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Four new genera of bamboos (*Gramineae: Bambusoideae*) from Malesia

K. M. WONG*

Summary. Four new genera of bamboos, *Holttumochloa* (three species: one new combination, two new species), *Kinabaluchloa* (two species: a new combination and a new species), *Maclurochloa* (one species, a new combination), and *Soejatmia* (one species, a new combination) are described.

INTRODUCTION

In the course of a revision of *Bambusa* in Malesia, a number of taxa found to be taxonomically aberrant in the genus were studied and found to represent undescribed genera. These are distinguished in the synoptic key below.

SYNOPTIC KEY TO DISTINGUISHING FOUR NEW GENERA FROM *Bambusa*

1. Pseudospikelets (of orders higher than the first) each subtended by a large bract (almost as long as the lemmas) immediately below insertion of the prophyll; branch complement derived from a single bud at the culm node, developing into a dense cluster of subequal branchlets; ovary glabrous to sparsely hairy at summit, when young slender-cylindric and tapering upwards **Kinabaluchloa**
1. Pseudospikelets (of orders higher than the first) each subtended by a bract distinctly smaller than the lemmas; branch complement, if derived from a single bud, developing a distinct dominant branch, otherwise derived from many primary buds at a culm node developing into a cluster of subequal branchlets; ovary with hairy summit, when young obovoid-ovoid becoming cylindrical.
 2. Inflorescence developing as clusters of pseudospikelets along simple, initially leafy branches of the branch complement; branch complement at culm node derived from many primary buds, bud prophylls divided into very unequal lobes; culm-sheath blades linear **Holttumochloa**
 2. Inflorescence developing as clusters of pseudospikelets along initially leafy branches that rebranch conspicuously during flowering; branch complement at culm node derived from a single bud, bud prophylls not divided; culm-sheath blades never linear.
 3. Perfect flowers in the spikelet only 1–2; transitional (“empty”) glumes below the flowers 3–5, the upper ones large, as long as the lemmas; culm-sheath auricle a low rim, blade reflexed; ovary summit not thickened **Maclurochloa**

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3. Perfect flowers in the spikelet 3–4, often more; transitional (“empty”) glumes none or only 1–2 and distinctly smaller than the lemmas; culm-sheath auricle a large earlike lobe, blade erect; ovary summit thickened.
4. Spikelet with 1–2 rudimentary flowers between the single transitional glume and fully developed flowers; palea hairy on the inside between the keels, the apex distinctly bifid (the projections often hooked); base of culm-sheath thickened and wrinkled; margins free in primary-branch bud prophylls. **Soejatmia**
4. Spikelet without such rudimentary flowers immediately above the transitional glumes (or, where these glumes are absent, the bud-bearing prophylls at the spikelet base); palea glabrous on the inside between the keels, the apex rounded, truncate or only slightly cleft; base of culm-sheath never wrinkled; margins fused in primary-branch bud prophylls. **Bambusa**

THE NEW GENERA

Holttumochloa K. M. Wong genus novum rhizomatis sympodialibus, inflorescentiis iterauctantibus, flore terminali spiculae vestigiali, internodiis rachillae (interflores) elongatis, lodiculis 3, staminibus 6 filamentis liberis, ovario apice piloso *Bambusae* Schreber affinis, sed gemmae ramorum ad nodos numerosae binatim elongatae, prophylo in 2 lobos asymmetricales carinatos diviso, rami ad nodos numerosi subaequales, axis inflorescentiae non ramosae, apicem rami foliosi, pseudospicula 1–3 bracteas steriles basilares, 1–2 gemmas prophyllaceas in axile bracteae et spiculam unicam continens, spicula 1–2 glumas, 2–5 flores continens stamina connectivis non prolongatis, stigmata 3 sessila, differt. Typus: *Holttumochloa magica* (Ridley) K. M. Wong.

Multiple branch buds at a node are also known in the *Chusqueinae* and *Apoclada* from the New World, but those bamboos have semelauctant inflorescences where the spikelets do not have buds below them on the same axis. Furthermore, in *Chusquea* the rhizome is monopodial and there is a strongly dominant larger bud in the bud complement. The branch complement in *Bambusa* is always derived from a solitary bud, and the primary branch axis in that genus is (if not always, then frequently clearly dominant in size over subsidiary higher-order branches.

The inflorescence in *Holttumochloa* is structurally unique in being composed of clusters of pseudospikelets arranged on a branch that is not otherwise rebranched (i.e., only pseudospikelets, which are in fact condensed “branches”, and not elongate branches are present). In other bamboos with iterauctant inflorescences, the inflorescence contains several orders of elongate branches bearing the pseudospikelets. The division of each branch-bud prophyll into two asymmetric lobes, each with a single hairy keel, is also distinctive; the primary-branch bud prophyll in *Bambusa* has fused margins.

The genus is named for Prof. R. E. Holttum (1895–1990), whose work contributed to new insights into bamboo classification. His influence in encouraging among younger botanists an ever-growing interest in the bamboos can perhaps be likened to the proliferation of primary-branch buds making up the branch complement typical of *Holttumochloa*, in itself a rather special feature.

