



## *Schizostachyum cambodianum*, a new species of bamboo (Poaceae: Bambusoideae) from Cambodia

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### ABSTRACT

*Schizostachyum cambodianum* is a new species of woody bamboo from the Cardamom Mountains in Cambodia. It is instantly recognized by a very large suborbicular projection at the base of the culm sheath. The only other bamboos which are known to consistently show such similar suborbicular projections are the Chinese species *Schizostachyum hainanense*, *S. auriculatum*, and *S. dumetorum*. In these species, however, the projections are less than one cm wide, whereas in *S. cambodianum*, it is particularly impressive, developing to about 3 cm wide. *S. cambodianum* can further be distinguished from its Chinese relatives by forming lax clumps due to its long-necked rhizomes and largely glabrous culm sheaths with only scattered pale hairs.

**Keywords:** Bambuseae, Cambodia, Indo-China, Melocanninae, *Schizostachyum*, taxonomy

### Introduction

During field work to the Phnom Samkos Wildlife Sanctuary, Cardamom Mountains, Cambodia in March and November 2015, our attention was drawn to a bamboo with a consistently large projection at its culm sheath base. Such suborbicular projections had so far only been reported from the Chinese species of bamboo *Schizostachyum hainanense* Merrill (*sine descr.*) ex McClure (1935: 591), *S. auriculatum* Qi-Hui Dai & Da-Yong Huang (1997: 29) and *S. dumetorum* Munro in Seeman (1857: 424; McClure, 1935; Xia & Stapleton, 2007). Subsequent examination of the material collected led us to the conclusion that this bamboo belongs to the *Schizostachyum jaculans* Holttum (1954: 494) alliance, characterised by its long, narrow, reflexed culm sheath blade, and the absence of lodicules (Holttum, 1954). Based on the combination of characters which does not match any other known species, we describe *S. cambodianum* as new to science.

### *Schizostachyum* bamboos

The genus *Schizostachyum* Nees (1829: 535) belongs to the Melocanninae subtribe of the Bambuseae. Other genera in this subtribe include *Melocanna* Trinius (1821: 43), *Cephalostachyum* Munro (1868: 138), *Ochlandra* Thwaites (1864: 376), *Pseudostachyum* Munro (1868: 141), *Teinostachyum* Munro (1868: 142), *Neohouzeaua* A.Camus (1922: 100), *Dendrochloa* C.E.Parkinson (1933: 707) and *Leptocanna* L.C.Chia & H.L.Fung (1981: 212; e.g. BPG, 2012; Kellogg, 2015). All these genera have several characters in common, including a conspicuous white waxy band below each node (Wong, 1995), a typical expression of the mid-culm branch complement as many subequal higher-order branches developing from a single primary branch bud, and a glabrous ovary attenuating into a rigid hollow apical extension or style containing a central tissue strand (Holttum, 1956).

Varying views regarding the definition of genera in the Melocanninae subtribe have been expressed. Holttum (1946) suggested that connateness of filaments does not seem to be a strong enough character for generic delineation and subsequently (Holttum 1954, 1956) included *Neohouzeaua* into his concept of *Schizostachyum*. A similar view was taken by Xia (1993), who recognised *Cephalostachyum* and *Pseudostachyum* as distinct genera, but included *Dendrochloa*, *Leptocanna*, *Neohouzeaua* and *Teinostachyum* within *Schizostachyum*.

*Neohouzeaua* was first described by A. Camus (1922) (type: *N. mekongensis* A.Camus 1922: 101) based on

flowering material only. It was set apart from *Schizostachyum* by its lack of a rachilla extension beyond the fertile floret, absence of lodicules, and the filaments connate into a tube. However, species later added into *Neohouzeaua* do have a rachilla extension, such as in *N. dulloa* (Gamble 1896: 101) A. Camus (1922: 101) or *N. helferi* (Munro 1868: 114) Gamble (1923: 91), and *N. tavoyana* Gamble (1923: 92) sometimes has lodicules.

