

# *Merostachys multiramea* (Poaceae: Bambusoideae: Bambuseae) and Similar Species from Brazil

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**ABSTRACT.** The true identity of *Merostachys multiramea* Hackel is discussed. As a result of a review of the group of the species similar to *M. multiramea*, the following are described as new: *Merostachys abadiana*, *M. cauciana*, *M. filgueirasii*, *M. kleinii*, *M. magellanica*, *M. pilifera*, *M. scandens*, and *M. skvortzovii*. The description of floral morphology is added to *M. glauca* McClure & L. B. Smith, which was originally described from sterile material. A key to the species is provided. All the species are fully illustrated.

In the past the name *Merostachys multiramea* Hackel has been applied erroneously to a number of different species, both described and undescribed. Because true *M. multiramea* is a distinct and rather rare species, represented in herbaria by only a few collections, a considerable amount of misidentified material has been placed under the specific epithet *multiramea* and thus left unstudied. Among these are species that present no difficulties in identification: either they are clearly new or they have already been described. However, there is a group of about 10 species that are difficult to distinguish one from another, but which cannot be aggregated under one name as has so far been the case.

As botanists working with herbarium collections of Brazilian bamboos have tended, over the years, to assign almost any specimen of *Merostachys* with medium-sized, 1- or occasionally 2-flowered spikelets to *M. multiramea* Hackel, the misidentification has had fourfold results. A number of validly published species, including *M. argyronema* Lindman, *M. clausenii* Munro, and *M. clausenii* Munro var. *mollior* Doell, were for a long time disregarded in the belief that they were all *M. multiramea*. Two names, *M. anomala* Dutra and *M. burchellii* Munro emend. Dutra (not *M. burchellii* Munro), crept into the group. Collections that would later be considered as distinct though unpublished taxa (*M. magellanica*, for instance) went unrecognized. And the identity of *M. multiramea* itself, the "umbrella" for so many other taxa, was largely obscured.

The name *Merostachys multiramea* was published in 1909 by Hackel, and *M. clausenii* Munro var.

*mollior* by Doell in 1880 (see von Martius, 1840–1906). The two species were described again, under new names, by Dutra in 1938: the former as *M. anomala* Dutra and the latter as *M. burchellii* Munro emend. Dutra. Dutra's emendation was based on the assumption that unidentified collections of flowering material in his possession were a good match for the vegetative and sterile material on which Munro (1868) based his original description. This "graft" was published by him (Dutra, 1938) as a distinct species.

The situation was further complicated by the inversion of the captions to Dutra's figures: his figure 2 (Dutra, 1938: 149), purporting to show leaves and inflorescences of *M. burchellii* Munro emend. Dutra, is, in fact, of *M. anomala* (= *M. multiramea*), while his figure 3 (Dutra, 1938: 149), which claims to be of *M. anomala*, is of *M. burchellii* Munro emend. Dutra (= *M. clausenii* Munro var. *mollior* Doell).

Return of the captions to their rightful figures eliminates a misleading interpretation of inflorescence and spikelet morphology in the two taxa concerned, and permits their proper identification as synonyms of previously published species. In this context, *M. multiramea* also assumes its true identity, as a rare bamboo from the southern part of Brazil; Dutra's figure 2 makes it clear that it is not one of the group of rather common species with only one floret in the spikelet. *Merostachys multiramea* Hackel is characterized by a 2-flowered spikelet and by its dark brown (nearly black), conical caryopses. Both florets are fertile—the rudimentary apical floret and the upper and lower glumes, called "florets" by authors of the last century, obviously not included. Thus, far from being widely distributed, *M. multiramea* has been collected only infrequently, and mostly by Dutra, under the name *M. anomala*.

## KEY TO THE SPECIES OF *MEROSTACHYS* SIMILAR TO *M. MULTIRAMEA*

1. Culm internodes densely pilose, hairs sericeous, translucent, ca. 1 mm long, in some areas sharp, globose prickly hairs also present . . . . . *M. pilifera*
1. Culm internodes glabrous, smooth or scabrous, with prickly hairs or mottled with dark spots and stripes . . . . . 2



- 2(1). Spikelets always 2-flowered or occasionally 2-flowered (both florets fertile), otherwise bearing different stages of development of the upper floret ..... 3
2. Spikelets always 1-flowered ..... 5
- 3(2). Spikelets always 2-flowered ..... 4
3. Spikelets occasionally 2-flowered (both florets fertile), otherwise bearing different stages of development of the upper floret; florets ca. 9 mm long, caryopsis ellipsoid, 6 mm long, 1.5 mm wide ..... *M. caucaiana*
- 4(3). Florets 7–9 mm long, 3 mm wide, laterally strongly compressed, imbricate; caryopsis conical, attenuate at the apex, dark brown (nearly black), 6–7 mm long, 3 mm wide ..... *M. multiramea* Hackel
4. Florets ca. 10–12 mm long; caryopsis broadly ovoid, basally and apically rounded, dark yellow, 6–7 mm long, 4–4.5 mm wide ..... *M. kleinii*
- 5(2). Spikelets always with two parallel, longitudinal, white lines, formed by the keels of the palea ..... *M. magellanica*
5. Spikelets without parallel, white lines ..... 6
- 6(5). Caryopsis ovoid ..... 7
6. Caryopsis ellipsoid, 7.5 mm long, 3 mm wide, grayish brown, culm leaf blades narrow, 4–5 cm long, 4 mm wide, branch leaf blades lanceolate, 4–9 cm long, 8–12 mm wide, L:W = 5–7.5 ..... *M. filgueirasii*
- 7(6). Branch leaf blades lanceolate, 3–11 cm long, 6–16 mm wide, L:W = 5–6.9 or 3.5–10 cm long, 8–14 mm wide, L:W = 4.4–7.1; branch complements with 40–200 branches ..... 8
7. Branch leaf blades broadly lanceolate, 4–12 cm long, 15–20 mm wide, L:W = 2.6–6 or narrowly linear-lanceolate, 5–13 cm long, 6–12(–17) mm wide, L:W = 8.3–10.8; branch complements with 20–60 branches ..... 9
- 8(7). Branch complement with 150–200 branches; branch leaf blades lanceolate, 3–11 cm long, 6–16 mm wide, L:W = 5–6.8; culm leaf blades lanceolate, 6–10 cm long, 10 mm wide; inflorescences pectinate; caryopsis 5 mm long, ca. 3 mm wide, apically rounded ..... *M. skvortzovii*
8. Branch complement with 40–60(–100) branches; branch leaf blades lanceolate, 3.5–10 cm long, 8–14 mm wide, L:W = 4.4–7.1, culm leaf blades lanceolate, 8–12 cm long, 4–5 mm wide; inflorescence distichously arranged, caryopsis 5.5–6.5 mm long, ca. 3 mm wide, slightly attenuate apically ..... *M. scandens*
- 9(7). Branch leaf blades broadly lanceolate, 4–12 cm long, 1.5–2 cm wide, L:W = 2.6–6; lemma finely puberulent ..... *M. abadiana*
9. Branch leaf blades narrowly linear-lanceolate, 5–13 cm long, 6–12(–17) mm wide, L:W = 8.3–10.8, lemma pilose, the hairs ca. 0.5 mm long, silver-grayish ..... *M. glauca* McClure & L. B. Smith

Culmi ca. 2 m longi. Fragmenta ad extremitates culmorum internodium 2–5 mm diametro, laevia. Nodi prominentes, crista supranodali angusta, tubiformi. Folia culmorum ignota. Rami in complemento 20–30. Foliorum ramorum laminae late lanceolatae, 4–12 cm longae, 1.5–2 cm latae. Inflorescentia specifformis, pectinata, 2–4 cm longa. Spiculae 11–13 mm longae, late ellipticae, 1-flosculatae; gluma infera 3 mm longa; gluma superior 8.5 mm longa, 11–13-nervia, acuta; lemma 9 mm longum, 15–16-nervium, late lanceolatum, puberulum; palea fusiformis, 9 mm longa, 10-nervia, anguste sulcata. Caryopsis ovoidea, 4.5 mm longa, 3.4 mm lata, cinereo-lutea.

Woody bamboo ca. 2 m high, according to collector's note. Fragments of internodes from tip of the culm fistulose, 2–5 mm diam., yellowish, smooth. Nodes salient, supranodal ridge narrow, tubiform. Culm leaves not seen. Branch complement with 20–30 branches, these 8–40 cm long, 1 mm thick, glabrous, 1–2-noded before the leaves. Branch leaves of the flowering branches 4–5 per complement: sheaths tight, finely puberulent, the overlapping margin glabrous; adaxial surface dark-spotted; oral setae 2–3 mm long, distally crisped; pseudopetiole grayish yellow, 2 mm long, finely pubescent; inner ligule a thick membrane, pubescent on the back; outer ligule a slightly pubescent rim; blades 4–12 cm long, 1.5–2 cm wide, L:W = 2.6–6, broadly lanceolate, glabrous adaxially except for a scabrous base, with rows of fine prickly hairs and 2–3 marginal nerves toward the apex with fine prickly hairs, slightly pubescent abaxially, more densely so at the base, the hairs whitish, margins glabrous or finely scabrous toward the apex. Inflorescences terminal on leafy branches, spikelike, pectinate, 2–4 cm long, with 4–15 spikelets. Rachis densely pubescent. Pedicels pubescent, short. Spikelets solitary, 1-flowered, bisexual, broadly ellipsoid, somewhat inflated, 11–13 mm long, 3–4 mm wide. Glumes 2, unequal. Lower glume 1-nerved, carinate, attenuate toward the apex, finely puberulent, 3 mm long, 1 mm wide at the base. Upper glume 8.5 mm long, 3.5 mm wide, broadly lanceolate, acute, awnless, finely puberulent, 11–13-nerved, adaxially shiny, dark-spotted. Lemma 9 mm long, 6 mm wide, very broadly lanceolate, deeply concave, enclosing a palea, 15–16-nerved, finely puberulent abaxially, the adaxial surface dark brown, shiny, densely spotted, the margins densely ciliate, the hairs dark, reddish. Palea fusiform, 9 mm long, 5 mm wide, 2-keeled, narrowly sulcate abaxially, 10-nerved, the nerves densely anastomosing, the veinlets uneven; the keels finely ciliate; abaxial surface densely puberulent at the apex and along the sulcus, glabrous in the lower part; adaxial surface shiny, dark. Rachilla extension bristle-like, with a small rudiment on the tip. Caryopsis 4.5 mm long, 3.4 mm wide, ovoid, rostrate,

***Merostachys abadiana*** Sendulsky, sp. nov. TYPE: Brazil. Estado de São Paulo: Município Itatinga, Abadia, 26 sep. 1978 (fl), *Campos Neto s.n.* (holotype, SP 154498). Figure 1.





Figure 1. *Merostachys abadiana* Sendulsky. —a. Branch complements from the upper part of the culm. —b. Apical part of the inflorescence. —c. Spikelet. —d. Caryopsis, lateral view. —e. Caryopsis, embryo view. —f. Lower glume. —g. Upper glume. —h. Lemma. —i. Palea. —j. Caryopsis, hilum view. —k. Upper portion of the branch leaf sheath and base of the blade (abaxial surface). Based on *Campos Neto s.n.* (SP 154498).

grayish yellow, the embryo and the hilum scarcely manifest externally.

**Phenology.** Known only from the type collection.

**Distribution.** Known only from the type locality, in the State of São Paulo, Brazil.

*Merostachys abadiana* was collected on the grounds of a Benedictine abbey in São Paulo in 1978 and sent to the Instituto de Botânica, São Paulo, for identification. No further information about the plant was obtained, except that some clumps of





Figure 2. *Merostachys caucaiana* Sendulsky. —a. Flowering branch complement. —b. Spikelet, lower floret with mature caryopsis, upper floret not fully developed. —c. Spikelets with two fertile florets. —d, e. Spikelets in different stages of development (upper florets). —f. Lodicules. —g. Caryopsis, embryo view. —h. Inflorescence. —i. Caryopsis, lateral view. —j. Caryopsis, hilum view. —k. Upper portion of the branch leaf sheath and base of the blade (abaxial surface). —l. Lower glume. —m. Upper glume. —n. Lemma. —o. Palea. —p. Palea and rachilla extension with underdeveloped upper floret. Based on O. Handro & Menezes s.n. (SP 262720).

the bamboos are still growing in that area. It is somewhat similar to *M. pilifera* (described later in this paper) in the morphology of the spikelet and

details of the lemma but differs in the glabrous internodes and in the wider branched leaf blades, which are hairy on the abaxial surface.



***Merostachys caucaiana*** Sendulsky, sp. nov.

TYPE: Brazil. Estado de São Paulo: Município de Cotia, Caucaia, 1978 (fl), *O. Handro & Menezes s.n.* (holotype, SP 262720). Figure 2.

Habitus ignotus. Fragmenta ad extremitates culmorum internodium fistulosa, laevia, opaca, maculis atro-viridibus rotundatis. Nodi pilis albis, retrorsis ad basin. Folia culmorum ignotae. Rami in complemento 40–50. Foliorum ramorum laminae lanceolatae, 2–7 cm longae, 5–12 mm latae. Inflorescentia spiciformis, pectinata, 2–3 cm longa, ramum foliorum terminans. Spiculae 1 aut rare 2-flosculatae, 9–10 mm longae, fusiformes, lateraliter compressae; flosculus inferior bisexualis, 9–10 mm longus vel rudimentalis. Gluma inferior 2 mm longa; gluma superior 7 mm longa, 9–11-nervia; lemma 7 mm longum, 9-nervium; palea 7 mm longa, late sulcata. Caryopsis elliptica, 6 mm longa, pallide brunnea.

Habit unknown. Fragments of the culm internodes from the tip of the culm delicate, with thin pendent or clambering tips. Internodes fistulose, ca. 1 cm diam., glabrous, smooth, but not lustrous, opaque, finely mottled with very small, dark green, rounded spots (not stripes) and with a glaucous-whitish touch toward the upper part. Upper culms sometimes rugose with small, sharp, retrorse prickly hairs. Culm walls 1 mm thick. Nodes salient with white retrorse hairs below. Culm leaves not seen. Branch complement (upper portion of plant) with 40–50 branches, these 10–15 cm long, 1 mm thick, glabrous, 1–2-noded before the leaves. Branch leaves 3–4 per complement: sheaths tight, glabrous, adaxially dark-spotted, the overlapping margin finely ciliate or glabrous, the intercostal zone finely transversally rugose; oral setae 13–15 cm long, diminishing in size downward, along the margins of the sheath; pseudopetiole dark, rugose, with a few fine prickly hairs at the base adaxially; inner ligule 0.5 mm long; outer ligule a salient rim; blade 2–7 cm long, 5–12 mm wide, L:W = 4–5.8, lanceolate, with an acuminate apex and slightly asymmetrical at the base, glabrous on both surfaces except for the base abaxially, the hairs whitish, hyaline, appressed, on one side of the midnerve; adaxial surface with 2–3 marginal nerves on one side with rows of fine prickly hairs; margins finely scabrous. Inflorescences spikelike, pectinate, 2–3 cm long, half inserted in ultimate sheath. Rachis and pedicels pilose. Spikelets 1- or rarely 2-flowered. Glumes 2, unequal. Lower glume 2 mm long, 1 mm wide, acuminate, carinate, 1-nerved, puberulent, ciliate at the margins. Upper glume 7 mm long, 3 mm wide, broadly lanceolate, 9–11-nerved, finely puberulent, ciliate at the margins, the nerves anastomosing. Lower floret bisexual, 9–10 mm long, 2–3 mm wide, fusiform, laterally compressed. Lemma 7 mm long, 4

mm wide, broadly lanceolate, finely puberulent, 9-nerved, the nerves anastomosing, the margins ciliate. Palea 7 mm long, glabrous, 2-keeled, broadly sulcate between the keels, the sulcus finely pilose, the keels ciliate. Rachilla extension flat, ca. 0.5 mm wide, puberulent and ciliate laterally, bearing one of several different stages of development of the upper floret, these varying in size and shape, from a small rudiment to a fully formed fertile floret, identical to the lower one. Rachilla extension of the upper floret bristle-like, with a small rudiment at the tip. Lodicules 3, 2 mm long, finely ciliate apically. Ovary not seen. Caryopsis 6 mm long, 1.5 mm wide, ellipsoid, rostrate, light brown, shiny, the embryo and the hilum scarcely manifest externally.

*Phenology.* The only available flowering specimen of this species is the holotype.

*Distribution.* Known only from the type locality, in the State of São Paulo, Brazil.

*Merostachys caucaiana* was found growing in a secondary forest in the Municipality of Cotia, ca. 40 km from São Paulo.

***Merostachys filgueirasii*** Sendulsky, sp. nov.

TYPE: Brazil. Distrito Federal: Catetinho, 15°57'S, 47°59'W, 7 Jan. 1982 (fl), *Filgueiras & Pereira 953* (holotype, IBGE; isotypes, CCN, MG, SP, UEC). Figure 3.

Culmi 2–10 m longi, 1–1.5 cm diametro; internodia fistulosa, scabra. Nodi glabri; crista supranodali tubiformi. Foliorum culmorum laminae angustae, 4–5 cm longae et 4 mm latae. Rami in complemento 20–50. Foliorum ramorum laminae lanceolatae, 4–9 cm longa, 8–12 mm latae. Inflorescentia spiciformis, pectinata, 3.5–4.5 cm longa, ramum foliarum terminans. Pedicelli pilosi, base dilata in projecturam nudam, globosam. Spiculae 13.5–14 mm longae, fusiformes, 1-flosculatae. Gluma infera 2 mm longa; gluma supra 8–10 mm longa, 7–9-nervia, aristulata; lemma 8–9 mm longum, 21–23-nervium, subtiliter puberulum, ad marginem strigosum, pilis fuscis; palea 11 mm longa, 12-nervia, anguste sulcata. Caryopsis elliptica, 7.5 mm longa, cinereo-brunnea.

Caespitose, woody bamboo, forming dense clumps. Rhizomes pachymorph, sympodial, densely covered by yellow scales. Culms 2–10 m long, 1–1.5 cm diam., flexuous at the tips, according to Filgueiras (1988). Internodes fistulose, scabrous, green when young, yellowish when mature, finely mottled with small, dark green stripes. Culm walls of the middle internodes 1–1.5 mm thick. Nodes glabrous, salient, supranodal ridge tubiform, 1–2 mm long, especially evident in young culms. Culm leaves deciduous: sheaths 12–15 cm long, 5–6 cm wide, rounded at the summit, fringed at the apex with dense tufts of





Figure 3. *Merostachys filgueirasii* Sendulsky. —a. Flowering branches. —b. Base of the branch complement. —c. Lower glume. —d. Upper glume. —e. Lemma. —f. Palea. —g. Spikelet. —h. Apical part of the inflorescence. —i. Caryopsis, embryo view. —j. Caryopsis, hilum view. —k. Rhizome. —l. Upper portion of the branch leaf sheath and base of the blade (abaxial surface). —m. Culm leaf. Based on *Filgueiras & Pereira* 953 except for k and m, which are based on *Filgueiras & Brochado* 2009.

hairs; hairs 12 mm long; abaxial surface glabrous, densely nerved, dark; adaxial surface somewhat shiny, dark, striate, densely nerved; margins glabrous or finely ciliate; inner ligule thick, finely ciliate; outer ligule a short, inconspicuous rim; blades reflexed, deciduous, narrow, 4–5 cm long, 4 mm wide.

Branch complement with 20–50 branches, these 30–45 cm long, 1 mm thick, glabrous, smooth, yellowish, 5–6-noded before the leaves, the nodes with fine, whitish pubescence below. Branch leaves 4–7 per complement: sheaths tight, glabrous, the overlapping margin finely ciliate toward base; oral



setae fine, 5–7 mm long, minutely scabrous, crisped distally; inner ligule solid, finely ciliate, ca. 0.5 mm long; outer ligule a short inconspicuous rim; pseudopetiole flat, grayish yellow, slightly puberulent, 3 mm long; blades 4–9 cm long, 8–12 mm wide, L:W = 5–7.5, lanceolate, light green, finely pilose on abaxial surface, more densely pilose at the base, the hairs whitish; adaxial surface glabrous, 2–3 marginal nerves on one side with rows of fine prickly hairs; margins and the apex finely scabrous. Inflorescence terminal on leafy branches, spikelike, pectinate, secund, 3.5–4.5 cm long, with 16–20 spikelets. Rachis densely pilose. Pedicel pilose, at the base swollen into a lateral, globose, tuberos, naked projection. Spikelets 13.5–14 mm long, 3 mm wide, solitary, 1-flowered, bisexual, attenuate, fusiform. Glumes 2, unequal. Lower glume 1-nerved, carinate, mucronate, finely puberulent, 2 mm long, ca. 1 mm wide at the base. Upper glume 8–10 mm long, 3 mm wide, 7–9-nerved, broadly lanceolate, finely puberulent, the apex scabrous, aristulate, the awn ca. 1 mm long; adaxial surface shiny, dark-spotted. Lemma 8–9 mm long, 6 mm wide, broadly lanceolate, 21–23-nerved, the nerves anastomosing in the upper part; abaxial surface puberulent, apically densely strigose near the margin, the hairs thick, short, dark; adaxial surface dark-spotted. Palea 11 mm long, ca. 5 mm wide, glabrous, 2-keeled, narrowly sulcate abaxially, 12-nerved, the nerves obliquely anastomosing; keels finely ciliate; adaxial surface shiny. Rachilla extension bristle-like, 7 mm long, with a minute rudiment. Lodicules not seen. Ovary elongate, style single, the stigmas 2, plumose, the stamens 3, the anthers 6 mm long, dark. Caryopsis 7.5 mm long, ca. 3 mm wide, ellipsoid, rostrate, grayish brown, finely striate, the embryo and the hilum scarcely manifest externally.

**Phenology.** According to Filgueiras (1988 and pers. comm.) two populations of *Merostachys filgueirasii* bloomed and died gregariously in 1980–1982, at the Reserva Ecológica do IBGE (Brazilian Institute of Geography and Statistics), and no regrowth was observed. A few months later, hundreds of seedlings could be seen in the area; these were collected by Filgueiras (*Filgueiras 1021*, IBGE). This collection contains seedlings in different stages of growth. The smallest specimen is 10 cm long, with 5 leaves and the caryopsis still attached. The seedlings of *M. filgueirasii* grew fast and occupied the bare ground left by the parent clump very quickly. By 1992, the two populations had completely re-established themselves at approximately the same site as the previous ones. No previous flowering is recorded.

**Distribution.** Brazil. Distrito Federal: grounds of the Reserva Ecológica do IBGE, gallery forest in *cerrado* vegetation, 850–1340 m, and grounds of Catetinho. However, the population of the type specimen at Catetinho was completely wiped out because the site was cleared for tourist interests.

The swollen lateral projections at the base of the pedicels are very peculiar; these are also found in *M. pluriflora* Munro ex Camus and in *M. skvortzovii* (described later in this paper). In the former they are rather prominent, whereas in the latter they are small and are located on the inner side of the pedicel.

This species was cited by Tarciso S. Filgueiras (1988) as *Merostachys multiramea* and is named for him, a friend and colleague, for his contributions to the knowledge of the Brazilian grasses.

**Paratypes.** BRAZIL. **Distrito Federal:** Reserva Ecológica do IBGE, 15°57'S, 47°52'W, próximo a cerca W da Recor, 26 Sep. 1980 (fl), *Heringer et al. 5812* (IBGE, K, US), 18 Jan. 1982 (fl), *Filgueiras 955* (IBGE), 8 Jun. 1982 (seedlings), *Filgueiras 1021* (IBGE); Reserva Ecológica do IBGE, mata do ribeirão Taquara, 20 Nov. 1990 (st), *Filgueiras & Brochado 2009* (IBGE, SP).

**Merostachys glauca** McClure & L. B. Smith.

**TYPE:** Brazil. Estado de Santa Catarina: Palhoça, Pilões, mata, 200 m, 24 feb. 1956 (st), *Reitz & Klein 2737* (holotype, US). Figure 4.

**Habit unknown.** According to McClure & L. B. Smith (1967) only fragments of the midculm are known. Internodes ca. 30 cm long, 1.2–2.5 diam., glabrous and smooth, greenish yellow, whitish glaucous upward, the thinner internodes greenish, smooth, somewhat shiny, finely mottled with very small, dark green rounded spots. Culm walls 1–3 mm thick. Nodes salient, with retrorse white hairs below; supranodal ridge tubiform. Culm leaves deciduous: sheaths oblong, 29 cm long, 11 cm wide, striate, rather rough, with a trace of wax and a few scattered white hairs, the blades not seen. Branch complement with 30–60 branches, these 1–2-noded before the leaves, glabrous. Branch leaves 5–7 per complement: sheaths tight, striate; inner ligule dark, 0.5 mm long, ciliate at the margin; outer ligule a salient rim; pseudopetiole 3–4 mm long, dark, glabrous; oral setae 5 mm long, deciduous; blades narrowly linear-lanceolate, attenuate at the apex, 5–13 cm long, 6–12(–17) mm wide, L:W = 8.3–10.8; adaxial surface glabrous, with 1–2 marginal nerves on one side with rows of fine, sharp, sparse prickly hairs; abaxial surface glabrous except for densely pubescent area at the base beside the mid-





Figure 4. *Merostachys glauca* McClure & L. B. Smith. —a. Flowering branch complement. —b. Part of the inflorescence. —c. Spikelet, showing lower glume and lemma. —d. Spikelet, showing upper glume and lemma. —e. Lower glume. —f. Upper glume. —g. Rachilla segment. —h. Lemma, adaxial surface. —i. Lemma, abaxial surface. —j. Palea with rachilla and rudiment. —k. Upper part of the branch leaf sheath and base of the blade (abaxial surface). Based on Klein & Sousa Sob. 10480.

nerve; margins sparsely scabrous. The epidermis of the sheath and the blade presents extremely small, rounded, flat papillae and some small scattered, pointed or unpointed prickly hairs. Inflorescences terminal on leafy branches, spikelike, pectinate, secund, 1.5–3 cm long, with 8–10 spikelets. Rachis

and pedicels pilose. Spikelets 1-flowered, solitary, fusiform, 10 mm long, 2.5 mm wide. Glumes 2, unequal. Lower glume 2.5 mm long, 1 mm wide, 1-nerved, finely puberulent, ciliate at the upper margin. Upper glume lanceolate, apiculate, finely puberulent, 6.5–7 mm long, 3 mm wide, 10-nerved,



some nerves anastomosing; adaxial surface shiny, brownish, with a few dark spots; margins ciliate. Lemma broadly lanceolate, 7.5–8 mm long, 4 mm wide, 9-nerved, adaxial surface shiny; abaxial surface densely pilose, the hairs ca. 0.5 mm long, silver-grayish. Palea 8 mm long, ca. 2 mm wide (folded), finely puberulent, 8-nerved, 2-keeled, broadly sulcate abaxially, 8-nerved, the keels ciliate, the sulcus puberulent; adaxial surface shiny, light brown, inconspicuously anastomosing. Rachilla extension about half the length of the palea, finely ciliate. Caryopsis not seen.

*Phenology.* According to Smith et al. (1981) flowering collections are known from 1971–1973.

*Distribution.* Brazil, State of Santa Catarina.

*Merostachys glauca* was originally described from vegetative material only (McClure & L. B. Smith, 1967). Later, the same species, but in flowering stage, was described again (Smith et al., 1981), although without a Latin diagnosis for the floral part. *Merostachys glauca* is distinguished by an unusually densely hirsute lemma and by the long, narrow branched leaf blades. The smooth internodes, mottled with dark green rounded spots, the glaucous-whitish touch upward, the dark-spotted adaxial surface of the branch leaf sheath, and the size of the 1-flowered spikelet suggest that this species resembles *M. cauciana*.

*Additional specimens examined.* BRAZIL. Santa Catarina: Paulo Lopes, Bom Retiro, mata, 400 m, 13 Dec. 1972 (fl), Klein & Sousa Sob. 10480 (NY); Joinville, Estrada Dona Francisca, mata, 15 Jan. 1974 (st), Klein & Klein 10996 (NY).

***Merostachys kleinii*** Sendulsky, sp. nov. TYPE: Brazil. Santa Catarina: Papanduva, E.R.F., 1 km ao sul da entrada para Papanduva, 800 m, 16 Jan. 1974 (fr), Klein & Klein 11008 (holotype, RB; isotype, US). Figure 5.

Habitus ignotus. Fragmenta culmorum internodiorum 2–3.5 cm diametro, fistulosa, scabra, maculis et striis atro-viridibus. Nodi pilis densis appressis, retrorsis, albis ad basin. Folia culmorum ignota. Rami in complemento 50–120. Foliorum ramorum laminae 3–9 cm longae, 7–15 mm latae, lanceolatae. Inflorescentia spiciformis, secunda, 3–6 cm longa. Spiculae 2-flosculata, usque 16 mm longa, congestae, dense aggregatae, 2-seriatae; gluma inferior 4 mm longa; gluma superior 12–14 mm longa, 15-nervia, apiculata; flosculi bisexuales, late fusiformes, 10–12 mm longi; lemma 10 mm longum, 16–17-nervium; palea fusiformis, 11–12 mm longa, 12–14-nervia, late sulcata. Rachillae projectura plana, ca. 1 mm lata; projectura flosculi superioris setiformis, rudimento ornata. Caryopsis late ovoidea, 6–7 mm longa, atro-lutea aut brunnea.

Habit unknown. Fragments of the culm internodes 2–3.5 cm diam., fistulose, scabrous, gray-greenish, with dark green spots and stripes. Culm walls of the middle internodes 2–3.5 mm diam. Nodes salient, prenodal zone with dense, appressed, retrorse, whitish silky hairs below. Culm leaves not seen. Branch complement dense, with 50–120 branches, these 15–40 cm long, 1–1.5 mm thick, glabrous, smooth, grayish green, 2–3-noded before the leaves, nodes dark. Branch leaves 4–5 per complement: sheaths tight, glabrous, the margins glabrous; oral setae fine, finely scabrous, deciduous; inner ligule short, dark, finely ciliate; outer ligule a salient rim; pseudopetiole dark, 2.5 mm long, 1 mm wide; blades 3–9 cm long, 7–15 mm wide, L:W = 4.2–6, lanceolate, apically attenuate, adaxially somewhat rough, 2–3 marginal nerves on one side with rows of fine prickly hairs, abaxially glabrous except for the densely pubescent base, the hairs long, villous, whitish, beside the midnerve. Inflorescences terminal on leafy branches, spike-like, secund, congested, 3–6 cm long, 2 cm wide, with 28–32 densely agglomerated spikelets in double rows. Rachis pilose. Pedicels short, pilose. Spikelet always 2-flowered, 16 mm long, florets bisexual, broadly fusiform, 10–12 mm long, 4 mm wide (with mature fruit), glabrous. Glumes 2, very unequal. Lower glume ca. 4 mm long, 1.5 mm wide, 1-nerved, puberulent, ciliate at the margins. Upper glume 12–14 mm long, 5 mm wide, broadly lanceolate, apiculate, finely puberulent, 15-nerved, some nerves anastomosing; adaxial surface shiny, brownish, densely dark-spotted. Lemma 10 mm long, 6 mm wide, broadly lanceolate, puberulent, 16–17-nerved, some nerves anastomosing; adaxial surface shiny, brownish, densely dark-spotted. Palea fusiform, 11–12 mm long, ca. 6 mm wide, glabrous, 12–14-nerved, broadly sulcate abaxially, the keels ciliate, some nerves anastomosing; adaxial surface shiny, golden. Rachilla extension between the florets flat, ca. 1 mm wide, finely puberulent, hairs whitish, bearing a fertile upper floret identical to the lower one. Rachilla extension of the upper floret bristle-like, with a small rudiment at the tip. Caryopsis broadly ovoid, basally and apically rounded, rostrate, dark yellow, 6–7 mm long, 4–4.5 mm wide, the embryo and the hilum scarcely manifest externally.

*Phenology.* Flowering collections are known only from 1974.

*Distribution.* Southern Brazil.

*Merostachys kleinii* seems to be a robust plant, with thick culms. This species can be found in several herbaria, but complete vegetative collections are still



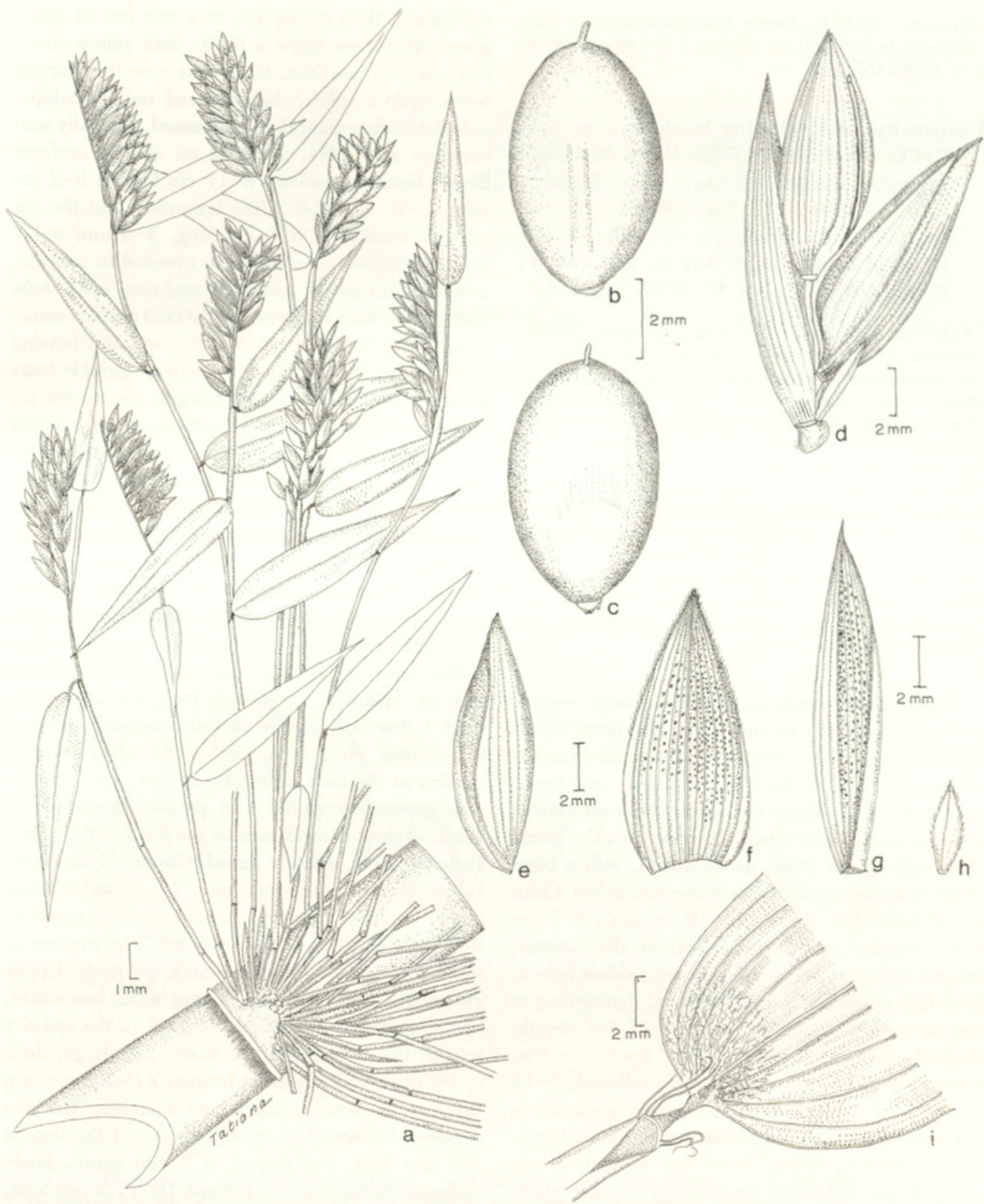


Figure 5. *Merostachys kleinii* Sendulsky. —a. Flowering branch complement. —b. Caryopsis, hilum view. —c. Caryopsis, embryo view. —d. Spikelet with two fertile florets and a rudiment. —e. Palea. —f. Lemma. —g. Upper glume. —h. Lower glume. —i. Upper portion of the branch leaf sheath and base of the blade (abaxial surface). Based on Klein & Klein 11008.

not available. The species is distinct in its 2-flowered spikelet, the stout appearance of its branch complements, inflorescences and spikelets, and in having the largest caryopsis in the *multiramea* group. For many years this species was conceived as being a

2-flowered form of “*multiramea*.” The true *M. multiramea* Hackel already is a 2-flowered species. *Merostachys kleinii* is named in honor of the late Roberto M. Klein, a distinguished botanist from Itajaí, Santa Catarina, Brazil.



*Paratype.* BRAZIL. **Santa Catarina:** 2 km a leste de Bocaina do Sul, 900 m, 22 Jan. 1974 (fr), *Klein & Klein 11062* (SP).

***Merostachys magellanica*** Sendulsky, sp. nov.

**TYPE:** Brazil. State of São Paulo: Município Anhembi, Fazenda Barreiro Rico, 22°40'S, 48°09'W, 510 m, 11 Jan. 1988 (fr), *Reis de Magalhães s.n.* (holotype, SP 248339; isotypes, BLA, BR, IBGE, ICN, K, MO, NY, P, R, RB, UB, UEC, US, W, WIS). Figure 6.

Culmi ca. 6–8 m alti, 12–14 mm diametro, fistulosi; internodia 60–80 cm longa; infera laevia, luteo-cinerea, striis maculisque viridi-fuscis minutis picta; supra cinereo-viridia, aculeis retrorsis munita; nodi prominentes, supra subterque nodum pilis lanatis densis brevibus vestita. Folia culmorum laminae reflexae, ca. 5–12 cm longae, 12–15 mm latae. Rami verticillati, in complemento 12–130. Folia ramorum laminae 8–17 cm longae, 1.5–2 cm latae, lanceolatae. Inflorescentia spiciformis, pectinata, imbricata, 6–8 cm longa, ramum foliorum terminans. Spiculae 11–14 mm longae, fusiformes ubi juvenes, ad maturitatem ovoidae, apicibus attenuatis, duabus lineis albis parallelis, longitudinalibus, carenis palearum formatis. Caryopsis oblonga, ovoidea, asymmetrica, lageniformis, rostrata, 6–7 mm longa, castanea.

Rhizomes sympodial, pachymorph. Culms woody, ca. 6–8 m tall, 12–14 mm diam., fistulose, erect; internodes 60–80 cm long; lower internodes grayish yellow, with minute dark green stripes and spots, smooth and shiny above the nodes; upper internodes greenish gray, with small, retrorse prickly hairs; culm walls 2 mm thick; nodes salient, with a band of short, dense, woolly hairs above and below. Culm leaves deciduous: sheath 25–30 cm long, 5–7 cm wide, rounded and asymmetrical at the summit, fringed with fine, wavy hairs, these reddish brown, but white at the base, 5–6 mm long, diminishing in size downward along the margins of the sheath; abaxially olive-green, many-nerved, the nerves fine, light-colored, smooth, shiny; blade reflexed, 5–12 cm long, 12–15 mm wide, attenuating gradually to a fine point. Branch complement with 12–130 subequal branches, these 15–65 cm long, 1–2 mm thick, 2–3-noded before the leaves, yellowish, nearly glabrous and shiny, with green stripes, sometimes with minute retrorse prickly hairs, the base with a few densely strigose, deciduous scales, these 3–20 mm long; first internode above the scales densely and retrorsely strigose. Foliage leaves 4–7 per complement. Sheath tight, glabrous, striate, the lower sheath aphyllous or with a rudimentary leaf and a few oral setae, the uppermost a little loose at the summit. Oral setae erect or crisped distally, 3–10 mm long, dark yellow or red-brown, slightly diminishing in size downward along the upper margin of

the sheath, then giving way to a fine row of short, silver cilia. Inner ligule a thick, dark yellow structure, ca. 0.5 mm long, finely ciliate on the margin; outer ligule a salient, light-colored rim. Pseudopetiole dark, dorsiventrally compressed, adaxially scabrous and waxy, glabrous on abaxial surface. Blades linear-lanceolate, 8–17 cm long, 1.5–2 cm wide, L:W = 5.3–8.5 (the lowermost and the uppermost smaller, 2.5–6 cm long, 3–4 mm wide), the base slightly asymmetrical, rounded to cuneate, gradually attenuate toward a scabrous apex, subglabrous on both surfaces, the adaxial surface sometimes finely hirsute near the base and also bearing 2–8 rows of hyaline, antrorse-strigose prickly hairs along the nerves near one margin; the nerves inconspicuous on the adaxial surface, weakly salient on the abaxial surface. Inflorescences terminal on leafy branches, spikelike, falcate, congested, secund, 6–8 cm long, with distinctive row of upper glumes when young or in early flowering stage, when mature and fruiting, 12–18 cm long, with loose, open, broadly spreading spikelets; rachis finely strigose, hairs white, sometimes with a rudimentary leaf emerging at the top of the oblique scar at the base of the inflorescence and subtending the lowermost spikelet. Spikelets 11–14 mm long, 1.8–2(–4) mm wide, 1-flowered, slightly curved, attenuate, narrowly fusiform when immature, ovoid when mature, swollen at the base, attenuate at the apex, grayish olive-green, except for two parallel, longitudinal, white, evident lines formed by the keels of the palea. Pedicels short, densely hispid. Glumes 2, unequal. Lower glume 3–3.5 mm long, 1 mm wide, triangular, 1-nerved, slightly curved, shortly strigose at the apex, ca.  $\frac{1}{4}$  the spikelet length, the mid-nerve spotted adaxially, the spots dark, purplish. Upper glume 5.5–7.5 mm long, 3 mm wide, lanceolate, apiculate, 9-nerved, shortly strigose,  $\frac{1}{2}$  the spikelet length, the adaxial surface shiny, with large, dark spots; when young, glumes forming a clear line along the row of densely imbricated spikelets. Rachilla segment between the upper glume and the lemma 2.5 mm long, cup-shaped, 1.2 mm diam., finely strigose, the hairs white. Lemma 10–11.5 mm long, 5–5.5 mm wide, oblong, lanceolate, 14–15-nerved, finely strigose abaxially, shiny, dark-spotted adaxially, ciliate at the margins, embracing the palea (at maturity only at the base). Palea a little longer than the lemma, 10.5–12.5 mm long, 4 mm wide, curved, 8–12-nerved, with oblique transverse veinlets, the dorsal keels white, minutely ciliate, the adaxial surface shiny, dark-spotted. Prolongation of the rachilla bristle-like, nearly as long as the palea, pubescent near the minute rudiment. Lodicules 3, 3.3 mm long, finely ciliate at the apex, faintly 2–3-nerved.



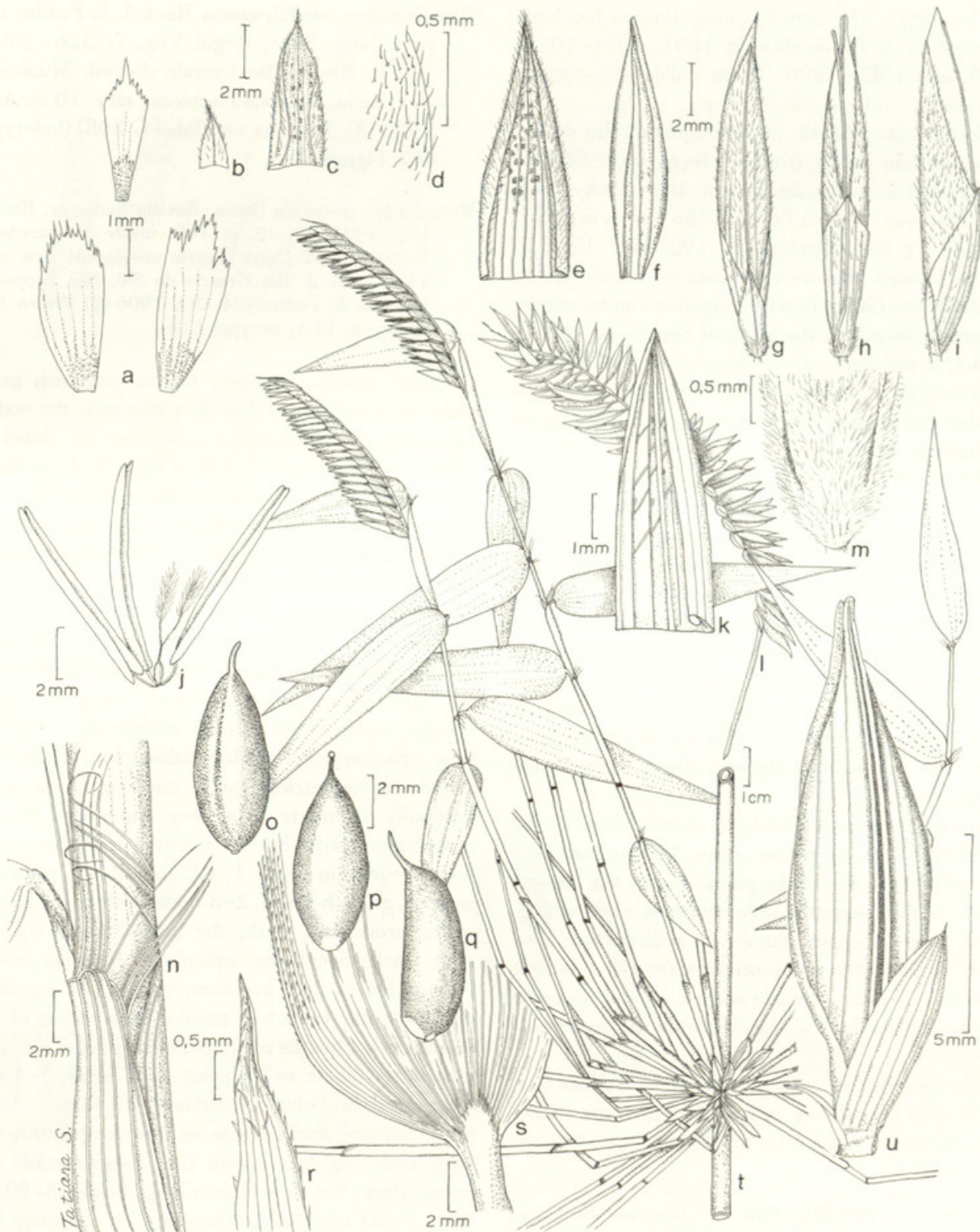


Figure 6. *Merostachys magellanica* Sendulsky. —a. Lodicules. —b. Lower glume. —c. Upper glume. —d. Detail of the abaxial surface of the upper glume. —e. Lemma. —f. Palea. —g. Spikelet, lemma side view. —h. Spikelet, palea side view. —i. Spikelet, lateral view. —j. Bisexual flower. —k. Palea. —l. Mature inflorescence, fruiting stage. —m. Base of the spikelet. —n. Oral setae. —o. Caryopsis hilum view. —p. Caryopsis, embryo view. —q. Caryopsis, lateral view. —r. Apex of a blade. —s. Base of a blade, adaxial surface. —t. Branch complement of the upper and slender part of a culm, with young inflorescences. —u. Mature spikelet, with parallel, white keels on the palea. All illustrations based on *J. G. Kuhlmann s.n.* (US 1255439) except l, o, p, q, and u, which are based on *Reis de Magalhães s.n.* (SP 248339).

Stamens 3, the anthers 9 mm long. Ovary oblong, subcylindrical; style single; stigmas 2, long-fringed when mature. Caryopsis oblong, 6–7 mm long, (lagenoid) curved or asymmetrical in the dorsiventral

plane, sulcate, apically long rostrate; pericarp glabrous, of uniform thickness, light brown; embryo small, basal; hilum linear, but the embryotegium weakly manifested externally.



**Phenology.** *Merostachys magellanica* has been collected in its fertile state in 1891, 1921–1922, 1956, and 1988–1990. These collections suggest a flowering cycle of 30–34 years.

**Distribution.** Brazil, in the States of Rio de Janeiro and São Paulo, from sea level to ca. 700 m.

The first known collection of *Merostachys magellanica* was made in Peruibe, São Paulo, in 1891, followed by the collections in 1921 and 1922 in Rio de Janeiro. Mature caryopses were collected in 1956 by José Carlos Reis de Magalhães on his ranch, “Barreiro Rico,” in the State of São Paulo (this is, in fact, a well-kept private forest reserve). Werner Bockermann, a zoologist at the São Paulo Zoological Garden, has studied these caryopses as a food supply for birds in the reserve.

When *Merostachys magellanica* flowered again in 1988 and set seed in quantity, a large collection was made by Reis de Magalhães and sent to the Institute of Botany in São Paulo, together with accurate data and observations concerning the habitat: soil analysis, rainfall, climate, behavior of the bamboos, etc. According to Reis de Magalhães, the poorest soil was exactly in the area where the species was collected. The adjacent forest area, 500 m away, with much better soil, has few or no bamboos. Thus, this new species shows a distinct preference for poor soil.

*Merostachys magellanica* is characterized by the spikelets, which have two white, longitudinal lines formed by the keels of the palea, and by the general aspect of the congested inflorescences when young, which present upper glumes in a distinctive row. When mature, the inflorescences are twice as long as wide, with loose, open, broadly spreading spikelets and have light brown, dorsiventrally asymmetrical caryopses.

*Merostachys magellanica* is named for José Carlos Reis de Magalhães, collector of the type collection, who in his respect for and love of nature knows few equals.

**Paratypes.** BRAZIL. **Rio de Janeiro:** Botafogo, Mundo Novo, 11 Nov. 1921 (early fl), *J. G. Kuhlmann s.n.* (RB 79198, US 1447816); Corcovado, Morro do Mundo Novo, Oct. 1922 (fl), *J. G. Kuhlmann s.n.* (US 1255439); Reserva Florestal da Fabrica Aliança, Sep. 1922 (fl-abnormal), *J. G. Kuhlmann s.n.* (RB 3852, US 1447817). **São Paulo:** Peruibe, 1891 (fl), *Loefgren & Edwall s.n.* (US 1021511); Município Itatins, Iguape, Estação Ecológica Juréia, 19 Nov. 1987 (fl), *Catharino 1334* (SP); Município Anhembi, Fazenda Barreiro Rico, 21 fev. 1956 (fr), *Reis de Magalhães s.n.* (SP 248383); Cananéia, Out. 1956 (fr), *Pereira s.n.* (SP 169270); Parque Estadual da Ilha do Cardoso, 8 Dec. 1987 (fl), *Kirizawa 1984* (SP); Ilha do Cardoso, estrada para turbina, 3 Dec. 1990 (fl), *Barros 2024* (SP); Ilha do Cardoso, Cambriú, 23 Aug. 1988 (late fr), *Rossi et al. 486* (SP).

***Merostachys multiramea* Hackel.** *In Feddes Rept. Nov. Spec. Regni Veg.* 7: 326. 1909. TYPE: Brazil. Rio Grande do Sul: Município Rio Pardo, Fazenda Itacolomi, elev. 70 m, Apr. 1906 (fl), *Jürgens s.n.* (label G-308) (holotype, W). Figure 7.