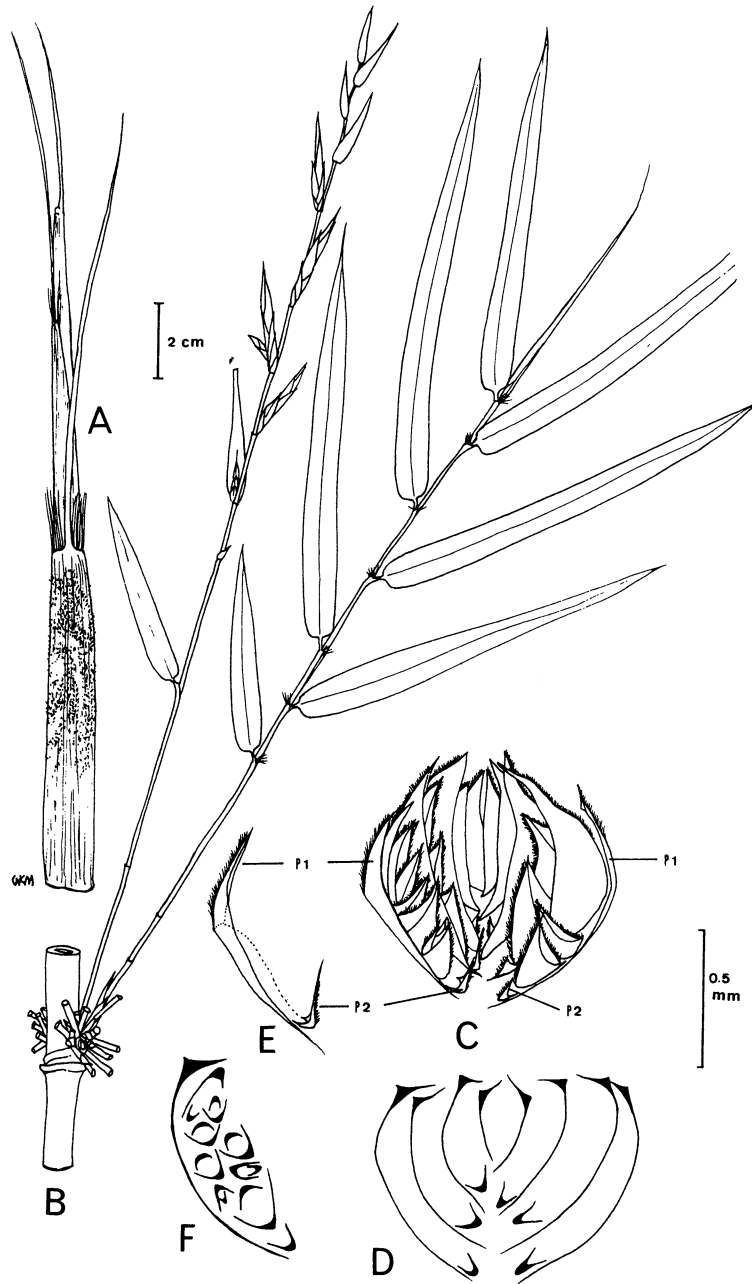


FIG. 1. *Hottumochloa magica*. **A** culm shoot; **B** leafy & flowering branches; **C** detail of branch buds at node; **D** diagram of insertion of primary branch-bud prophylls; **E** prophyll of primary branch bud, divided into two asymmetric lobes (P1 and P2); **F** diagram of insertion of primary & secondary prophylls within one branch bud. From Wong FRI 35227. Drawn by author.

KEY TO THE SPECIES OF *HOLTUMOCHLOA*

1. Leaf blades densely pale-hairy on lower side **3. *H. pubescens***
 1. Leaf blades glabrous.
 2. Pseudopetiole 2–3 mm; leaf-sheath auricle bristly; spikelets 2–3 cm long, perfect flowers 4–5, rachilla internodes 3–5 mm **1. *H. magica***
 2. Pseudopetiole 1–1.5 mm; leaf-sheath auricles nil or inconspicuous; spikelets not longer than 1.5 cm, perfect flowers 2–3, rachilla internodes 2–3 mm **2. *H. korbuensis***

1. *Holtumochloa magica* (Ridl.) K. M. Wong, comb. nov.

Bambusa magica Ridley in J. Straits Branch Roy. Asiat. Soc. 44: 208 (1904); Mat. Fl. Malay. Penins. 3: 184 (1907); Fl. Malay Penins. 5: 258 (1925); E. G. Camus, *Bambusées*: 122 (1913); *Holtum* in Gard. Bull. Singapore 16: 75 (1958); Gilliland, *Revised Flora of Malaya* 3: 22 (1971). Type: Malay Peninsula, Pahang, Gunong Brumbun, *Wray* 1560 (holotype SING, isotypes CAL, K).

Bambusa nana sensu Gamble in Ann. Roy. Bot. Gard. (Calcutta) 7: 40 (1896), *pro parte*: *Wray* 1560 (CAL, K, SING), non Roxb.

Bambusa elegans Ridley in J. Straits Branch Roy. Asiat. Soc. 44: 258 (1904); Mat. Fl. Malay. Penins. 3: 185 (1907); E. G. Camus, *Bambusées*: 127 (1913); Ridley, Fl. Malay Penins. 5: 258 (1925). Type: Malay Peninsula, Selangor, Ulu Semangkok, *Ridley* 12114 (holotype SING, isotype K). Figs. 1 & 2.

DISTRIBUTION. Endemic to Peninsular Malaysia, recorded from the Cameron Highlands in Pahang and the Fraser Hill area in the Pahang-Selangor state border, both on the Main Range.

HABITAT. Lower and upper montane forests, especially on ridges, at 1200–2000 m.

PENINSULAR MALAYSIA. Pahang: Cameron Highlands, Boundary Path, *Holtum* SFN 31390 (K, KEP, SING); G. Batu Gangan, *Ja'amat* KEP 27030 (K, KEP, SING); G. Berumbun, *Holtum* SFN 23403 (K, SING), *Ridley* 13853 (K, SING), *Whitmore* FRI 15488 (KEP), *Wray* 1560 (holotype SING; isotypes CAL, K), *Wong* FRI 35227 (A, K, KEP, KLU, L, SING); G. Brinchang, *Holtum* s.n., 4 Aug. 1946 (SING), *Stone* 7214 (KLU), 8051 (KLU), 8395 (KLU), *Whitmore* FRI 15436 (KEP); G. Jasar, *Wong* FRI 29400 (KEP); hills above Moonlight Cottage, *Wong & Widjaja* FRI 32438 (KEP, KLU); Myrtle Hill, *Symington* KEP 20992 (SING); Rhododendron Hill, *Henderson* SFN 17887 (SING); Ulu Telom, *Dolman* KEP 27251 (K); Ulu Terla, *Ja'amat* KEP 27612 (KEP, SING). Selangor: Semangko Pass, *Burn-Murdoch* 11926 (K, SING); Ulu Semangkok, *Ridley* 12114 (K, SING).

