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Reviewed work(s):

Source: *Kew Bulletin*, Vol. 53, No. 4 (1998), pp. 857-873

Published by: [Springer](#) on behalf of [Royal Botanic Gardens, Kew](#)

Stable URL: <http://www.jstor.org/stable/4118873>

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# *Cyrtochloa*, a new genus of bamboo (*Gramineae-Bambusoideae*) from the Philippines

SOEJATMI DRANSFIELD<sup>1</sup>

*Summary.* *Cyrtochloa*, a new genus of bamboo (*Gramineae-Bambusoideae*) from the Philippines, is described. There are five species in the genus. Three of them, *Cyrtochloa toppingii* (Gamble) S. Dransf., *C. fenixii* (Gamble) S. Dransf. and *C. luzonica* (Gamble) S. Dransf., are transferred from *Schizostachyum* Nees, and two are described as new: *C. hirsuta* S. Dransf. and *C. puser* S. Dransf. Morphology of vegetative and flowering parts, and relationships with other genera are discussed. The genus is mainly found in Luzon, possibly also extending to Mindoro. The new genus appears to be related to *Dinochloa* Büse, by having one-flowered spikelets and fruits with a relatively thick fleshy pericarp, abortive endosperm, and a large scutellum.

## INTRODUCTION

In early 1980 when I started working on the genera *Schizostachyum* Nees and *Dinochloa* Büse, I found that two species of *Schizostachyum* from Luzon, Philippines, *S. toppingii* Gamble and *S. fenixii* Gamble, did not fit within the genus. These two species have globose fruits resembling those of *Dinochloa* species, and I thought they should be excluded from *Schizostachyum*, and placed in *Dinochloa*. In *Schizostachyum* the fruit is cylindrical or oblong, extending upwards into a long beak, with a relatively thin pericarp easily removed from the seed; the seed is usually cylindrical, and is like a typical grass seed, with a well-developed endosperm, and a small embryo situated at the base. The spikelet in *Schizostachyum* usually has one floret (exceptionally up to four) and a rachilla extension bearing a rudimentary floret. The fruits in *S. toppingii* and *S. fenixii* have a relatively thick pericarp, almost no endosperm, and an embryo with a large scutellum that fills the fruit cavity, features that are found in the fruits of *Dinochloa* (Dransfield 1981). *Dinochloa* is a genus of sympodial climbing bamboos, with usually large, indeterminate inflorescences consisting of small pseudospikelets bearing one-flowered spikelets without a rachilla extension, and globose fruits. The fruit consists of a relatively thick, fleshy pericarp, abortive endosperm, and a large embryo comprising mainly a scutellum; the plumule and radicle are lateral, and the scutellum is traversed by vascular bundles (Dransfield 1981; Rudall & Dransfield 1989). In *S. toppingii* and *S. fenixii* the spikelets consist of one floret without a rachilla extension, and the plumule and radicle of the embryo are basal. The type specimens do not show very well whether the plants were true climbers,

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Accepted for publication July 1998.

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but the label mentions “scrambling” or “scandent”. At first I thought they were probably only extreme forms of *Dinochloa*. In 1993 I carried out fieldwork in Luzon, Philippines, to find and recollect some native bamboos. I managed to visit type localities of various bamboo species described from the island, and collected them. Unfortunately flowering plants of *S. toppingii* and *S. fenixii* were not seen, but I am nevertheless convinced that I recollected them. The leaf-blades match those of the type specimens; they have unequal bases, so characteristic that one can identify these species from leaf-blades alone — that is one side of the base is markedly rounded or cordate, the other side cuneate. The plants do not climb, but scramble as noted on the type specimens. The culms are erect, but the tips or the upper parts scramble or lean on nearby trees or vegetation, or droop to the ground, and the dominant middle, or primary, branches elongate and also scramble over nearby vegetation. In the areas where there is not much natural vegetation left, such as on hills around Wa Wa Dam, east of Montalban (type locality of *S. toppingii*), young culms can be seen sticking over thickets with the upper parts arching. These features, noticed in the field, together with other structures, such as the spikelets and fruit, support the exclusion of these two species from *Schizostachyum* and from *Dinochloa*, and their placement in a new genus *Cyrtochloa*, with *C. toppingii* as the type species. The name alludes to the distinctive arching feature of the young culms.

I also visited Zambales Province, and managed to collect *Schizostachyum luzonicum* Gamble, described in 1910. The type specimen consists of leafy branches and young inflorescences. The habit resembles that of *C. toppingii* and *C. fenixii*, and the leaf-blades also have unequal bases. I found young inflorescences which match the type specimen. Although I did not see fruit, I include this species in the new genus, because of the manifest similarities; however, when fruit, as one of the most important characters of *Cyrtochloa*, is obtained, it may be necessary to exclude it from the genus.

In his account of bamboos of the Philippines, Santos (1986) included *Pseudostachyum polymorphum* Munro, a species found in Burma and India, on the basis of specimens from Zambales and Bataan Provinces. Unfortunately no specimens are cited, but he provided illustrations. Specimens which bear an annotated label of *P. polymorphum*, and collected by the Rev. Fred Pennoyer (*Pennoyer* 853) from Dinalupihan, Bataan, were sent to Kew on loan from the Philippine National Herbarium. A copy of the illustrations is also attached to one of the specimens, and I believe Santos' description was based on these specimens. This bamboo, in fact, is not *P. polymorphum*. In *Pennoyer* 853 the middle branch is dominant, surrounded by few small branches (in *P. polymorphum* the branches are of the same size); the spikelet has no rachilla extension, the style is hairy, and fruit has a large embryo and an abortive endosperm. Based on these characters I include this bamboo in *Cyrtochloa*, as a new species *C. hirsuta*, which can be differentiated from the other three species mainly by its hairy glumes, lemma and palea.

In describing *Schizostachyum fenixii*, Gamble included *McVey* s.n. collected from Abra, with the local name “puser”. In 1993 I collected a sterile bamboo in San Quintin, Abra, called “puser” by local people; its leaf-blades match those of

“puser” collected by McVey. The fruit is very different from that of the type of *S. fenixii*; it is obovoid, pointed towards the base with a broad top, and is more or less rugose or wrinkled. Moreover, the culm sheaths are glabrous and smooth and the ligule is short and entire. “Puser” is different from *S. fenixii*, has not previously been described, and certainly belongs to *Cyrtochloa*. I have called this bamboo *Cyrtochloa puser*.

#### MORPHOLOGY

*Cyrtochloa* species are relatively small bamboos 3 – 6(– 10) m tall, with culms 1 – 4 cm in diameter. The culms in *Cyrtochloa* are not absolutely straight, but slightly geniculate. The internodes are usually smooth, with relatively thick walls, and are very hard. As relatively small diameter bamboos, the culms or internodes should be easily cut, even with a pen-knife, but in fact the internodes of the culms and branches are so hard that they are very difficult to cut. Moreover, the culms are not easily split. In *Schizostachyum* the culms have thin walls, and normally are easily cut or split, whereas in *Dinochloa* they are usually solid (somewhat hollow with small lumen), but easily cut, because the middle part is soft. In bamboos the size of the culm can often be used to differentiate genera, but the texture of the culm is not usually employed in differentiating bamboo genera. In the case of *Cyrtochloa*, however, the hardness of the culm can be used to support other features to differentiate it from other related genera.

Branch morphology is very important in bamboo taxonomy, especially in differentiating genera (Holttum 1958; McClure 1966; Dransfield 1981; Wong 1995a & b). In *Cyrtochloa* there is one branch primordium at each node protected by the sheath of the culm leaf. This branch primordium gives rise to a single primary branch bud which develops and elongates, and becomes a primary lateral branch. This primary lateral branch produces secondary branches at each node, starting from its lowermost nodes. In this case, the main culm has several branches at each node with the middle, or primary, branch dominant. This middle branch is often as large as the main culm, and bears several branches at each node; it cannot support itself, and scrambles over nearby vegetation or trees, or subsides on to the ground. This can give the impression that the bamboo is a climber. In *Schizostachyum* the culm has generally many branches of the same size at each node, and there is no dominant middle branch. In *Dinochloa* the middle branch is dominant, but is dormant, and will develop only when the apex of the main culm is damaged. Based on branch morphology, *Cyrtochloa* is not related to *Schizostachyum*, but is more closely related to *Dinochloa*.

The inflorescence in *Cyrtochloa* is indeterminate. The pseudospikelets are arranged on the lateral branches of a large leafless flowering branch up to 60 cm long, or on a short branch terminating a leafy branch. The main axis of the inflorescence bears a single lateral branch at each node, each supported by a sheath or bract possessing a blade or modified blade. These branches can be very short or long; in *C. toppingii* they are up to 1 cm long, with densely compacted pseudospikelets, whereas in *C. hirsuta* they are up to 9 cm long. The spikelets are up to 8 mm long, longer than those of typical *Dinochloa* species (such as *D. scandens*),

and slightly more slender with more or less acute tips. It is possible that based on the spikelet features, Gamble (1910) included these taxa in *Schizostachyum*. They certainly do not belong to *Schizostachyum*, because the spikelet contains only one floret (usually fertile), without a rachilla extension. Moreover, the anthers have an apiculate hairy apex, in *Schizostachyum* the anthers have an obtuse apex; the elongate style is hairy, whereas in *Schizostachyum* it is smooth and glabrous. As mentioned earlier, the fruits are quite different from those of *Schizostachyum*, but resemble those of *Dinochloa* species.

The relationships with other related genera, and also with *Sphaerobambos* S. Dransf., a genus with globose fruit (Dransfield 1989), are summarised in Table 1.

TABLE 1. Comparative morphology of *Cyrtochloa* S. Dransf., *Dinochloa* Büse, *Schizostachyum* Nees, and *Sphaerobambos* S. Dransf.

	<b>Cyrtochloa</b>	<b>Dinochloa</b>	<b>Schizostachyum</b> (Malesian spp., except <i>S. terminale</i> )	<b>Sphaerobambos</b>
Habit	erect, then scrambling	climbing	erect, with arching tips	erect, then scrambling
Culms	slightly geniculate	zig-zag	straight	straight or slightly zig-zag
Internodes	with relatively thick walls, hard	solid or with small lumen, not so hard	generally with thin walls, moderately hard	with thin walls, moderately hard
Branches	several, with middle branch dominant	several to many, middle dormant, or elongating	many, the same size	several to many, middle branch dominant
Spikelet	1 floret, no rachilla extension	1 floret, no rachilla extension	1 – 4 florets, with rachilla extension	many florets, no rachilla extension
Lodicules	3	usually not present	usually 3	absent
Anthers	with apiculate tips	with apiculate tips	with obtuse tips	with apiculate tips
Style	hairy	glabrous	glabrous	hairy
Fruits	globose or obovoid, berry, fleshy pericarp, endosperm vestigial	globose or subglobose, berry, pericarp fleshy, endosperm vestigial	cylindrical or oblong, pericarp hard, endosperm well-developed	globose, berry, pericarp fleshy, endosperm vestigial
Plumule and radicle	basal	lateral	basal	basal

## CYRTOCHLOA

**Cyrtochloa** S. Dransf. **gen. nov.** structura interna fructus, spiculis unifloris *Dinochloae* Büse affinis, sed culmis erecto-patentibus vel ascendentibus, gemmis ramorum primariorum non dormientibus, internodiis cavis pariete crasso duro, stylo pubescenti, embryone plumula et radicula basali differt. Typus: *Cyrtochloa toppingii* (Gamble) S. Dransf.

Erect, then scrambling, relatively small, sympodial bamboo; rhizomes often with relatively long necks. Culms erect with arching tips when young, then scrambling, strong and rigid, hollow with relatively thick and very hard walls, not markedly straight, or slightly zigzag. Branches few to many at each node, with the primary branch dominant and elongating, often as large as the main culm, and bearing few to several lateral branches at each node. Culm sheaths of culm leaves usually consisting of two parts, the upper part (the culm sheath proper) rigid, often woody, glabrous or densely hairy on the back, and the base prominent or not so, usually rugose, glabrous or hairy; blades usually erect, occasionally spreading or reflexed (in *C. puser*), broadly ovate to ovate-lanceolate, base cordate; auricles present. Leaf-blades slightly rigid, usually with subequal bases, one side cordate, the other attenuate, margins (especially near the base) serrate, very sharp, petiole very short. Inflorescences indeterminate, borne on leafy or leafless branches, pseudospikelets usually arranged in compact groups at each node. Spikelet containing one floret without a rachilla extension; glumes 2, glabrous or hairy; lemma glabrous or hairy, with short or long pointed tip, many-nerved; palea with a narrow groove on the back, often with an extra structure (see note below) inside the palea; lodicules usually 3 (probably absent in *C. luzonica*); stamens 6, anthers with long pointed hairy tips (not markedly hairy in *C. hirsuta*); ovary hairy at the top, style long and hairy; stigmas 3, hairy. Fruit globose, oblong or obovoid, pericarp thick, seed usually with reduced endosperm, embryo with large scutellum, plumule and radicle basal.

NOTES. It is very interesting to note the presence of an extra structure opposite and inside the palea. The first time I examined the spikelet of *Schizostachyum toppingii* Gamble (= *Cyrtochloa toppingii*) and *S. fenixii* Gamble (= *C. fenixii*), I was surprised at the arrangement of the palea and lodicules. It can be generalised that in bamboos with three lodicules, the posterior lodicule is situated between palea and pistil/ovary, whereas the two anterior ones are close to the edges of the palea; usually the posterior lodicule is symmetrical, whereas the other two are asymmetrical. In the two species above, the lodicules are almost identical and symmetrical, two of them are situated between the pistil/ovary and a membranous non-keeled structure, which at first I thought was the palea though the arrangement of the lodicules would be unusual. After working on the genus *Decaryochloa* A. Camus from Madagascar (Dransfield 1997), which also has an extra structure opposite and inside the palea, I realised that the membranous non-keeled structure in the two species above is an extra scale. The palea in the two species above is more or less 2-keeled on the back especially near the apex, and encloses the base and the margins of this membranous structure. It is not clear which part of the floret it represents.