*Neohouzeaua* occurs in our study area and has some vegetative affinities with the new *Schizostachyum* species, such as a lanceolate and reflexed culm sheath blade and a truncate apex of the culm sheath (Dransfield, 1998). However, the species described here has free filaments, which sets it apart from the concept of *Neohouzeaua*, based on the type *N. mekongensis*. Also, no large basal projections have been mentioned in descriptions of the culm sheaths of *Neohouzeaua*. Other comparison is hampered by the uncertainty of vegetative features of *Neohouzeaua* due to the lack of herbarium specimens.

While it may seem too early still to assess the taxonomic importance of characters for separating *Neohouzeaua* from *Schizostachyum*, our new species is consistent with the type of *Schizostachyum*, *S. blumei* Nees (1829: 535), in having pseudospikelets that end in a pronounced rachilla extension and terminal vestigial flower, absence of glumes and lodicules, and presence of three stigmas. It differs from the type and several other species in the genus in having a glabrous lemma and palea (the type species has a pubescent lemma and palea surface).

## The new species

*Schizostachyum cambodianum* Merklinger, Chhang & K.M. Wong, *spec. nov.*, Figs. 1–2.

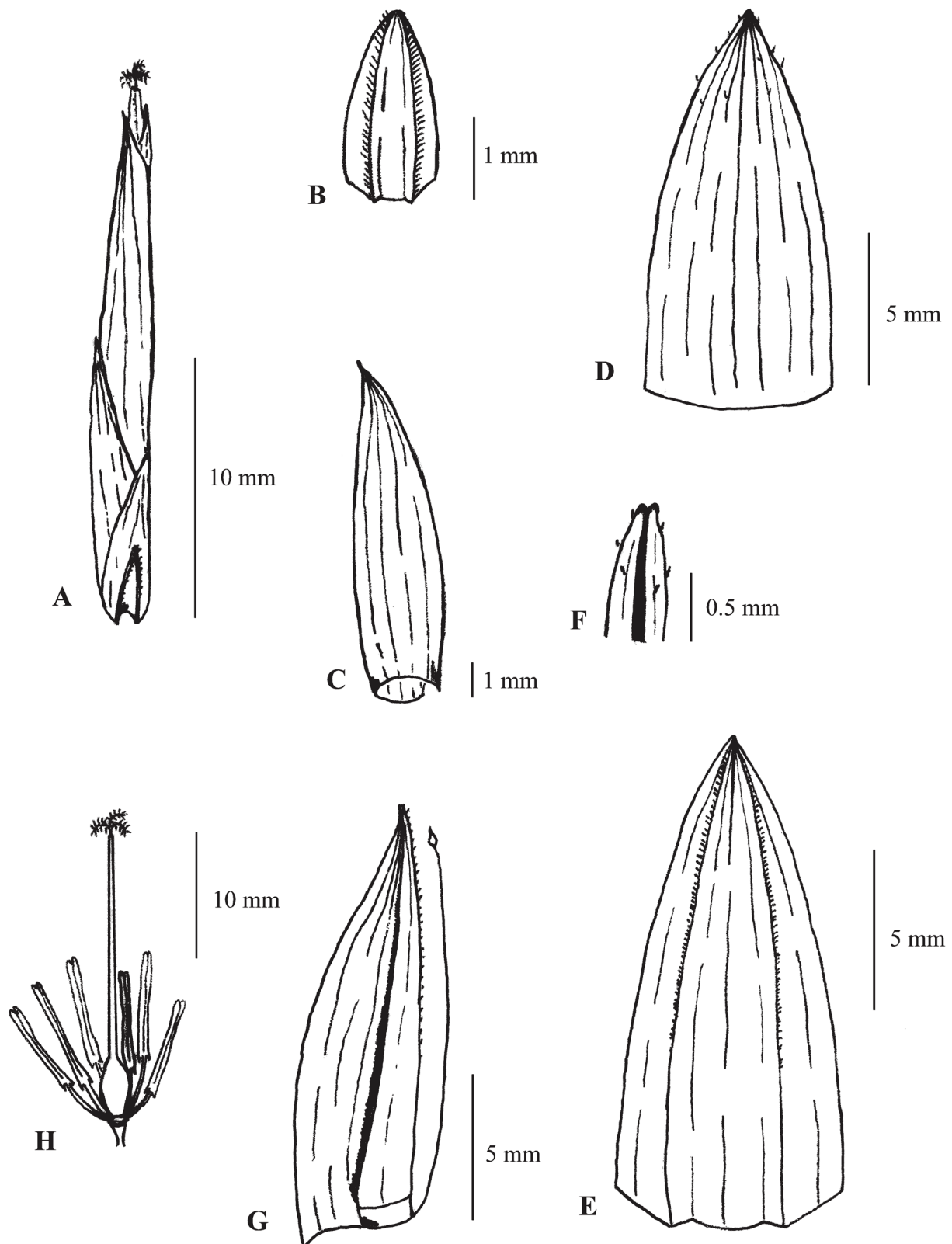
TYPE: — CAMBODIA. Pursat Province: Veal Viang District, Phnom Samkos Wildlife Sanctuary, Yai Mau Shrine area, ca. 5 km SW of Dei Kraham village, N 12° 12' 38.6" E 102° 53' 55.2", ca. 875 m elevation, 25 November 2015, Merklinger, *FFM 2015-76* (holotype: SING!; isotypes: K!, Forestry Administration Cambodia!).

*Schizostachyum cambodianum* resembles *S. hainanense*, *S. auriculatum* and *S. dumetorum* in that all have a culm sheath with a suborbicular projection at its base, a reflexed culm sheath blade that is usually more than half the length of the sheath, and absence of glumes and lodicules (the inflorescence of *S. auriculatum* is not known). *Schizostachyum cambodianum* differs from these three species in its more impressive suborbicular projection at the base of the culm sheath, developing to about 3 cm wide (that in the other three species is less than 1 cm wide) and elongated rhizome necks resulting in a more open sympodial growth habit with well-spaced culms. The other three species have short rhizome necks resulting in a more tightly clumping habit. It differs from *S. dumetorum* (which has a culm diameter of 0.5–1.1 cm) by its culm diameter of 2–4 cm; and from *S. hainanense* (which has appressed stiff brown hairs on its culm sheath and 1.2–1.5 cm long pseudospikelets) by its very sparse translucent hairs on the culm sheath and 2–2.4 cm long pseudospikelets.

Medium to large-sized, sympodial bamboo with rhizome necks to ca. 15 cm long. Culms erect, apex pendulous, green and white powdery, 6–8 m tall, 2–4 cm in diameter; mid-culm internodes ca. 40 cm long and with a conspicuous white waxy zone below each node. Culm sheaths to 32 cm long, light green and white powdery, subglabrous and at most with a few scattered translucent hairs, margins ciliate; auricle on each side an inconspicuous ridge to 1 mm high, bearing erect, pale bristles 12–18 mm long; ligule ca. 1 mm high, with a dense fringe of pale cilia ca. 1 mm long; culm sheath blade linear to narrowly lanceolate, reflexed, typically more than half the length of the culm sheath, apex with involute margins and centrally densely pale-hairy on adaxial side. Branches many at each node, slender and subequal, arising from a single primary branch bud. Foliage leaves 5 to 6 per complement, 10–23 cm long, 2–3.2 cm wide, upper and lower surface glabrous; auricles inconspicuous but bearing several pale erect to spreading bristles 1–2 mm long; ligules less than 0.5 mm high, inconspicuous. Pseudospikelets with 1 perfect floret, pale green when live, very narrowly fusiform and slightly arching, 2–2.4 cm long and to 2 mm in diameter when mature, rachilla internodes 2–4 mm long; basal bracts subtending prophyllate buds 2 (–3), glabrous; lemma 12–14 mm long, 7-veined, apical cusp 0.1 mm long or shorter, glabrous but with very minutely scabrid apex; palea 13–15 mm long, 2-keeled, ciliolate along keels, cilia especially long on apical part of keels, 3-veined between keels, 1 vein on each wing, glabrous, the apex truncate to slightly notched and slightly scabrid; rachilla extension very pronounced, 18–22 mm long; lodicules absent; stamens 6, filaments free, white, ca. 3 mm long in a young flower and probably longer at maturity (none collected); young anthers 4–7 mm long, apex blunt, yellow; ovary ovoid with attenuated apical portion or style to 20 mm long, rigid, glabrous, pale green to white when fresh; stigmas 3, ca. 1 mm long, plumose, purplish-maroon when fresh. Fruit not seen.