*Merostachys anomala* Dutra, *Revista Sudamer. Bot.* 5: 151. 1938. Fig. 2, p. 149, under *M. burchellii* Munro *emend.* Dutra (figures misplaced). Syn. nov. TYPE: Brazil. Rio Grande do Sul: São Leopoldo, Fazenda da Pedreira, 6 Oct. 1906 (fl), *Dutra 518* (holotype, BLA; isotype, US).

Culms woody, fistulose, terete, yellowish gray, glabrous, smooth, but densely pilose near the nodes, 12 m long, according to *C. Jürgens s.n.* (label G-308); pendulous above, 6–9 m high, 3–4 cm diam. below, according to Dutra (1938); nodes prominent, glabrous, densely pilose above, pilose and also with a row of white, dense, brushlike, retrorse hairs below. Culm leaves of an incompletely developed shoot (see discussion): sheaths 20–25 cm long, 5–6 cm wide, symmetrical, papery, opaque, rugose adaxially, fringed with dense, wavy, reddish hairs at the summit, diminishing in size downward along the upper margin; inner ligule a thick membrane, 1–2 mm long, opaque; outer ligule a salient rim; blades lanceolate, asymmetrical, ca. 7 cm long, 1 cm wide, gradually attenuate to a very fine point. Branch complement with 30–70 unequal leafy branches, these 5–50 cm long, 1–1.2 mm thick, glabrous, smooth, grayish green, 2–3-noded before the leaves; nodes prominent, dark, the base densely covered with small, deciduous, apiculate, glabrous scales. Foliage leaves 3–8 per complement, the leaves of the flowering branches smaller than those of the sterile ones. Sheaths tight, glabrous, striate, the margins finely ciliate or glabrous. Oral setae 3–4 mm long, straight, white, extremely deciduous. Inner ligule papery, finely ciliate on the margin, 0.5 mm long. Outer ligule a salient rim. Pseudopetiole glabrous, dark, flat, 2.5–4 mm long. Blades 3–20 cm long, 5–20 mm wide, lanceolate or narrowly lanceolate, attenuate to a very narrow, filiform point, the base rounded to cuneate, slightly asymmetrical, subglabrous on both surfaces except for a small area on the abaxial surface near the base, bearing short, white, dense hairs mixed with wax and for 2–3 lateral nerves on the adaxial surface near one margin, bearing parallel rows of antrorse, strigose, hyaline prickly hairs. Inflorescence 5–7(–9) cm long, straight or subfalcate, secund, terminal on a leafy branch, usually fully exerted from the uppermost sheath when mature. Peduncle of the inflorescence and the rachis densely strigose, the hairs white.





Figure 7. *Merostachys multiramea* Hackel. —a. Part of a branch complement with some young inflorescences. —a<sub>1</sub>. Mature inflorescence. —b. Part of the spike. —c. Lower glume. —d. Upper glume. —e. Lemma. —f. Palea, abaxial surface. —g. Palea, adaxial surface. —h. Spikelet, glumes removed. —i. Bisexual flower. —j. Lodicules. —k. Base of a leaf, adaxial surface. —l. Caryopsis, hilum view. —m. Caryopsis, lateral view. —n. Caryopsis, embryo view. —o. Base of a leaf, adaxial surface, showing ligule and a few oral setae. —p. Culm leaf. All illustrations based on Dutra 518, except a<sub>1</sub>, which is based on Dutra 517.

Spikelets 2-flowered, 11–12 mm long, grayish green, with wrinkled surface, both florets bisexual, 7–9 mm long, 3 mm wide, laterally strongly compressed when immature, prominently keeled, imbricate at an angle

of 45°. Pedicel ca. 1 mm long, densely hispid. Glumes 2, unequal. Lower glume 2.5–3 mm long, 1 mm wide, lanceolate, 1-nerved, the abaxial surface puberulent, the margins densely ciliate. Upper glume



7–9 mm long, ca. 5 mm wide, half as long as upper floret, carinate, apiculate, asymmetrical, 9-nerved, the nerves anastomosing; abaxial surface finely hirsute-appressed, the margins finely ciliate. Rachilla segment between the lower and the upper florets 2–3.5 mm long, flattened, narrow below, dilated at the apex, finely appressed-pubescent. Lemma 8 mm long, 5 mm wide, carinate, adaxially slightly dark-spotted, 9–11-nerved. Palea 8 mm long, curved, bicarinate, broadly canaliculate between the finely ciliate keels, 8-nerved, the veinlets anastomosing in the upper part. Prolongation of the rachilla (on the upper floret only) bristle-like, flattened, half as long as the palea or a little over, bearing a minute rudiment. Lodicules 3, membranous, ca. 0.7 mm long, ciliate at the apex. Stamens 3, the anthers 4–5.5 mm long. Ovary oblong, subcylindrical; style single; stigmas 2, plumose. Caryopsis 6–7 mm long, 3 mm wide, conical, attenuate at the apex, rostrate, dark brown, nearly black, shiny; embryo small, basal; hilum linear, but the sulcus and the embryo weakly manifested externally.

**Phenology.** Flowering collections are known from 1876 (Dutra, 1938), 1906–1907, 1914–1915, 1937–1939, and 1974–1978.

**Distribution.** Southern Brazil.

The description of the culm leaves of *Merostachys multiramea* is based on Prance *et al.* 6887, the only collection in which these leaves are present. This material is not very typical of the species; together with Gibbs *et al.* 6672 and Ihering *s.n.* (NY, SP 10315) it makes up a group of three similar specimens, all collected in the State of São Paulo. If these specimens can be admitted as good *M. multiramea*, the description of the culm leaves is valid. The only difference between these collections and the others is that the spikelets are not wrinkled and the short hairs that cover the spikelets are black and not so worn out and colorless as on the spikelets of the specimens from the State of Rio Grande do Sul.

**Additional specimens examined.** BRAZIL. **Paraná:** Ipiranga, Dusen 14367, 5 Jan. 1914 (fl) in US sheet, and 15 Jan. 1915 (fl) in WIS sheet. **Rio Grande do Sul:** Valle do Rio Taquari, São Leopoldo, 1907 (fr), Dutra *s.n.* (NY, SP 10313, US 1503502); Suburbios, Oct. 1906 (fl), Dutra 151 (RB); Bom Jesus, Fazenda Carauna, 1907 (fl and fr), Dutra 517 (BLA); São Leopoldo, Quilombo, Nov. 1937 (fl), Dutra 1634, (ICN); Panambi, 4 Oct. 1970 (fl), Pott *s.n.* (BLA 8363). **São Paulo:** Reserva Carlos Botelho, entre S. Miguel Arcanjo e Sete Barras, elev. ca. 800 m, 31 Jan. 1978 (fl), Prance *et al.* 6887 (RB, US); Rodovia Jaquía a Piedade, 29 Oct. 1977 (fl), Gibbs *et al.* 6672 (SP); São Bernardo, Oct. 1914 (fl), Ihering *s.n.* (NY, SP 10315).

***Merostachys pilifera* Sendulsky, sp. nov. TYPE:**

Brazil. Rio Grande do Sul: Mun. São Francisco de Paula, Primeiro Distrito, São Francisco de Paula, Morro da Pera (uppermost part of Serra Geral), 29°27'S 50°35'W, alt. 970 m, 11 May 1972 (fl), Soderstrom & Sucre 1987 (holotype, RB). Figure 8.

Culmi usque 20 m longi, fistulosi ad extremitates solidi. Culmi internodia dense pilosa supra et infra nodos, pilis translucidis, appressis, ca. 1 mm longis. Folia culmorum ignotae. Crista supranodalis tubiformis. Rami in complemento 50 ad extremitates culmorum. Foliorum ramorum laminae lanceolatae, 2–8 cm longae, 4–12 mm latae. Inflorescentia spiciformis, pectinata. Spiculae 1-flosculata, bisexualis, late elliptica, 13–14 mm longa; gluma infera 2.5 mm longa; gluma supera 9 mm longa; 11-nervia; lemma 10 mm longum, 15-nervium; palea fusiformis, 11 mm longa, 10–12-nervia, anguste sulcata. Caryopsis non visa.

Woody, according to the collectors' note, culms erect, up to 20 m tall, 5 cm diam., closely clumped and forming a thicket; internodes fistulose, 60–65 cm long at base, with thin walls, becoming shorter, successively thinner and solid above; the tips whip-like, arching. New culm internodes densely pilose above and below the nodes, the hairs sericeous, translucent, appressed, thick, ca. 1 mm long, these substituted in some occasionally hairless parts of the internode areas by dense, sharp, retrorse prickly hairs with globose, yellowish bases, together with some scattered sericeous hairs. The old thick culms still display prickles and areas with worn and damaged hairs. Nodes salient, supranodal ridge tubiform, especially evident in new culms, prenodal zone with dense, appressed, retrorse hyaline hairs. Culm leaves not seen. Branch complement from tip of the culm (internode 5 mm diam.) with 50 branches, these 15–20 cm long, ca. 0.5 mm thick, glabrous, smooth, 1–2-noded before the leaves. Branch leaves 2–3 per complement: sheaths tight, finely puberulent; the overlapping margin glabrous; adaxial surface shiny, golden, dark-spotted; oral setae fine, ca. 5–6 mm long, straight; inner ligule short, finely ciliate; outer ligule an inconspicuous rim; pseudopetiole dark, finely puberulent, 2–2.5 mm long; blades lanceolate, 2–8 cm long, 4–12 mm wide, L:W = 6.2–6.6, glabrous, the abaxial surface with a very few fine hairs. Inflorescences terminal on leafy branches, 2–3.5 cm long, spikelike, pectinate. Rachis and pedicels pubescent. Spikelets solitary, 1-flowered, bisexual, broadly ellipsoid, somewhat inflated, 13–14 mm long, 4 mm wide. Glumes 2, unequal. Lower glume 2.5 mm long, ca. 1 mm wide, shortly awned, 1-nerved. Upper glume broadly lanceolate, 9 mm long, 4 mm wide, shortly awned, 11-nerved, some nerves anastomosing, the adaxial surface dark-spot-





Figure 8. *Merostachys pilifera* Sendulsky. —a. Flowering branch complement. —b. Lodicules. —c. Hermaphroditic flower. —d. Spikelet. —e. Apical portion of the inflorescence. —f. Culm hairs. —h. Lower glume. —i. Upper glume. —j. Lemma. —k. Palea. —l. Upper portion of the branch leaf sheath and base of the blade (abaxial surface). Based on Soderstrom & Sucre 1987.

ted. Lemma very broadly lanceolate, deeply concave, enclosing a palea, 10 mm long, 7 mm wide, 15-nerved, finely puberulent abaxially, the adaxial surface dark-spotted, the margins densely ciliate upward. Palea fusiform, 11 mm long, 2.5 mm wide

(folded), 10–12-nerved, 2-keeled, narrowly sulcate, the keels finely ciliate, abaxially puberulent at the apex and along the sulcus; some nerves anastomosing; adaxial surface shiny. Lodicules 3, subequal, ca. 2.5 mm long, finely ciliate. Stamens 3, the



anthers dark, ca. 10 mm long. Ovary elongate, style single, stigmas 2. Caryopsis not seen.