KEY TO THE SPECIES OF *CYRTOCHLOA*

1. Culm sheaths glabrous . . . . . 2  
 Culm sheaths hairy . . . . . 3
2. Blades of culm leaves erect; ligule short, with long bristles . . . . . 5. *C. luzonica*  
 Blades of culm leaves erect then deflexed; ligule short, entire . . . . . 3. *C. puser*
3. Lemmas hairy on the back, with long pointed tips (2.5 mm long) . . . 4. *C. hirsuta*  
 Lemmas glabrous on the back, with short tips (about 1 mm long) . . . . . 4
4. Fruit globose, slightly rugose; auricles of leaf-blades resembling narrow rim . . . .  
 . . . . . 1. *C. toppingii*  
 Fruit oblong, smooth; auricles of leaf-blades resembling rounded lobes . . . . .  
 . . . . . 2. *C. fenixii*

1. *Cyrtochloa toppingii* (Gamble) S. Dransf. comb. nov.

*Schizostachyum toppingii* Gamble, Philipp. J. Sci. 5: 276 (1910). Type: *Topping* Bur Sci. 5222 (holotype K).

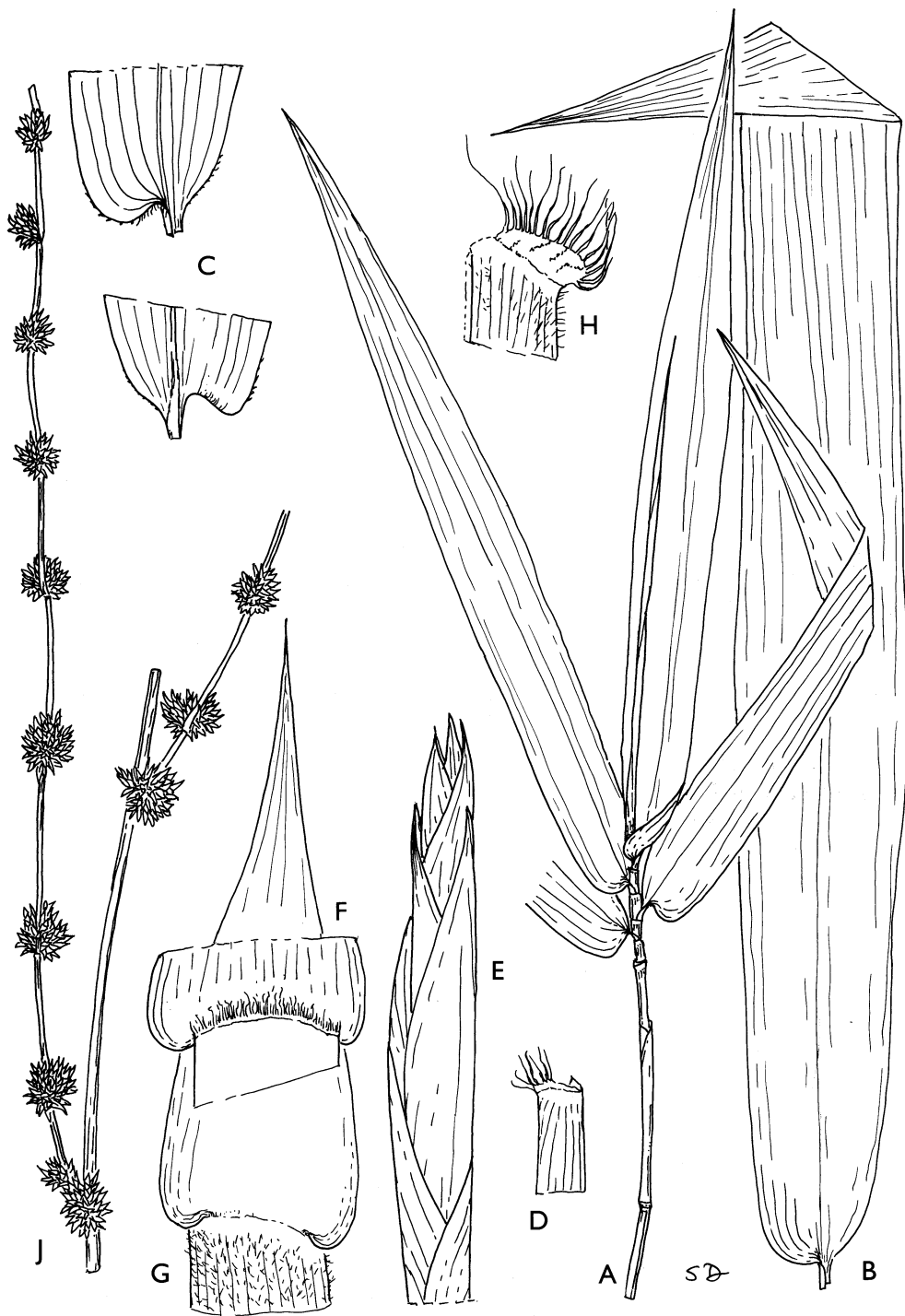
Culms slightly zigzag, 5–10 m tall, with tips scrambling or leaning on nearby trees or vegetation, or dropping onto the ground, internodes 20–40 cm long, 2–4 cm in diameter, walls 2–3 mm thick, dark green, when young covered with white wax especially below nodes, smooth when mature. Branches at each node about 18 with middle branch dominant, elongate, as large as the main culm. Young shoot green. Culm sheaths of culm leaves 6–8 cm long, densely covered by purplish brown or brown hairs, hairs easily shed, base not prominent, slightly rugose, usually covered by brown hairs, one margin hairy; blades erect, broadly ovate, cordate at the base, 11–20 cm long, 2.5–6 cm wide at the base, tapering to long tips, glabrous; ligule lacinate, about 6 mm long; auricles large lobes, erect or spreading, about 6 mm long, fringed with bristles, easily shed or broken. Leaf-blades 14–32 × 1–3.6 cm, base asymmetrical, 6 mm wide on one side, and 3 mm wide on the other, glabrous or sparsely hairy then glabrescent, margins serrate (especially near the base), tapering to a long tip; ligule lacinate, 3 mm long; auricles not prominent; sheath glabrous, one margin hairy; petioles about 2 mm long. Inflorescences about 50 cm long, lateral branches up to 1 cm long. Pseudospikelets glabrous, about 6 mm long, prophylls 2 (one-keeled) or one 2-keeled; glumes 2, 4–5 mm long, glabrous; lemma glabrous, 6 mm long, sharply pointed, 7-nerved; palea glabrous, 6-nerved, extra structure 3-nerved, ciliolate along the margins; lodicules ciliolate, about 1.5 mm long. Fruits globose, usually slightly rugose, 4–8 mm in diameter. Figs. 1 & 3K–W.

LOCAL NAME. Bokavi (Bokawe, Bocavi).

DISTRIBUTION. Luzon, found mainly in Rizal Province.

HABITAT. Secondary vegetation along streams or ravines, on rocks containing heavy metals; altitude c. 50 m.

