezasa*, using a substantially broader species concept than previously applied in Japan, although a distinction between wild and cultivated species still allowed recognition of cultivated species including *P. argenteostriatus* (and also *P. humilis* sensu Mitford) when they have exactly the same specific morphological characters as a wild bamboo, *P. chino*, and differ only in smaller stature. Following the morphological characters that he applied (Suzuki 1978), some of the more common bamboos in *Pleioblastus* section *Nezasa* with mainly glabrous culm sheaths are keyed out below, as currently identified with appropriate and misapplied epithets.

Culm sheaths mainly glabrous

1a leaf sheaths pilose

2a leaf blades large..... *P. humilis* sensu Suzuki 1978, non Mitford 1896; *P. virens* Makino 1928

2b leaf blades small... *P. pygmaeus* var. *pygmaeus* sensu Suzuki 1978, only cult. Japan, non Miq.

1b leaf sheaths glabrous

3a leaf blades glabrous

4a leaf blades variegated *P. argenteostriatus* Regel 1865

4b leaf blades green

5a leaf blades well separated . *P. chino* Franch. & Sav. 1877; *P. humilis* Mitford 1896;

5b leaf blades close together, ‘distichous’

6a culm nodes pilose, culms to 1.5m

..... *P. distichus* sensu Mitford 1896; *P. pygmaeus* var *pygmaeus* sensu Hort.

6b culm nodes glabrous, culms to 0.5m *P. pygmaeus* var *distichus* Hort.

3b leaf blades abaxially pubescent

6a leaf blades variegated *P. fortunei* Van Houtte 1862; *P. pygmaeus* Miq. 1866

6b leaf blades green

7a leaf blades adaxially glabrous; nodes pilose *P. pumilus* Mitford 1896

7b leaf blades also adaxially pubescent, and more densely pubescent below

8a nodes glabrous *P. shibuyanus* Nakai 1934

8b nodes pilose *P. shibuyanus* forma *pubescens*

Within those species of *Pleioblastus* section *Nezasa* having mainly glabrous culm and leaf sheaths the earliest species name is *P. argenteostriatus*. It could be considered quite justified to combine all these bamboos under that species name. The ‘distichous-leaved’ bamboos would then appear to represent a variety rather than a separate species, and could be reduced to *P. argenteostriatus* var. *distichus*. However, this would cause considerable confusion. Recognizing *P. distichus* as a distinct species on the basis of the unusual leaf arrangement is probably more acceptable at the current time, until a thorough revision of the Japanese species and cultivars is undertaken. The two bamboos cultivated in the west would appear to merit cultivar status. The larger one with pilose nodes apparently already has the cultivar name ‘Ramosissimus’ in Japan. The smaller cultivar with glabrous nodes would also require a cultivar name, such as ‘Pygmy’, which avoids direct use (which would be a misapplication) of Miquel’s name but continues the reference to small stature.

Within the pubescent-leaved bamboos in this group, whether one or two species are recognized depends upon species concepts. For those with abaxially pubescent leaves, the name *P. fortunei* is appropriate if this character is considered sufficient for separate specific status, and *P. shibuyanus* is appropriate if leaves pubescent on both surfaces were considered important enough to distinguish a further species as well. Mitford’s *Arundinaria pumila* would appear to be a variety or cultivar of *P. fortunei* with green leaves and pilose nodes.

Pleioblastus fortunei (Van Houtte) Nakai, J. Jap. Bot. 9: 232. 1933; *Bambusa fortunei* Van Houtte, Prix-courant de plantes de serres et de plein air: 93. 1862. Type: None designated.
= *Bambusa pygmaea* Miq., Ann. Mus. Bot. Lugd. Bat. 2: 286. 1866. Type: Indonesia. Java, Bogor Botanic Garden, 2781, *Herbarium Hookerianum* (neotype designated here, K).

Pleioblastus distichus (Mitford) Nakai, Rika Kyô-iku 15: 69. 1932; *Bambusa disticha* Mitford, Bamboo Garden: 183. 1896. Type: UK. RBG Kew, *Anon.*, s.n., 22 Sep. 1895 (neotype designated here, K).

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