**Phenology.** The only known specimen of this species is the holotype, collected in 1972.

**Distribution.** Known only from the type locality.

*Merostachys pilifera* is known only from the type locality in the State of Rio Grande do Sul. The description presented above was based solely on *Soderstrom & Sucre* 1897, 1972. The label states that the entire colony of this bamboo flowered after this date and is represented by *Soderstrom* 2040, 2 Feb. 1973 (US). *Merostachys pilifera* is distinguished by its pilose culm internodes, the character from which the name is derived. It is somewhat similar to *M. abadiana* in the details of the spikelet structure.

***Merostachys scandens*** Sendulsky, sp. nov. TYPE: Brazil. State of São Paulo: Município de São Paulo, 10 km S of center of city of São Paulo, in grounds of the Instituto de Botânica, Parque do Estado, 6 Dec. 1973 (fl), *Sendulsky 1319* (holotype, SP; isotypes, BLA, BR, IBGE, ICN, K, MO, NY, P, R, RB, UB, UEC, US, W, WIS). Figure 9.

Culmi ca. 6 m longi, 1–3 cm diametro; internodia fistulosa, subtiliter rugulosa; nodi pilis densis, appressis, retrorsis. Foliorum culmorum laminae angustae, 8–12 cm longae, 4–5 mm latae. Rami in complemento 40–60(–100). Foliorum ramorum laminae lanceolatae, glaucovirides, 3.5–10 cm longae, 8–14 mm latae. Inflorescentiae spiciformes, 5–6 cm longae, ramorum foliorum terminantes. Spiculae ellipticae, 1-flosculatae, 13–14 mm longae, distichae, lateraliter dispositae; gluma infera 4.5–5 mm longa; gluma supera 9–10 mm longa, 15-nervia; lemma 11 mm longum, 19–23-nervium, ad marginem superiorem strigosum; palea fusiformis, 11 mm longa, 12-nervia, anguste sulcata. Caryopsis ovoidea ad apicem subtiliter attenuata, 5.5–6.5 mm longa, cinereo-lutea.

Caespitose, woody bamboo. Culms ca. 6 m long, 1–3 cm diam., flexuous, with long, attenuate, threadlike, pendent or clambering tips. Internode fistulose, finely rugose, dark gray, with dull green stripes. Culm walls ca. 2 mm thick. Nodes salient, prenodal zone with dense appressed whitish, retrorse hairs. Culm leaves deciduous: sheaths 15–25 cm long, 4–8 cm wide, narrowing toward the summit, fringed at the apex with 1-cm-long, golden reddish, distally crisped hairs; abaxial surface glabrous, densely nerved; adaxial surface somewhat shiny or dark, apically tessellate; margins glabrous; inner ligule 1 mm long, finely ciliate; outer ligule a salient rim; blades reflexed, deciduous, narrow, 8–12 cm long, 4–5 mm wide, attenuate, forming a fine point. Branch complement with 40–60(–100) branches,

these 30–60 cm long, 1–1.5 mm thick, grayish, glabrous or puberulent, 2–3-noded before the leaves, nodes glabrous. Branch leaves 5–6 per complement: sheaths tight, glabrous, the intercostal zone finely transversely rugose, the overlapping margin glabrous; oral setae fine, deciduous, ca. 3 mm long; inner ligule ca. 0.8 mm long, finely ciliate; outer ligule a salient rim; pseudopetiole flat, slightly puberulent, 2.5 mm long; blades 3.5–10 cm long, 8–14 mm wide, L:W = 4.4–7.1, lanceolate, glaucous-green, adaxially glabrous, 2–3 marginal nerves on one side with rows of very fine prickly hairs; abaxial surface glabrous except for finely strigose base, the margins and the apex very finely scabrous. Inflorescences terminal on leafy branches, spike-like, 5–6 cm long, with 17–18 spikelets, these distichously arranged, distinctly separate and laterally outspread along the narrow, obscurely triquetrous, slightly sinuous, densely pilose rachis or rarely pectinate. Spikelets solitary, 1-flowered, bisexual, ellipsoid, 13–14 mm long, 3 mm wide. Glumes 2, unequal. Lower glume 1-nerved, carinate, attenuate toward the apex, finely puberulent, 4.5–5 mm long, ca. 1 mm wide at the base. Upper glume 9–10 mm long, 4 mm wide, broadly lanceolate, carinate, finely puberulent, 15-nerved, some nerves anastomosing, the apex scabrous, aristulate, ca. 1 mm long; adaxial surface shiny, dark-spotted; margins finely ciliate. Lemma 11 mm long, 5–5.5 mm wide, lanceolate, 19–23-nerved, the nerves anastomosing; abaxial surface somewhat strigose, the hairs appressed, longer and denser toward the upper margins, these densely ciliate; adaxial surface shiny, dark-spotted. Palea fusiform (folded), 11 mm long, ca. 4 mm wide, glabrous, opaque, 2-keeled, narrowly sulcate abaxially, 12-nerved, the nerves obliquely anastomosing in the upper part; keels finely ciliate, the hairs dark red; adaxial surface shiny. Rachilla extension bristle-like, 9 mm long, with a minute rudiment. Lodicules 3, subequal, 2.5 mm long, finely ciliate at the apex. Stamens 3, the anthers 12 mm long, dark. Ovary elongate, the style single, the stigmas 2, plumose; stigmatic papillae sharply pointed. Stamens 3, the anthers 12 mm long, dark. Caryopsis 5.5–6.5 mm long, ca. 3 mm wide, ovoid, apically slightly attenuate, rostrate, grayish yellow, smooth, apically slightly attenuate, the embryo and the hilum scarcely manifested externally.

**Phenology.** The flowering collections are known from 1941 and 1972–1974, thus suggesting a flowering cycle of 31–33 years.

**Distribution.** Southern Brazil.

*Merostachys scandens* was in bloom at the same time as *M. skvortzovii* (described later in this paper)





Figure 9. *Merostachys scandens* Sendulsky. —a. Flowering branch complement. —b. Gynoecium with two lodicules. —c. Stigmatic papillae. —d. Spikelet in bloom (flowering cycle 1973). —e. Lodicules. —f. Apical part of the inflorescence. —g. Culm leaf. —h. Caryopsis, hilum view. —i. Caryopsis, embryo view. —j. Lower glume. —k. Upper glume. —l. Lemma. —m. Palea. —n. Upper portion of the branch leaf sheath and base of the blade (abaxial surface). Based on Sendulsky 1319.

and in the same forest of the Biological Reserve, on the grounds of the Instituto de Botânica, São Paulo. The plants did not form dense clumps, but were slender and leaning on vegetation. The glaucous-green leaves are distinct from the green leaves of

*M. skvortzovii*. Because the plant was deep in the shaded forest, the visiting insects were not observed (see the discussion in *M. skvortzovii*). The habit of the inflorescence, its widely separated distichous spreading spikelets, is of some interest. This orga-



nization of the inflorescence is quite rare in the genus and contradicts the significance of the name *Merostachys*, formed from the Greek *meros*, part (partial or incomplete), and *stachys*, spike, alluding to the secund (one-sided) profile of the inflorescence (McClure, 1973). In *M. scandens* the inflorescence may sometimes also be pectinate, when for some unknown reason the very narrow rachis bends longitudinally over the ventral surface, bringing together its margins and the spikelets of two opposite rows.

**Paratypes.** BRAZIL. **São Paulo:** Município de São Paulo, 10 km S of center of city of São Paulo, in grounds of the Instituto de Botânica, Parque do Estado, 6 Dec. 1973 (fl), *Sendulsky 1317* (SP), 6 Dec. 1973 (fl), *Sendulsky 1320* (SP, US), 17 Dec. 1973 (fl), *Sendulsky 1323* (SP, US); Reserva Biológica, Parque Estadual das Fontes do Ipiranga, 8 Mar. 1974 (fr), *Sendulsky 1365* (SP); São Paulo, nativa no Jardim Botânico, 1 Dec. 1941 (fl), *O. Handro s.n.* (SP sheet 79756).

***Merostachys skvortzovii* Sendulsky, sp. nov.**

**TYPE:** Brazil. Estado de São Paulo: São Paulo, Parque do Estado e Jardim Botânico, 20 Oct. 1973, *Skvortzov s.n.* (holotype, SP 120954). Figure 10.

Culmi 4–6 m longi, 2–3 cm diametro; internodia fistulosa, scabra; nodi subpilosi, pilis albis. Foliorum culmorum laminae lanceolatae, 6–10 cm longae, 10 mm latae. Rami in complemento 150–200. Foliorum ramorum laminae lanceolatae, 3–11 cm longae, 6–16 mm latae. Inflorescentia spiciformis, pectinata, 1.5–3 cm longa, ramorum foliorum terminans. Spiculae 10–12 mm longae, fusiformes, 1-flosculatae; gluma infera 1.5 mm longa; gluma supera 8–9 mm longa, 9–11-nervia, aristulata; lemma ca. 9 mm longum, 16–18-nervium, puberulum, ad apicem strigosum; palea ca. 10 mm longa, 13–14-nervia, anguste sulcata. Caryopsis ovoidea, ad apicem globosa, 5 mm longa et ca. 3 mm lata, cinereo-latea.