FIG. 1. *Cyrtochloa toppingii*. **A** leafy branch with smaller leaf-blades × 2/3; **B** larger leaf-blade × 2/3; **C** base of leaf-blade, adaxial and abaxial surfaces × 1/3; **D** auricle of leaf-blade × 3; **E** upper part of young shoot × 1/3; **F** culm leaf and **G** culm leaf showing the ligule × 1/3; **H** auricle of culm sheath × 3; **J** part of flowering branch × 2/3. **A–D** and **J** from the type, **E–G** from SD1297, **H** from SD1326. Drawn by the author.



PHILIPPINES. Rizal, Montalban, fl. & fr., July 1908, *Topping* 5222 (holotype, K); l.c., Payatas, near Montalban, st., 24 Nov. 1993, *Dransfield et al.* SD1326 (K, PNH); Laguna, Los Baños, College, FORI Bambusetum, planted, st., 9 Nov. 1993, *Dransfield et al.* SD1297 (K, PNH); Macati, San Pedro, st., March 1911, *Merrill* 7471 (PHN, US).

NOTE. Gamble cited several specimens under this species, but only two of them are *C. toppingii*. *Merritt* For. Bur. 9500, from Mt Calavite, Mindoro, is a *Dinochloa* species. The vernacular name "usu" recorded by Merritt, mentioned by Gamble, then cited by Santos (1986), is in fact a local name for *Dinochloa* species. *Merrill* 126, from Nueva Viscaya, is *C. fenixii*.

## 2. *Cyrtochloa fenixii* (Gamble) S. Dransf. comb. nov.

*Schizostachyum fenixii* Gamble, Philipp. J. Sci. 6: 289 (1913). Type: *Fenix* s.n. (holotype K).

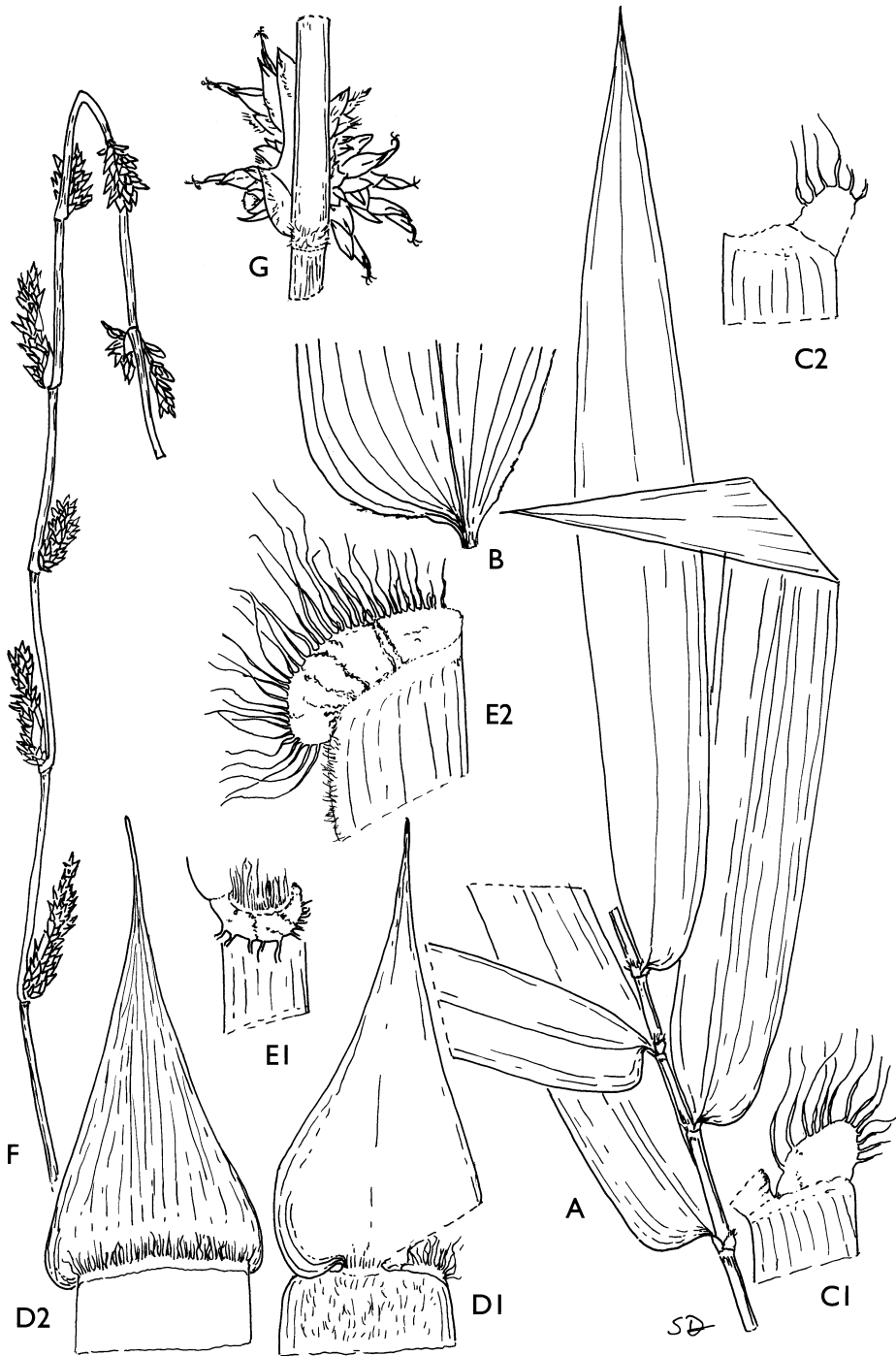
Culms erect with long drooping or scrambling tips, slightly zigzag, 7–10 m long, internodes 30–50 cm long, diam. 2.5–3 cm, walls 4–5 mm thick, light to dark green, smooth, with white wax when young, especially below nodes. Branches few to many, with middle branch dominant, elongating, drooping or scrambling over nearby vegetation. Young shoots covered with golden brown hairs. Culm sheaths 15 cm long, very hard, thick and woody, covered with long golden brown hairs especially when young, hairs easily shed, base prominent with age, also covered with easily shed golden brown hairs; auricles large, 9–20 mm long, with long curly bristles up to 15 mm long; ligule short, with bristles 7–13 mm long; blades broadly ovate, 9–16 cm long, 23–56 mm wide near the base, tapering to a long fine tip, usually erect, usually glabrous. Leaf-blades glabrous, 23–30 × 3.5–4.5 cm, bases subequal, one side cordate or rounded, about 9 mm wide, other attenuate, 3–4 mm wide; ligule very short, ciliate; auricles large, 3 mm long, oblique, fringed with bristles (up to 10 mm long); sheaths glabrous; petioles 5 mm long. Inflorescences about 1.5 m long, lateral branches about 1 cm long. Pseudospikelets ± 6 mm long, with one 2-keeled prophyll at the base. Spikelet consisting of 2 glumes and one floret; lower glume 3.5 mm long, ovate with pointed tip, hairy along the margins, especially in the upper part, 5-nerved; upper glume 4 mm long, broadly ovate, mucronate, with stiff hairs especially near the apex, 5-nerved; lemma 5 × 2 mm, with a stiff tip 1 mm long, glabrous, 5-nerved; palea 5.5–6 × 2.5–3 mm, glabrous, with 2-pointed tips, 6-nerved; lodicules 1.5–2 × 1 mm; anthers 4–4.5 mm long (including hairy tips); ovary and style 8 mm long. Fruit oblong, smooth, 7 mm long, about 5 mm in diameter. Figs. 2 & 3A–J.