2. *Holtumochloa korbuensis* K. M. Wong sp. nov. *H. magicae* (Ridl.) K. M. Wong similis sed pseudospicula usque ad 12mm longa ex 1–2 bracteis sterilibus basilaribus, 1–2 gemmis prophyllaceis in axile bractearum et spicula unica constanti, spicula 1-gluma 2–3 floribus differt. Typus: Malay Peninsula, Perak, Gunong Korbu, *Symington* KEP 31496 (holotypus KEP).

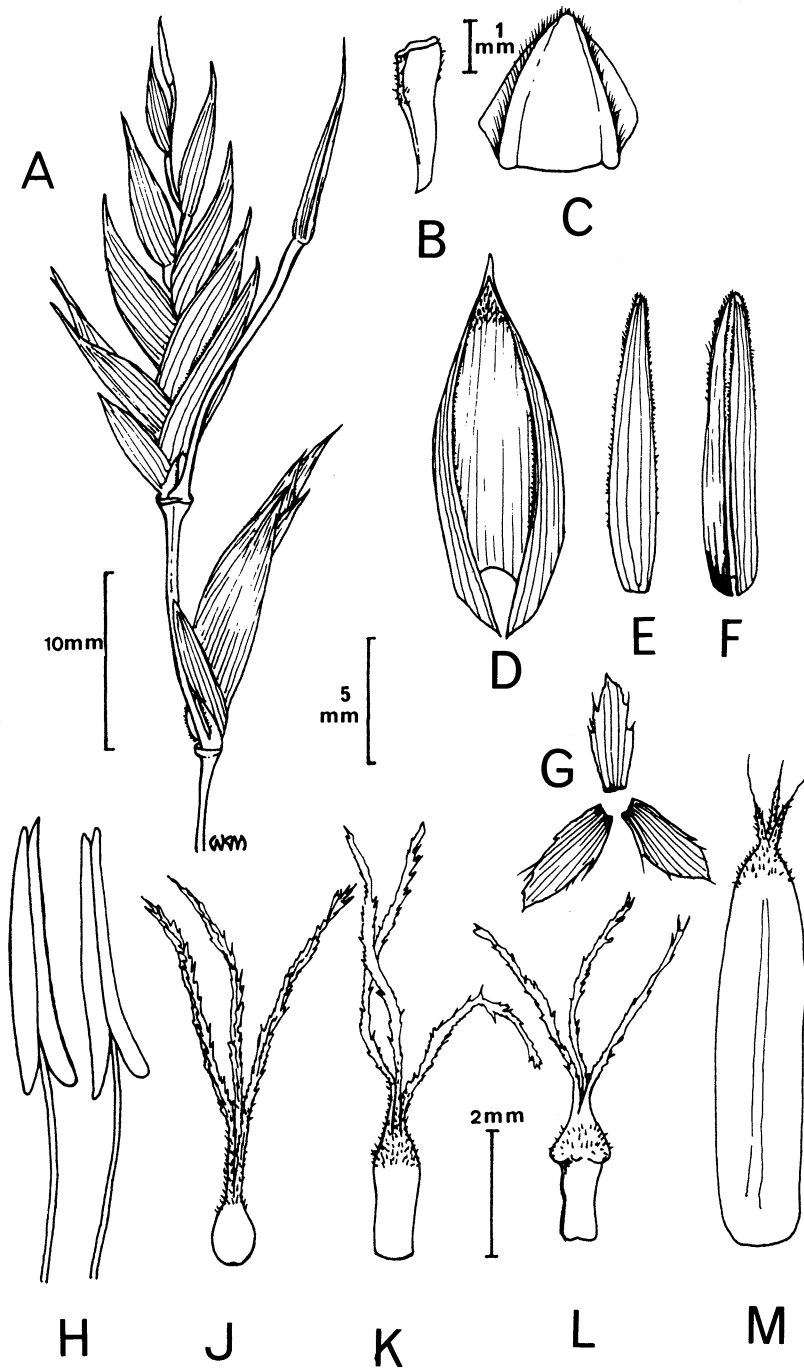


FIG. 2. *Holttumochloa magica*. A tip of inflorescence with two pseudospikelets; B rachilla internode; C prophyll of pseudospikelet. D lemma; E palea, dorsal view; F palea, ventral view. G lodicule complement; H stamens; J pistil; K-L young fruits. M mature fruit. From Wong FRI 35227. Drawn by author.

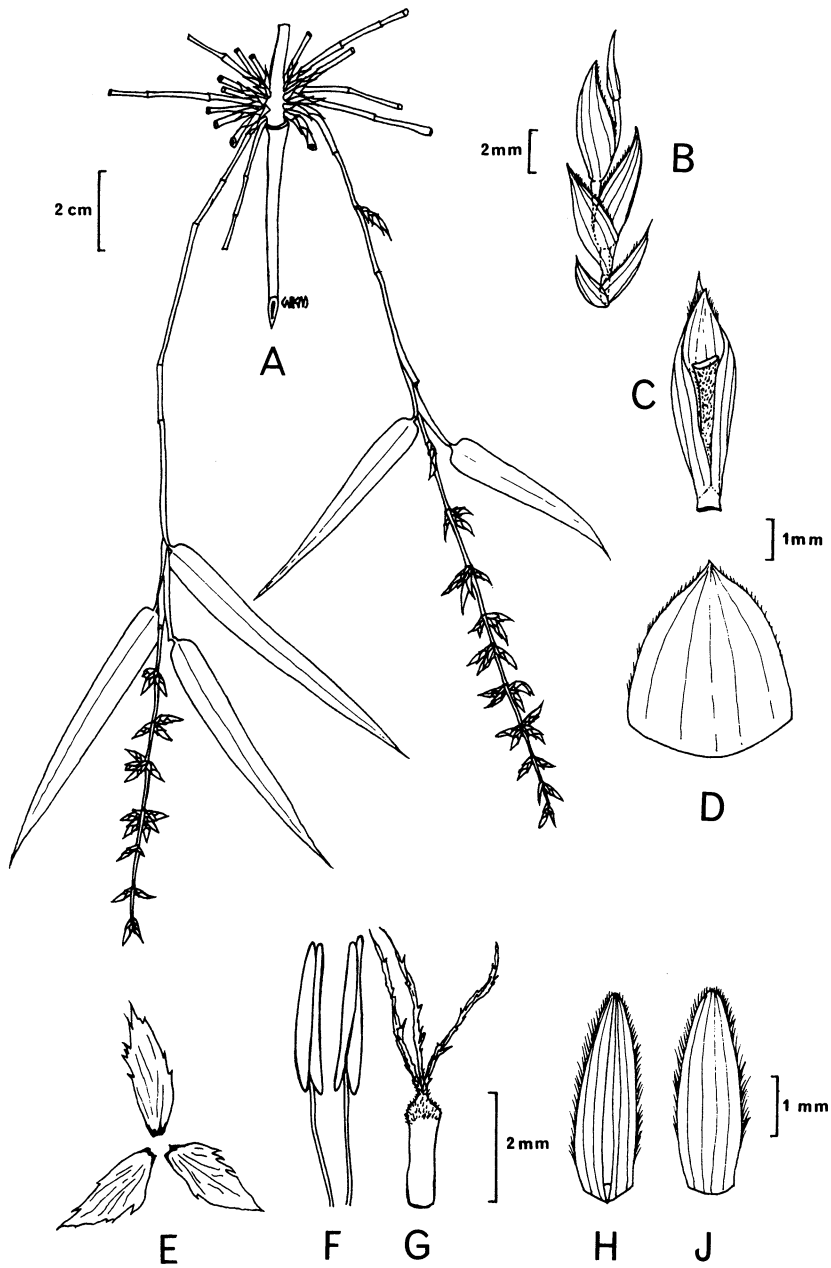


FIG. 3. *Holttumochloa korbuensis*. **A** flowering leafy branches; **B** pseudospikelet with (from the base) 2 gemmiferous bracts, one transitional glume, 2 perfect flowers, terminal vestigial flower; **C** palea and rachilla internode with lemma; **D** lemma. **E** lodicule complement; **F** stamens; **G** young fruit with stigmas; **H** palea, ventral view; **J** palea, dorsal view. From *Symington* KEP 31496. Drawn by author.

Culm (on specimen) 0·4 cm diameter, glabrous. Culm sheaths unknown. Branch complement at each culm node of many slender leafy branches 10–25 cm long, these simple and bearing only one bud at each node. Leaf blades 3·5–7·5 cm × 6–10 mm, glabrous, green; pseudopetiole 1–1·5 mm long; auricles nil; ligule a rim to 0·5 mm high, densely short-hairy. Inflorescence initiating at the end of a leafy branch and gradually developing more spikelets basipetally as the leaves drop, the primary pseudospikelets each developing from a solitary bud at each branch node. Pseudospikelet to 12 mm long, of 1–2 basal (empty) bracts, 1–2 bracts subtending prophyllate buds, 1 transitional glume, 2–3 perfect flowers and a vestigial terminal flower, spikelet rachilla internodes strongly flattened, finely hairy, c. 2 mm long between florets and to 3 mm long just below the terminal vestigial flower. Lemma to 5 mm long, acute, edges with fine short pale hairs, otherwise glabrous, with 5 nerves. Palea 3–4 mm long, 2-keeled with the wing-like margins infolded, each wing with 2 nerves, the back (between the keels) with 4 nerves, the keels pale fine hairy. Lodicules 3, glabrous, the margins serrate, the 2 anterior c. 2 × 1·5 mm, the posterior c. 2·5 × 1 mm. Stamens 6, the anthers 1–1·5 mm long with emarginate tips, basifixed, the filaments filiform and free. Ovary cylindrical with a thickened apex, 1·5–2 mm long, short-hairy at the apex; stigmas 3, arising directly from the ovary apex, plumose. Fig. 3.

DISTRIBUTION. Known only from the mountain Gunung Korbu in Perak, on the Main Range.

HABITAT. Montane forest.

PENINSULAR MALAYSIA. Perak: Gunung Korbu, *Symington* KEP 31496 (holotype KEP), *Lee Shok Mee*, s.n. 15 May 1988 (KEP).

3. *Holttumochloa pubescens* K. M. Wong sp. nov. *H. korbuensis* Wong affinis sed laminis foliorum ramorum puberulis et auriculis setosis recedit (inflorescentia ignota). Typus: Malay Peninsula, Kelantan, Gunung Stong, *Whitmore* Fri 12444 (holotypus KEP).

Culms (on specimen) 0·6 cm diameter, glabrous. Culm sheaths unknown. Branch complement at each node of many slender leafy branches 10–30 cm long, these typically simple (very rarely once branched) and bearing only one bud at each node. Leaf blades 5–11 cm × 4–10 mm, upper side pale-hairy at the base, lower side densely pale-hairy, green; pseudopetiole 1–1·5 mm long; auricles with 2–3 mm long pale bristles; ligule a rim 0·1–1·5 mm high, densely short-hairy. Inflorescences unknown.

DISTRIBUTION. Known only from G. Stong in Kelantan.

HABITAT. Upper montane stunted forest on granite, at c. 1450 m.