Caespitose, woody bamboo, forming dense clumps. Culms 4–6 m long, 2–3 cm diam., erect except for the flexuose tips. Internodes fistulose, scabrous, with dark green stripes. Culm walls of the middle internodes 1–1.5 mm thick. Nodes salient with a touch of whitish pubescence above and below, younger nodes with short, tubiform supranodal ridge. Culm leaves deciduous: sheath 15–20 cm long, 5–6 cm wide, auriculate, fringed at the apex with a few hairs, abaxial surface glabrous, densely nerved, dark; adaxial surface opaque, dark, striate, tessellate above; inner ligule 1 mm long, finely ciliate at the margin, the cilia white; outer ligule a short inconspicuous rim; margins glabrous; blades lanceolate, reflexed, deciduous, 6–10 cm long, 10 mm wide. Branch complement with 150–200 slender branches, these 20–50 cm long, 1 mm thick, glabrous or finely puberulent, the internodes ca. 4–6 cm long, 2–3-

noded before the leaves. Branch leaves 5–7 per complement: sheaths tight, glabrous, striate; oral setae fine, 5–6 mm long; inner ligule a finely ciliate membrane, ca. 1 mm long; outer ligule a short rim; pseudopetiole flat, 3 mm long, finely puberulent; blades lanceolate, 3–11 cm long, 6–16 mm wide, L:W = 5–6.9, adaxially glabrous, slightly pilose abaxially, densely pilose at the base; when old, glabrous on both surfaces except at the base abaxially; adaxial surface with 3–4 marginal nerves on one side with rows of fine prickly hairs; margins finely scabrous. Inflorescences terminal on leafy branches, spike-like, pectinate, 1.5–3 cm long, with 16–18 spikelets. Rachis and pedicels pilose, some of the pedicels present at base on inner side small, swollen, whitish, rugose projections. Spikelets 10–12 mm long, 3 mm wide, solitary, 1-flowered, acuminate, fusiform. Glumes 2, unequal. Lower glume 1-nerved, carinate, acuminate, finely puberulent, 1.5 mm long, 0.8 mm wide at the base. Upper glume 8–9 mm long, 3.5 mm wide, broadly lanceolate, finely puberulent, 9–11-nerved, the nerves anastomosing in the upper part, the apex scabrous, aristulate, ca. 1 mm long; adaxial surface shiny, dark-spotted. Upper glume sometimes subtending a rudimentary bud (vestige of a depauperate floret attached to rachilla segment). Lemma ca. 9 mm long, 6 mm wide, broadly lanceolate, 16–18-nerved, the nerves obliquely anastomosing in the upper part; abaxial surface puberulent, somewhat strigose in the upper part; adaxial surface dark-spotted; margins ciliate. Palea ca. 10 mm long, 5 mm wide, glabrous, 13–14-nerved, 2-keeled, narrowly sulcate abaxially, the keels finely ciliate; adaxial surface shiny. Rachilla extension bristle-like, 8 mm long, with a minute rudiment. Lodicules 3, subequal, 3.2 mm long. Ovary elongate; stigmas 2, plumose, the stigmatic papillae elongate, rounded at the tips; stamens 3, the anthers 6 mm long, dark. Caryopsis 5 mm long, ca. 3 mm wide, ovoid, apically rounded, rostrate, grayish yellow, smooth; hilum linear, the embryo hardly visible.

**Phenology.** Flowering collections are known from 1941 and 1972–1974, suggesting a flowering cycle of 31–33 years.

**Distribution.** Southern Brazil.

Most collections of *Merostachys* consist of fragmentary flowering branches. The vegetative parts of the plants are nearly always omitted. Consequently, the descriptions and measurements of the leaves, branch complements, culm and culm leaves, when available, are based on flowering material; usually they are gathered from the easily reachable upper branches of the plant, which are always smaller in size and therefore less representative of the



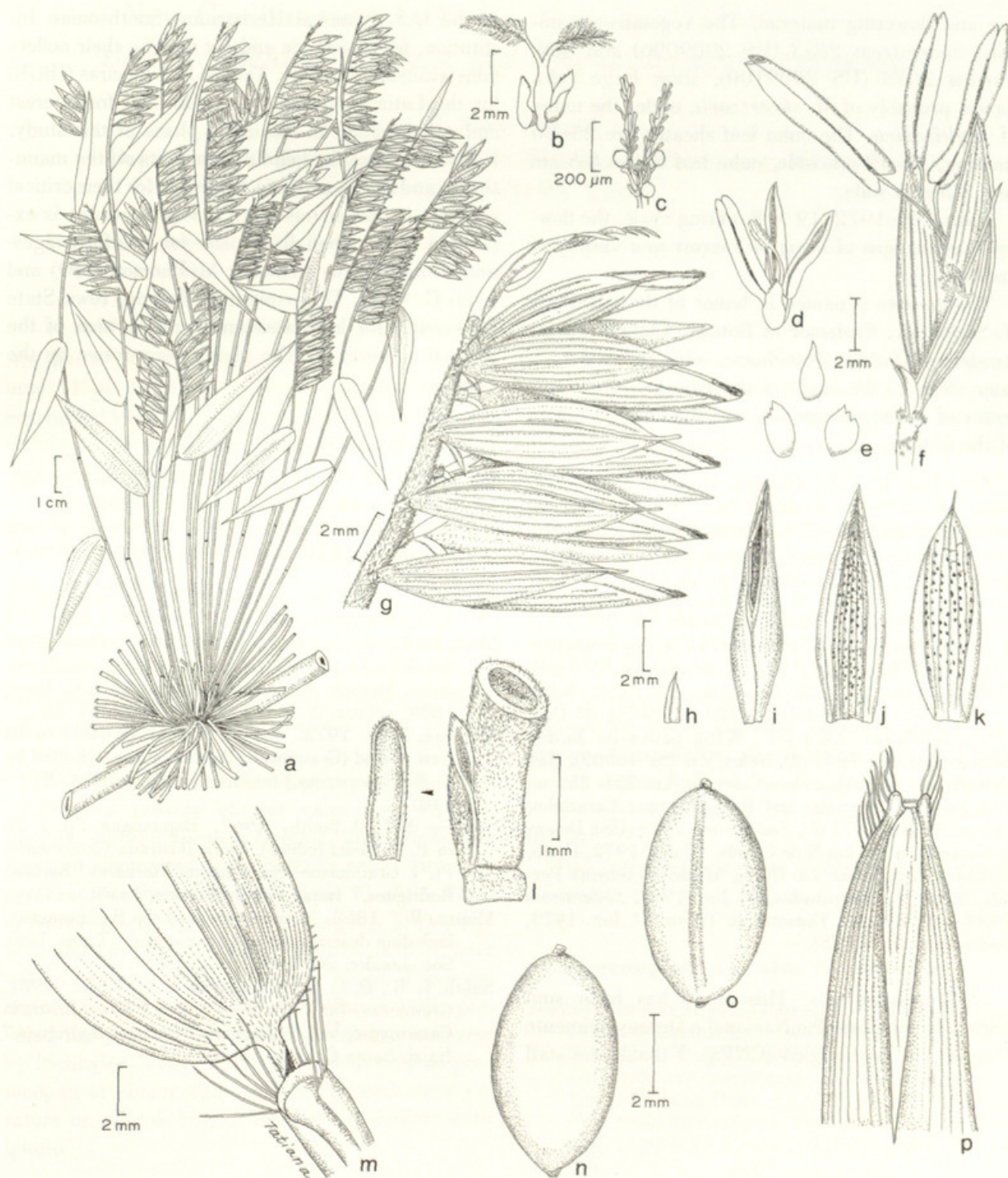


Figure 10. *Merostachys skvortzovii* Sendulsky. —a. Flowering branch complement. —b. Gynoecium with two lodicules. —c. Stigmatic papillae with pollen grains. —d. Bisexual flower with one lodicule. —e. Lodicules. —f. Spikelet in bloom (flowering cycle 1973). —g. Apical portion of the inflorescence. —h. Lower glume. —i. Palea. —j. Lemma. —k. Upper glume. —l. Rudimentary bud attached to rachilla segment. —m. Upper portion of the branch leaf sheath and base of the blade (abaxial surface). —n. Caryopsis, embryo view. —o. Caryopsis, hilum view. —p. Culm leaf. Based on the type specimen *Skvortzov s.n.* (SP 120954).

plant as a whole. Deciduous and decaying culm leaves from basal or midculm nodes, originated during the initial growing period, are lost by the time of flowering. The plant stops producing any new vegetative organs and turns to flowering. When it

is possible to find the vegetative, but complete collection, made from the same plant, the branch leaves are twice as large and the culm leaves are remarkably larger. Unfortunately, it is very seldom that a correctly identified collection displays both vegeta-



tive and flowering material. The vegetative materials, *Soderstrom* 2033 (US 2909096) and *Soderstrom* 2035 (US 2909100), show large culm leaves, probably of *M. skvortzovii*, under the name *M. multiramea*. The culm leaf sheaths are 25–30 cm long, 18–19 cm wide, culm leaf blades 8.5 cm long, 25 mm wide.

During the 1972–1974 flowering cycle, the flowers showed signs of being of interest to a variety of insects.

This species is named in honor of the late Boris V. Skvortzov, Professor of Botany, Chinese Forest Academy, Harbin, Manchuria, who dedicated his later years to the study of the Brazilian flora, collector of the type material, and the beloved father of the author.

**Paratypes.** BRAZIL. **Paraná:** Município Palmas, Estrada Palmas-Ponte Serrado, 5 Dec. 1971 (fl), *Hatschbach et al.* 28267 (NY, SP). **São Paulo:** São Paulo, Reserva Biológica, Parque Estadual das Fontes do Ipiranga, 7 fev. 1974 (fl), *Sendulsky* 1341 (SP, WIS); 10 km S of center of city of São Paulo, in grounds of the Instituto de Botânica, Parque do Estado, 10 Oct. 1973 (fl), *Sendulsky* 1314 (SP), 20 Oct. 1973 (fl), *Sendulsky* 1315 (SP, WIS), 6 Dec. 1973 (fl), *Sendulsky* 1318 (SP, WIS), 17 Dec. 1973 (fl), *Sendulsky* 1321 (SP, WIS), 17 Dec. 1973 (fl), *Sendulsky* 1322 (SP, WIS), 23 Dec. 1973, *Sendulsky* 1324 (SP, WIS); nativa no Jardim Botânico, 21 Oct. 1941 (fl), *Gehrt. s.n.* (SP 46002). **Rio Grande do Sul:** Município Colorado, km 251–252 on road between Carazinho and Bonambi, near Carazinho, 555 m, 30 Jan. 1973 (fl), *Soderstrom* 2029 (US); Depois de Caracol, ca. 10 km N de Canela, 17 dez. 1972, *Porto, Girardi & Lindeman s.n.* (ICN); Município tenente Portela, 3 km S of Derrobadas, 31 Jan. 1973, *Soderstrom* 2033 (US); Reserva Florestal do Turvo, 31 Jan. 1973, *Soderstrom* 2035 (US).

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