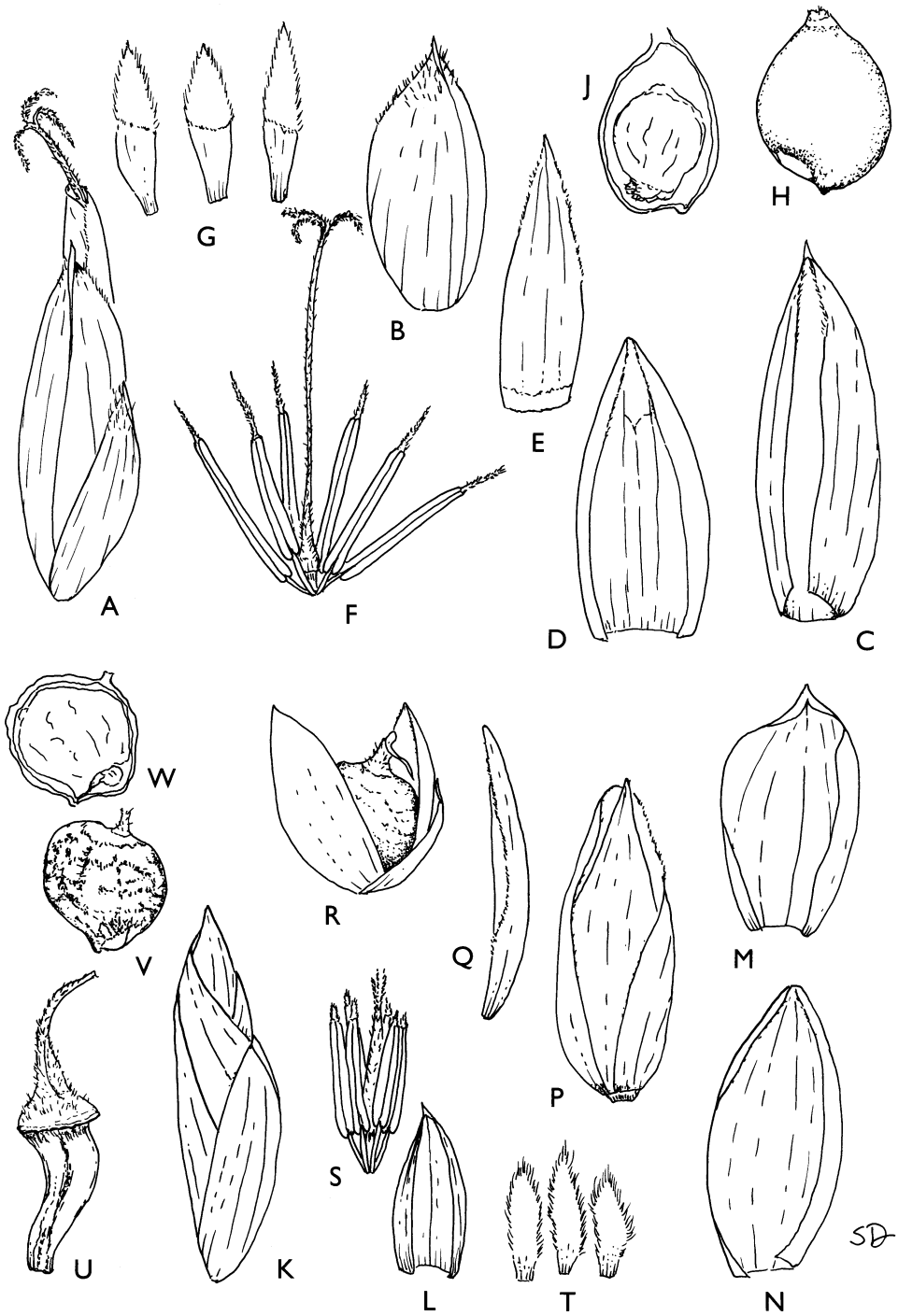
DISTRIBUTION. Luzon, Benguet and Pampanga Provinces.

HABITAT. Secondary vegetation on rocky slopes, by the road; alt. 200 m.

PHILIPPINES. Benguet Province, Sablang, fl. & fr., Dec. 1910, *Fenix* s.n. (holotype, K); l.c., Kalud, near Baguio, about 15 km from Naguilian, st., 12 Nov. 1993, *Dransfield et al.* SD1308 (K, PHN); Pampanga, Mt Arayat, fl., 15 Feb. 1893, *Loher* 1671 (K).

FIG. 2. *Cyrtochloa fenixii*. **A** leafy branch × 1/3; **B** base of leaf-blade × 1; **C1** & **C2** auricles of leaf-blade × 3; **D1** culm leaf showing auricle and hairy sheath & **D2** showing the ligule × 1/3; **E1** & **E2** auricles of culm sheath × 1 1/2; **F** part of flowering branch × 2/3; **G** a node of flowering branch × 1 1/2. **A–C**, **F** & **G** from the type, **D** & **E** from SD1308. Drawn by the author.





**3. *Cyrtochloa puser*** S. Dransf. **sp. nov.** *C. fenixii* (Gamble) S. Dransf. affinis, sed vagina culmi glabra non hirsuta, laminis vaginarum culmi plerumque reflexis, fructu obovoideo non oblongo recedit. Typus: *McVey* s.n. (holotype K).

Culms slightly zigzag, 7–10 m long, with long tips drooping or scrambling over nearby trees, diam. 2.5–3 cm, internodes 30–40 cm long, hollow with thick walls (walls 5 mm thick), light green to dark green, smooth, covered with white wax when young, especially below nodes. Branches few to many at each node, middle branch dominant, often elongating. Culm sheaths glabrous, smooth, thick and woody, hard but brittle, 8–15 cm long, apex horizontal, usually with prominent rugose, glabrous base; auricles 10–30 mm long, 2–5 mm wide, brittle, easily shed, fringed with long bristles, these easily shed; ligule entire, 2 mm long; blades erect then deflexed, broadly ovate, tapering to long fine tips, base cordate, 8–13 cm long, 1.5–5 cm wide near the base, glabrous abaxially, hairy adaxially, especially near the base. Leaf-blades (5.5–)6–23 × (0.5–)2.2–3.6 cm, with fine long tips, usually glabrous, margin slightly serrate near the base; auricles 1–3 mm long, with curly bristles up to 7 mm long; ligule very short, entire in the middle, with long bristles along both ends; sheaths glabrous, often hairy along the margins near the top; petioles 2–3 mm long. Inflorescences borne on leafless culms or branches. Pseudospikelets 6 mm long, slightly flattened; lower glume 3 mm long, thin, stramineous, hairy especially towards the apex, with acuminate tip, 7-nerved; upper glume 5–6 mm long, thin, stramineous, hairy towards the apex, with long acuminate tip, 9-nerved; lemma 6–7 mm long, thin, stramineous, hairy especially towards the apex, with long acuminate tip, 7-nerved; palea 6 mm long, papery, 4-nerved, extra structure 5 mm long, very thin, apex obtuse-acuminate, ciliate along the margins towards the apex, 2-nerved; lodicules 1 mm long, fringed; ovary 5 mm long. Fruits obovoid, 7 mm long, diameter 4 mm near the top, wrinkled or slightly rugose. Fig. 4.

