Nianhochloa gen. nov. (Poaceae, Bambusoideae), a new bamboo genus endemic to Bidoup Mountain, southern Vietnam

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ABSTRACT

A clambering bamboo endemic to Bidoup Mountain, southern Vietnam, represents a new monotypic endemic genus, *Nianhochloa* H.N.Nguyen & V.T.Tran, gen. nov. (Gramineae, Bambusoideae), which is described and illustrated. *Nianhochloa*, gen. nov. is distinguished from *Kinabaluchloa* K.M.Wong and *Bambusa* subg. *Lingnania* Chia & Fung by morphological synapomorphies: clambering culm habit and short rachilla internodes. Other diagnostic characters include a branch complement derived from single bud at a culm node developing into 3-4 subequal branches, these subequalling the main culm internode; short culm internodes; culm leaf blades erect; and lodicules protruding and glabrous.

KEY WORDS
Poaceae,
Bambusoideae,
Bambusa subg.
Lingnania,
Holttumochloa,
Kinabaluchloa,
Nianhochloa gen. nov.,
Nianhocloa bidoupensis,
Vietnam,
new genus,
new species.

RