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Schizostachyum kuisingii, a new species of bamboo (Poaceae: Bambusoideae) from Peninsular Malaysia

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ABSTRACT. *Schizostachyum kuisingii* K.M.Wong is a new species of bamboo from Peninsular Malaysia, distinguished from closely related species from adjacent areas in Indonesia, such as *Schizostachyum castaneum* Widjaja, *Schizostachyum lutescens* Widjaja and *Schizostachyum mampouw* Widjaja, by the hairs of the culm internode, glabrescent foliage leaves, leaf ligule form, a palea longer than the lemma and the presence of two lodicules in the flower.

Keywords. Bambuseae, Malay Peninsula, Malesia, Melocanninae, taxonomy

Introduction

Of some 60 bamboo species in 14 genera documented for Peninsular Malaysia (Wong, 1995), 11 are classified in *Schizostachyum* Nees. This paper describes a hitherto unknown *Schizostachyum* species that Mr Tan Kui Sing brought me to see in Johor state in Peninsular Malaysia in 2008, during a period when we were gathering bamboos to represent a special living collection for Peninsular Malaysia. We have subsequently been able to study the literature and specimens pertaining to the *Schizostachyum* diversity in Southeast Asia, with the conclusion that this bamboo is new to science. Herbarium acronyms used here follow Thiers (continuously updated).

Schizostachyum bamboos

Schizostachyum and allied genera, such as *Melocanna* Trin., *Cephalostachyum* Munro, *Pseudostachyum* Munro, *Teinostachyum* Munro, *Neohouzeaua* A.Camus, *Dendrochloa* C.E.Parkinson and *Leptocanna* L.C.Chia & H.L.Fung, belong to the Melocanninae subtribe of the Bambuseae (BPG, 2012; Kellogg, 2015). Whereas *Melocanna* has always been easy to distinguish based on its long-necked sympodial rhizomes and fleshy fruit pericarp, the relationships of the other genera mentioned here have been contentious (Holttum, 1946, 1956). Otherwise the genera of Melocanninae generally share a number of conspicuous characters: a branch complement of many slender subequal branches developing from a single branch bud, and a glabrous ovary with a rigid hollow attenuating upward extension of the ovary apex (analogous to a stylar structure and often just simply called the 'style') connecting with the stigmas

(Holttum, 1956); also there is a conspicuous white-waxy ring just below each culm node (Wong, 1995).

Holttum (1946) had suggested that *Schizostachyum* might include *Cephalostachyum*, *Teinostachyum* and *Pseudostachyum* because the number of flowers per pseudospikelet and fusion of filaments may not be stable distinguishing characters. Later, Holttum (1956) added *Neohouzeaua* to his broad concept of *Schizostachyum*. Although limited-sampling molecular phylogenetic investigations have yet to clearly resolve their generic positions, *Pseudostachyum* seems to be a distinct lineage (Yang et al., 2007). Although Xia (1993) recognised *Cephalostachyum* and *Pseudostachyum* as distinct genera, he also deemed it is practical to include *Dendrochloa*, *Leptocanna*, *Neohouzeaua* and *Teinostachyum* within *Schizostachyum*. From the molecular analyses of Yang et al. (2007), it seems likely that *Cephalostachyum* may be heterogeneous, with its type species *C. capitatum* Munro and an alliance including *C. latifolium* Munro (syn. *C. fuchsianum* Gamble) and *C. pallidum* Munro forming one possible generic entity, and others like *C. pergracile* Munro and *C. virgatum* (Munro) Kurz being more closely allied to a group of *Schizostachyum* species including *S. brachycladum* (Kurz) Kurz and *S. zollingeri* Steud. As it stands, too little is known about comparative pseudospikelet and floral structure for this group of genera and it is premature still to speculate if differences such as keeled or convolute palea, 2 versus 3 stigmas, presence of glumes and number of flowers will correlate with clades recognised from molecular analyses, when these eventually benefit from sufficient taxon sampling that includes nomenclatural types.