LOCAL NAME. “Puser” (Abra).

DISTRIBUTION. Luzon, Abra Province; common locally.

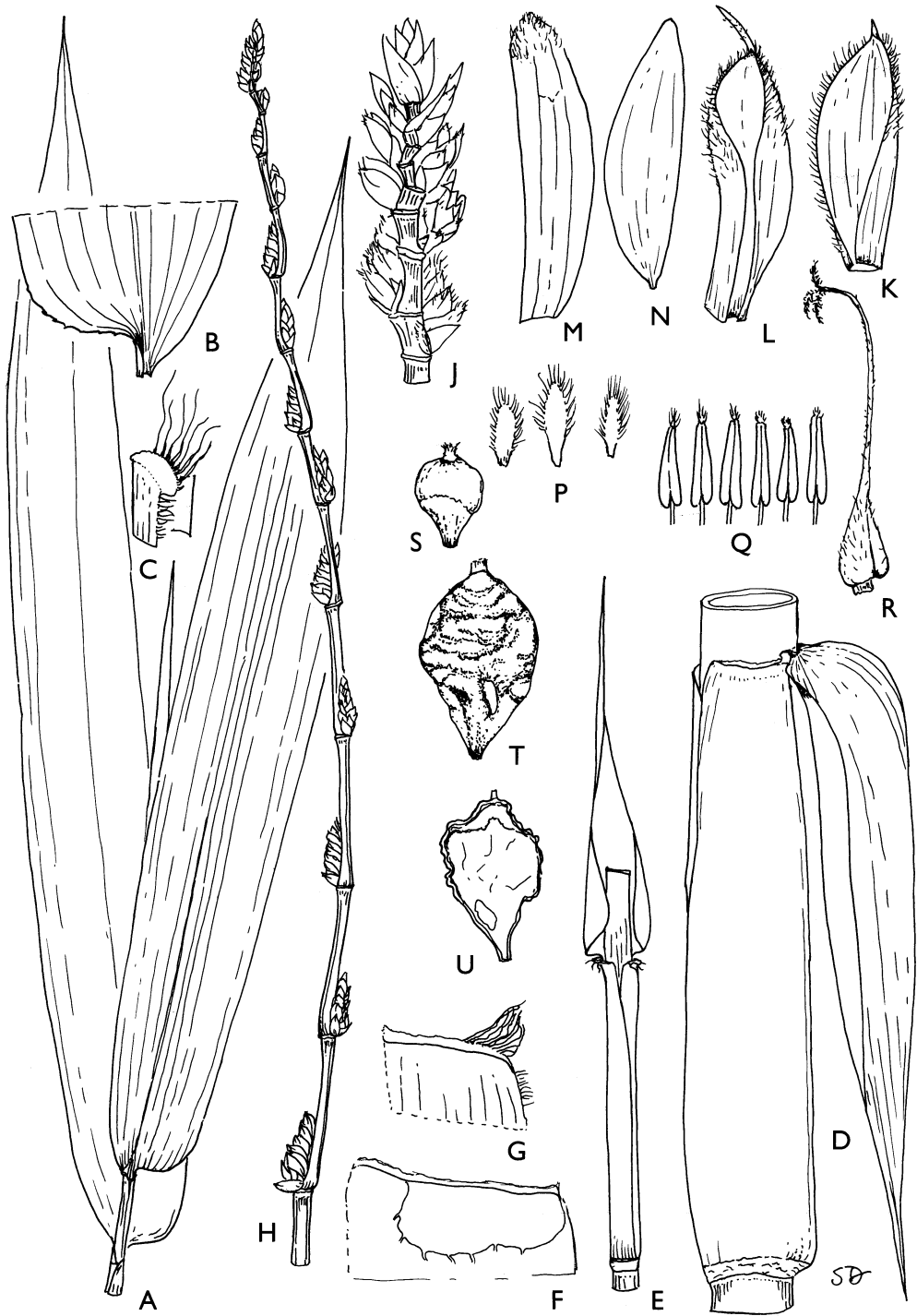
HABITAT. Secondary vegetation on open hilly ground; altitude c. 50 m.

PHILIPPINES. Abra, Banguet, fl. & fr., Feb. 1911, *McVey* s.n. (holotype, K); l.c., San Quintin, st., 16 Nov. 1993, *Dransfield et al.* SD1319 (K, PNH).

USES. Culms used for making fences, often seen for sale along the road where “puser” grows.

NOTES. The vegetative description is based mainly on SD1319. On one of the sheets of the type specimen (*McVey* s.n.) there is a large leaf-blade (34 × 9 cm), which probably does not belong to the same species.

FIG. 3. **A–J** *Cyrtochloa fenixii*. **A** floret with upper glume × 9; **B** upper glume × 9; **C** lemma × 9; **D** palea (note the middle nerve branched near the top) × 9; **E** extra scale × 9; **F** stamens and ovary with hairy style × 7; **G** lodicules × 7; **H** fruit × 3; **J** longitudinal section of the fruit × 3. All from the type. **K–W** *Cyrtochloa toppingii*. **K** young floret with upper glume × 9; **L** upper glume × 9; **M** lemma × 9<sup>2</sup>/<sub>3</sub>; **N** palea × 9<sup>2</sup>/<sub>3</sub>; **P** palea with extra scale × 9<sup>2</sup>/<sub>3</sub>; **Q** extra scale × 9<sup>2</sup>/<sub>3</sub>; **R** young fruit inside the floret × 4<sup>5</sup>/<sub>6</sub>; **S** stamens and ovary with hairy style × 10; **T** lodicules × 12<sup>2</sup>/<sub>3</sub>; **U** young fruit × 5<sup>1</sup>/<sub>3</sub>; **V** mature fruit × 3; **W** longitudinal section of fruit × 3. All from the type. Drawn by the author.



4. *Cyrtochloa hirsuta* S. Dransf. **sp. nov.** lemmate et palea pilosa, apice lemmatis pilifero a ceteris speciebus bene distincta. Typus: *Pennoyer* 853 (holotype PNH).