PENINSULAR MALAYSIA. Kelantan: Gunung Stong, summit, *Whitmore* FRI 12444 (holotype KEP).

***Kinabaluchloa* K. M. Wong genus novum** rhizomatibus sympodialibus, inflorescentiis iterauctantibus, spicula 1–2 flores et florem vestigiallem terminalem in internodio rachillae longo portatum ferenti, 3 lodiculis, 6 staminibus filamentis plerumque liberis, systemate ramorum e fasciculo ramorum subaequalium a

gemma unica nodo culmi exorienti constanti *Schizostachyo* Nees et generibus cognatis affinis sed pseudospicula bractea magna (magna quam lemmate) subtenta, flore unico vel inferno super glumam magnam quam lemma inserto, ovario cylindraceo gracile glabro vel apice sparse pubescenti, stigmatibus sessilibus differt. Typus: *Kinabaluchloa wrayi* (Stapf) Wong.

The only genera with somewhat comparable characters are those of the *Bambusinae* and *Schizostachydinae* as circumscribed by Soderstrom & Ellis (1987), which are generally characterised by sympodial rhizomes, solitary primary branch buds, itercauctant inflorescences, 6 stamens and 3 lodicules.

Kinabaluchloa differs from *Bambusa* in having a reduced number of flowers, and in having primary-branch bud prophylls with free margins. It is distinguished from *Gigantochloa* by the reduced number of flowers and by having rachilla internodes that disarticulate below the lemma. It differs from *Dendrocalamus* and *Klemachloa* in that even with a reduced number of flowers in the spikelet, an extended rachilla internode bearing a terminal vestigial flower is always present, and in that all paleas are keeled. *Thyrsostachys* has the lowermost palea bifid, and *Dinochloa* and *Melocalamus* are characterised by fleshy fruits, whereas in *Kinabaluchloa* the paleas are not bifid and the fruit is an endosperm-filled caryopsis.

The *Schizostachyum* and *Melocanna* alliance of genera all have a distinctive glabrous ovary with an elongated and persistent style, whereas *Kinabaluchloa* has ovaries that are glabrous to slightly hairy at the summit, from which the stigmas arise directly. The large bract subtending each pseudospikelet in *Kinabaluchloa* is reminiscent of the spathe-like bracts that embrace each pseudospikelet in *Melocanna*; however, *Melocanna* has unkeeled paleas and only two lodicules in the flower, large fleshy fruits and secundly arranged pseudospikelet branches, and so is very different.

The genus is named after Mount Kinabalu, at the northern end of Sabah's Crocker Range and botanically one of the most spectacular mountains known, where the species *K. nebulosa* is common.

KEY TO THE SPECIES OF KINABALUCHLOA

- Pseudopetiole 1–1.5 mm long; leaf-sheath auricles bristly; pseudospikelet 10–12 mm long; spikelet with one perfect flower (Malay Peninsula). . . **1. *K. wrayi***
 Pseudopetiole 2–4 mm long; leaf-sheath auricles inconspicuous and glabrous; pseudospikelet 15–25 mm long; spikelet with two perfect flowers (Borneo). **2. *K. nebulosa***

1. *Kinabaluchloa wrayi* (Stapf) K. M. Wong, comb. nov.

Bambusa wrayi Stapf in Bull. Misc. Inform., Kew 1893: 14 (1893) & in Hooker's Ic. Pl. 23 pl. 2253 (1893); Gamble in Ann. Roy. Bot. Gard. (Calcutta) 7: 49, pl. 46 (1896); Ridley in Mat. Fl. Malay. Penins. 3: 183 (1907); E. G. Camus, Bambusées: 128, pl. 75 (fig. C) (1913); Ridley, Fl. Malay Penins. 5: 259 (1925); Holttum in Gard. Bull. Singapore 16: 73 (1958); Gilliland, Revised Flora of Malaya 3: 22 (1971). Type: Malay Peninsula, Perak, Gunong Inas, Wray 4166 (holotype K, isotype SING). Fig. 4.