**FIGURE 1.** *Schizostachyum cambodianum* A. Culm sheath showing large basal projection (from specimen FFM 2015-76). B. Reflexed culm sheath blade on live plant. C. Close-up of basal projection on live plant. Also visible the white band below the node, typical for *Schizostachyum* bamboos.



**FIGURE 2.** *Schizostachyum cambodianum*. A. Pseudospikelet showing prophyll at base, a series of 3 bracts, lemma, palea slightly longer than lemma, and plumose stigmas. B. Prophyll with ciliolate keels. C. Bract, glabrous. D. Lemma, glabrous with scabrid apex. E. Palea, glabrous, with two ciliate keels. F. Notched apex of palea with scattered minute hairs. G. Palea, side view, partially unfolded, with pronounced rachilla extension carrying a terminal vestigial flower. H. Young stamen complement showing free filaments and gynoecium including a rigid attenuated apical portion or style and plumose stigmas. Drawn by Felix F. Merklinger, based on type specimen *FFM* 2015-76.



FIGURE 3. Geographical distribution of *Schizostachyum cambodianum* (stars).

**Geographic distribution and habitat:**—*Schizostachyum cambodianum* was found in Cambodia in Pursat Province, Veal Viang district (here also chosen as the type locality), in the central Cardamom Mountains. A second collection was made in Koh Kong Province, south-western Cardamom Mountains (Fig. 3). This species was collected at the fringe of evergreen forest from 30–875 m elevation. It was also observed to re-colonize areas of disturbed vegetation along road sides.

**Etymology:**—This species is the only bamboo with a large suborbicular projection at the base of the culm sheath that is known to occur in Cambodia. It seems therefore fitting to name it after its country of first description.

**Paratype (designated here):**—CAMBODIA. Koh Kong Province, along the highway “AH-123” from Kampong Speu toward Koh Kong, N 11° 25′ 12.7” E 103° 13′ 47.2”, ca. 30 m elevation, 18 August 2016, Merklinger, Chhang & Wong, *FFM 2016-17* (SING!).

TABLE 1. Morphological comparisons of *S. cambodianum* with two of its closest relatives (*S. hainanense*, *S. dumetorum*) and with *Neohouzeaua mekongensis*.

	<i>S. cambodianum</i>	<i>S. hainanense</i>	<i>S. dumetorum</i>	<i>N. mekongensis</i>
Culm sheath apex	Concave	Concave	Rounded	Concave
Culm sheath base	With very large projection to 3 cm wide	Usually with projection less than 1 cm	Sometimes with small rounded expansion	—
Culm sheath surface hairs	Very sparse, spreading, translucent hairs	Appressed, brown hairs	glabrescent and shining	—
Pseudospikelet length	c. 2–2.4 cm long	1.2–1.5 cm long	c. 1.8–2 cm long	1.9–2.2 cm long
Lemma indument	Glabrous	Hairy at upper part	Sparsely pilose at one side near the summit	Glabrous
Filaments	Free	Tendency to cohere in pairs	Connate	Fused into a tube
Terminal rachilla extension	Very pronounced, 18–22 mm long	Very pronounced, 10–12 mm long	2–4 mm long	Absent

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