Culms erect, 6–7 m tall, green turning yellow, diam. 4–7 cm, hollow, walls 4–7 mm thick, internodes 50–60 cm long. Branches several at each node, with middle branch dominant. Culm sheath about 13 cm long, persistent, covered with appressed pale brown hairs, base less prominent, rugose; auricles erect, 15 mm long, 5 mm tall, fringed with long bristles along the margins, bristles easily shed; ligules short, fringed with bristles; blades erect, triangular, 9 cm long, 10 cm wide at the base, base cordate, with long tips, glabrous abaxially, pubescent adaxially. Leaf-blades (10–)25–32 × 2–5 cm, glabrous, serrate along the margins; auricles small, about 2 mm long, erect, fringed with bristles 5 mm long, these easily shed; ligule entire or minutely lacinate; sheaths glabrous, margins hairy; petioles 5 mm long. Inflorescences borne on leafless axillary branches, or terminating leafy branches, or up to 60 cm long, lateral branches curved, about 9 cm long, each branch supported by a prominent sheath bearing a blade or a modified blade, and often furnished with small auricles; sheaths up to 9 cm long, glabrous, hairy along the margins, blades ovate-lanceolate, with long tips, up to 1 cm long. Pseudospikelets 9 mm long, sheaths or bracts hairy on the back towards the apex; spikelets slightly flattened; lower glume 4–5 mm long, acuminate with long tip, hairy on the back especially near the apex and along the margins, 5-nerved; upper glume 7–8 mm long, acuminate with long tip (about 1 mm long), hairy on the back especially near the apex and along the margins, 9-nerved; lemma about 8–9 mm long, with a tip up to 3 mm long, acuminate, hairy on the back especially near the apex and along the margins, 9-nerved; palea 8 mm long, apex 2-lobed, hairy on the back near the apex, with 5 nerves, the middle one branched half way, and joining the side nerve next to it; extra structure 6 mm long, lanceolate, very thin, obtuse, 3-nerved; lodicules 1 mm long, fringed along the margins; ovary 9 mm long. Fruits subglobose, slightly rugose, 10 mm long, 7 mm diam. Fig. 5.

DISTRIBUTION. Luzon, so far known only from the type.

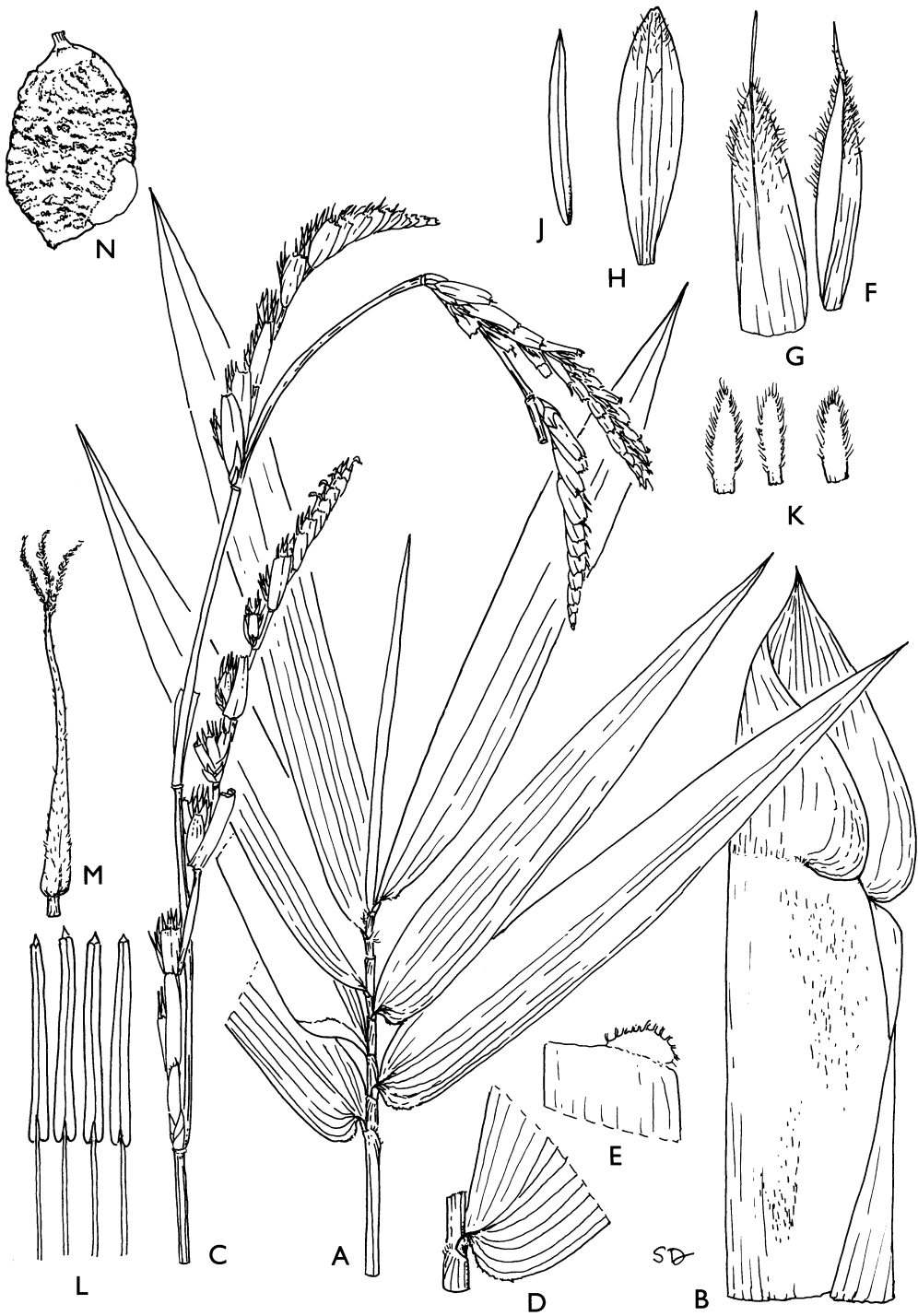
HABITAT. Secondary growth, along rivers or creeks.

PHILIPPINES. Bataan Province, Dinalupihan, in Barrio San Pablo, fl., 27 April 1981, *Pennoyer* 853 (PNH).

USES. Culms are used for making fences.

NOTES. Some of the lateral branches of the inflorescence have a long axis, and are curved, superficially resembling the inflorescence of *Pseudostachyum polymorphum* Munro. However, the detailed structure of the inflorescence and spikelets of *C. hirsuta* is very different.

FIG. 4. *Cyrtochloa puseri*. **A** leafy branch × 2/3; **B** base of leaf-blade × 1 1/3; **C** auricle of leaf-blade × 3; **D** culm leaf with deflexed blade × 2/3; **E** culm leaf with erect blade × 2/3; **F** auricle of culm sheath (bristles removed) × 1 1/2; **G** part of culm sheath ligule, showing bristles near the edge × 3; **H** part of flowering branch × 2/3; **J** upper part of flowering branch × 1 1/2; **K** upper glume × 7; **L** lemma × 7; **M** palea × 7; **N** extra scale × 7; **P** lodicules × 10; **Q** stamens × 15 1/3; **R** ovary with hairy style × 7; **S** young fruit × 5 1/3; **T** mature fruit × 3; **U** longitudinal section of fruit × 3. **A–C** and **H–U** from the type, **D–G** from SD1319. Drawn by the author.



**5. *Cyrtochloa luzonica* (Gamble) S. Dransf. comb. nov.**

*Schizostachyum luzonicum* Gamble, Philipp. J. Sci. 5: 277. 1910. Type: Luzon, Curran & Merritt For. Bur. 8411 (holotype K).

Open clumping, slender bamboo. Culms erect, upper parts scrambling, about 6 m tall (or 1–2 m, see note), 1–1.3 cm diam., smooth, light green, with white wax below nodes, walls 2–3 mm thick, internodes 40 cm long. Branches few at each node, with middle branch often dominant. Culm sheaths light green, not so hard, moderately thin, 8–13 cm long, covered with appressed light brown hairs and white wax, margins often hairy especially near the top, base more or less prominent, rugose, often hairy; auricles 5–7 mm long, erect or deflexed, fringed with long bristles up to 12 mm long; ligule short, fringed with long bristles; blades broadly erect, ovate, tapering to long fine tips, base cordate, 6–13 cm long, 1–3 cm wide at the base, glabrous abaxially, pubescent adaxially. Leaf-blades 12–31 × 1.5–3.9 cm, glabrous; auricles small, erect, with few long bristles; ligule short with long bristles; sheaths glabrous, margins hairy; petioles 6 mm long. Inflorescences terminating leafy branches, or borne on leafless branches, about 42 cm long, lateral branches about 1 cm long, subtending sheaths or bracts with or without modified blades, sheaths or bracts 5–25 mm long, glabrous on the back, hairy along the margins, modified blades ovate to lanceolate, 3–15 mm long. Pseudospikelets 5–7 mm long, glumes 2 with long pointed tips, 4–7 mm long (including the tips), glabrous on the back, hairy along the margins, lower glume 11-nerved, upper glume 13-nerved; lemma with long pointed tip, 11-nerved; palea 4 mm long, membranaceous, glabrous, 4-nerved, extra structure membranaceous, acuminate; lodicules not seen. Fruit not seen. Fig. 6.

**DISTRIBUTION.** Luzon, mainly in Zambales Province.

**HABITAT.** Disturbed forest or growing on open grounds/fields on ultramafic rocks; 400–800 m.

**PHILIPPINES.** Zambales, fl., Nov. – Dec. 1907, Curran & Merritt 8411 (holotype, K); Anuling, Nov. – Dec. 1924, fl., Ramos & Edano 44662 (K, PNH); about 20 km from Masinloc, Cotto Mine, st., 18 Nov. 1993, Dransfield *et al.* 1323 (K, PNH); Mt Pinatubo-Villar, 300 m, st., 13 Oct. 1948, Balintay 286 (PNH) and 18 Oct. 1948, Balintay 558 (PNH).

**USES.** Culm used for making fences.

**NOTES.** The clumps found growing in open fields vary from 1.5 m to about 6 m tall, and the culms also vary in diameter. It is possible that the culms have been harvested extensively by local people for making fences, so that the rhizomes are no longer able to produce normal size culms (this is the case in many tropical sympodial bamboos). *C. luzonica* often can be seen in the open fields at 50 m altitude, about 15 km east from Masinloc, Zambales.

**FIG. 5. *Cyrtochloa hirsuta*.** A leafy branch × 1/3; B culm leaf × 1/3; C part of flowering branch × 2/3; D base of leaf-blade × 2/3; E auricle of culm sheath × 2/3; F upper glume × 4/3; G lemma × 4/3; H palea × 4/3; J extra scale × 4/3; K lodicules × 7; L 4 of 6 stamens × 10; M ovary with long hairy style × 7; N fruit × 3. All from the type. Drawn by the author.



## ACKNOWLEDGEMENTS

1993 fieldwork in Luzon was financed by TOBU funds through the Royal Botanic Gardens, Kew, and fully supported by the Philippine National Herbarium, Manila, and the Ecosystems Research and Development Bureau, College, Laguna. I would like to thank Dr D. Madulid and his PNH staff, especially Mr E. Reynoso and Mr R. Fuentes, and Dr Virtuoso (ERDB) and his staff, Ms Cristina A. Roxas (ERDB) and Mr Comia, for making the fieldwork successful. I would also like to thank my Filipino friends, Benny & Easter Cid of Laguna, and Miss Honorata Velarde of Manila for their hospitality. Drs W. D. Clayton and John Dransfield read early versions of the paper and I thank them for their constructive suggestions. I also would like to thank the Director of the Philippine National Herbarium for the loan of material, and Dr Wong Khoon Meng for reviewing the paper.

## REFERENCES

- Dransfield, S. (1981). The genus *Dinorchloa* (*Gramineae-Bambusoideae*) in Sabah. Kew. Bull. 36: 613 – 633.
- (1989). *Sphaerobambos*, a new genus of bamboo (*Gramineae-Bambusoideae*) from Malesia. Kew. Bull. 44: 425 – 434.
- (1997). Notes on the genus *Decaryochloa* (*Gramineae-Bambusoideae*) from Madagascar. Kew Bull. 52: 593 – 600.
- Gamble, S. (1910). Bamboos of the Philippines Islands. Philipp. J. Sci. 5 (4): 267 – 281.
- Holtum, R. E. (1958). The Bamboos of Malay Peninsula. Gard. Bull. Singapore 16: 1 – 135.
- McClure, F. A. (1966). Bamboos. A fresh perspective. Harvard University Press, Cambridge, Massachusetts.
- Rudall, P. & Dransfield, S. (1989). Fruit structure and development in *Dinorchloa* and *Ochlandra* (*Gramineae-Bambusoideae*). Ann. Bot. (London) 63: 29 – 38.
- Santos, J. V. (1986). Philippines Bamboos. In: J. V. Santos, E. D. De Guzman & E. S. Fernando (eds.), Guide to Philippine Flora and Fauna Volume 4. Bamboos, grasses, palms. Pp. 1 – 43. Ministry of Natural Resources & University of the Philippines.
- Wong, K. M. (1995a). The Morphology, Anatomy, Biology and Classification of Peninsular Malaysian Bamboos. University of Malaya Botanical Monograph No. 1. University of Malaya, Kuala Lumpur.
- (1995b). The Bamboos of Peninsular Malaysia. Malayan Forest Rec. 41: 1 – 200.

FIG. 6. *Cyrtochloa luzonica*. **A** leafy branch with flowering branches  $\times \frac{1}{3}$ ; **B** culm leaf  $\times \frac{2}{3}$ ; **C** part of flowering branch  $\times 3$ ; **D** base of leaf-blade  $\times 2$ ; **E** auricle and ligule of culm sheath  $\times 3$ ; **F** auricle and margin of culm sheath  $\times 2$ ; **G** auricle of leaf-blade  $\times 2$ ; **H** upper glume  $\times 7$ ; **J** lemma  $\times 7$ ; **K** palea  $\times 7$ ; **L** extra scale  $\times 7$ ; **M** stamens and ovary  $\times 15\frac{1}{3}$ . **A**, **C**, **D**, **G** & **H** – **M** from the type, **B**, **E** & **F** from SD1323. Drawn by the author.