The consensus seems to be that *Melocanna*, *Pseudostachyum* and *Cephalostachyum* could be distinguished from *Schizostachyum*, and the last could probably include *Dendrochloa*, *Leptocanna*, *Neohouzeaua* and *Teinostachyum*, as well as some species currently placed in *Cephalostachyum* (such as *C. pergracile* and *C. virgatum*). The present new species is consistent with the type of *Schizostachyum*, *S. blumei* Nees, in having slender 1-flowered pseudospikelets that terminate with a rachilla extension bearing a terminal vestigial flower, absence of glumes, convolute paleas with 2 long-pointed tips and 3 stigmas. It differs from the type and many other species of the genus in consistently having two lodicules (the type species does not have lodicules, whereas a number of others have three, although variable numbers are sometimes encountered).

The new species

Schizostachyum kuisingii K.M.Wong, **sp. nov.**

Schizostachyum kuisingii is similar to *S. castaneum* Widjaja, *S. lutescens* Widjaja and *S. mampouw* Widjaja in having an erect clump habit, narrowly triangular to ovate-lanceolate culm-sheath blades that are at first erect, and generally small culm-sheath auricles with fine bristles on their margin. It differs from these three species in having glabrescent leaf blades (the other species have persistently hairy leaf blades), minutely serrate-ciliate leaf ligules (the other species have entire-glabrous leaf ligules), and two

lodicules in its flower (*S. lutescens* and *S. mampouw* do not have lodicules; the flowers of *S. castaneum* are not known). – TYPE: Peninsular Malaysia, Johor, Bekok, old logging track past Kampung Tomoh and c. 10 km before the Selai gateway to Endau-Rompin State Park, 26 November 2008, *K.M. Wong, Y.W. Low, Zulkapli Ibrahim & K.S. Tan WKM 2896* (holotype SING; isotypes K, KLU). (Fig. 1–3)

Medium-size clumping bamboo to 18 m high, erect to slightly arching outward. ***Culms*** plain green, 2.5–5.5 cm diameter; mid-culm internodes to 40–45 cm long, with scattered appressed pale hairs all over and a white-waxy zone below each node; branches many at each node, slender and subequal, arising from a single branch bud. ***Culm sheaths*** light green, with loose irritant stiff chestnut-brown hairs all over the back; auricles low rim-like, c. 1 mm high, dark purplish black, with pale brown bristles 14–22 mm long on the margin; ligule with a 1–1.5 mm high rim-like base with 2–3(–6) mm long bristles on the margin; blade narrowly triangular to ovate-lanceolate, erect in the more basal sheaths, and erect becoming patent to reflexed at mid-culm or higher, dark green. ***Foliage leaves*** 8–32 cm long, (1.4–)2.3–3.6 cm broad, adaxial surface glabrous, abaxial surface sparsely pale minute-hairy becoming glabrescent; auricles rounded to elongate lobes extending free of the sheath margin, 0.5–2 mm long bearing bristles 2–5 mm long on their margin; ligules 1 mm high, minutely serrate-ciliate. ***Pseudospikelets*** green, very slender, only 1–1.5 mm diameter, 10–14 mm long, 1-flowered with a rachilla extension 7–12 mm long bearing a terminal vestigial flower; basal bracts subtending prophyllate buds 2–3, each 5-veined, the back with very sparse short hairs. ***Flower*** with lemma 10–11 mm long, 9-veined, apical cusp 1 mm long, glabrous; palea 12–18 mm long, 9-veined, apex bifid with cusps 2–2.5 mm long, glabrous; lodicules 2, obovate to oblanceolate, 2.5–3.5 mm long, 0.5–1.5 mm wide, with ciliate margin; stamens 6, filaments free; anthers 4–5 mm long, apex blunt, maroon; ovary ovoid, c. 1 mm long, glabrous; style to 13–19 mm long, exserted c. 4 mm in the mature flower, rigid, glabrous, white; stigmas 3, hairy, white.

Etymology. This new species honours Mr Tan Kui Sing, an experienced horticulturist with wide interests in exploring the native Malaysian flora for novel candidate species in tropical landscaping. He brought the existence of this new species to the attention of the author.

Provisional IUCN conservation assessment. As far as is known, this species exists only in the village at Bekok, Johor, Peninsular Malaysia. In spite of its novelty, its status as an indigenous Malaysian bamboo is doubtful, as with a suite of other bamboo species known only in cultivation or in association with human settlements, which Holttum (1958) referred to as "village bamboos". Because only one locality has been documented, it seems appropriate to consider this species as "Data Deficient" in conservation terms (IUCN, 2012).

Notes. Besides the key differences from its close congeners, *Schizostachyum castaneum*, *S. lutescens* and *S. mampouw* (Widjaja, 1997), noted in the diagnosis above, there

Fig. 1. Habit of *Schizostachyum kuisingii* K.M.Wong. (Photo: K.M. Wong)

Fig. 2. Key vegetative characteristics of *Schizostachyum kuisingii* K.M.Wong. **A.** Detail of culm sheath showing loose brown hairs, spreading blade and bristly, dark rim-like auricles; culm internode with a covering of appressed white hairs, and a pale waxy zone just below the node. **B.** Branch complement with a cluster of many slender subequal branches developing from a solitary branch bud. **C.** Detail of leaf sheaths showing pale-bristly auricles. **D.** Pseudospikelet clusters. (Photos: K.M. Wong)

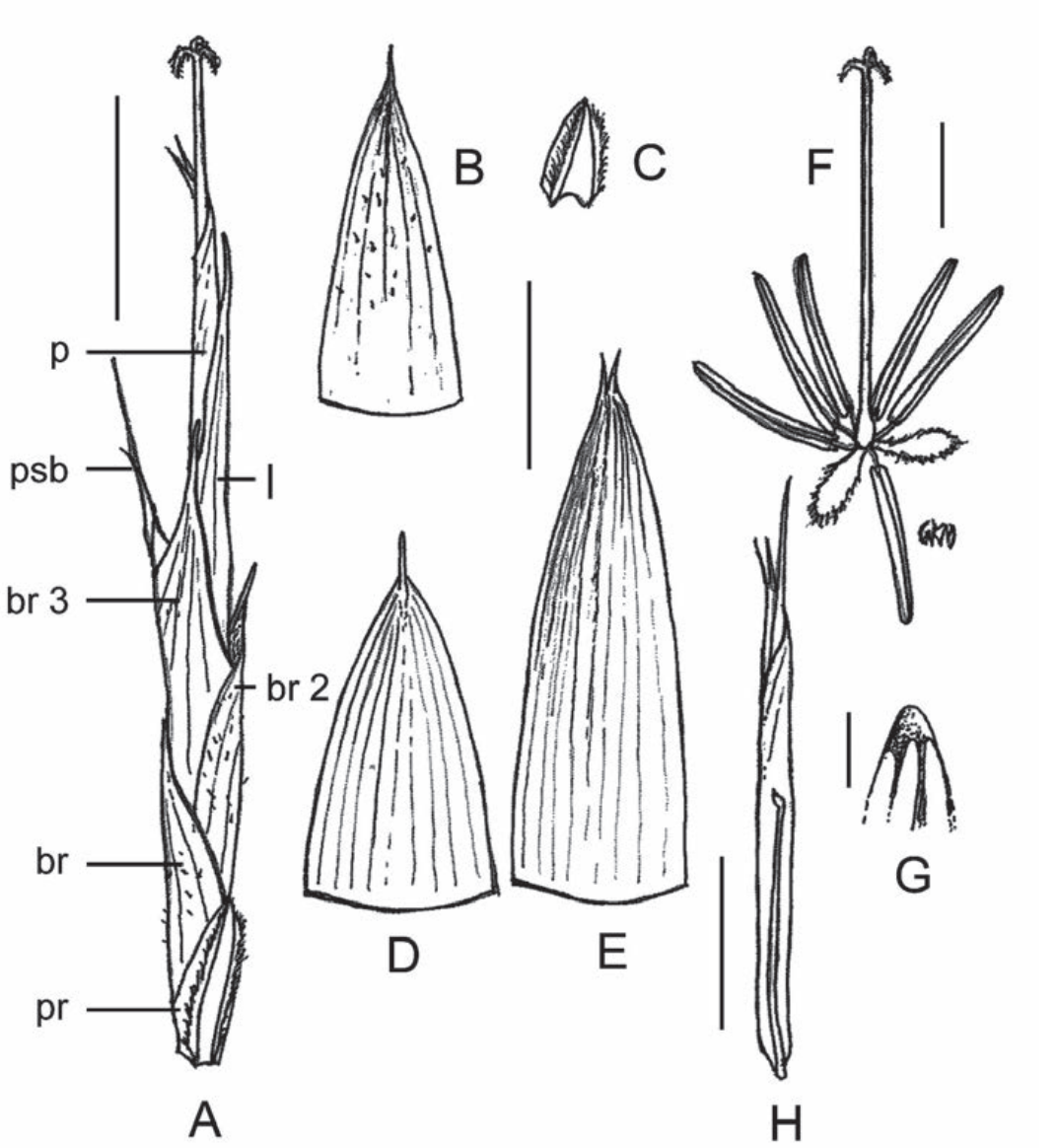

Fig. 3. *Schizostachyum kuisingii* K.M.Wong, pseudospikelet and flower structure. **A.** Pseudospikelet with (from base) prophyll (pr), three bracts subtending prophyllate buds (br, br 2, br 3), a pseudospikelet branch (psb) developing from the bud subtended by br3, the lemma (l) and palea (p) of the perfect flower with its protruding stiff style and stigmas. **B.** Bract. **C.** Prophyllate bud. **D.** Lemma. **E.** Apically bicuspidate palea. **F.** Gynoecium with a stiff style, with six free stamens and two lodicules. **G.** Detail of blunt anther apex. **H.** Perfect flower with lemma removed, revealing a slender rachilla extension with a terminal vestigial flower. Scale bars represent 5 mm except for G (1 mm). Drawn by the author from *WKM 2896* (SING).

Table 1. *Schizostachyum kuisingii* K.M.Wong compared with closely related species. A dash indicates feature not known for a particular species. The description of "hairy" ovaries in various Indonesian species such as *S. lutescens* Widjaja and *S. mampouw* Widjaja (Widjaja, 1997) is probably erroneous, as the species known to the present author (including *S. kuisingii*) and described by others have invariably smooth (glabrous) ovaries and fruits.

	S. kuisingii	***S. castaneum***	***S. lutescens***	***S. mampouw***
Midculm internode length (diameter) (cm)	40–55 (2.5–5.5)	45–70 (4.5–6)	45–60 (2–4)	30–60 (2.5–3)
Hair type on internode surface	*White appressed hairs only*	White and brown hairs	White hairs and scattered brown hairs	—
Hair type on back of culm sheaths	Dense chestnut-brown hairs	Dense chestnut-brown hairs	Chestnut-brown hairs	*White to brown hairs*
Culm-sheath auricles	Low rim only 1 mm high, bristles 14–22 mm long	*Low lobes to 2 mm high*, bristles 4–11 mm long	—	Low rim 1–2 mm high, bristles 14 mm long
Culm-sheath ligules	1–1.5 mm high base, bristles 2–3 mm long, at times to 6 mm long	1 mm high base, *denticulate (small 1 mm teeth)*	—	1 mm high base, bristles 2–3 mm long
Culm-sheath blade	Narrowly triangular to ovate-lanceolate, *erect then patent to reflexed*	Narrowly triangular to ovate-lanceolate, erect	—	Narrowly triangular to ovate-lanceolate, erect
Lower surface of foliage leaves	Sparsely pale minute-hairy, *glabrescent*	Hairy	Sparsely hairy	Sparsely hairy
Leaf sheath ligules	*Minutely serrate-ciliate*, 1 mm high	Entire, glabrous, 1 mm high	Entire, glabrous, 1 mm high	Entire, glabrous, 1 mm high
Lemma length, hairiness	10–11 mm (shorter than palea), glabrous	—	c. 12 mm (*longer than palea*), glabrous	9–10 mm (shorter than palea), glabrous
Palea length, hairiness	12–18 mm, glabrous	—	c. 9 mm, glabrous	10–15 mm, glabrous
Lodicules	*2*	—	0	0
Anther colour	*Maroon*	—	Yellow	Yellow

are further distinctions (Table 1). *Schizostachyum kuisingii* culm internodes have only white appressed hairs, whereas those of *S. castaneum* and *S. lutescens* have a mixture of white and brown hairs (those of *S. mampouw* have not been documented). *Schizostachyum castaneum* also differs from *S. kuisingii* and *S. mampouw* in having small lobe-like culm-sheath auricles (instead of rim-like auricles) and denticulate culm-sheath ligules (instead of bristly ligules). In addition, *Schizostachyum lutescens* differs from *S. kuisingii* and *S. mampouw* by its lemmas longer than the paleas (in the other two species, the lemmas are shorter than the paleas). *Schizostachyum kuisingii* has maroon anthers, whereas *S. lutescens* and *S. mampouw* have yellow anthers.

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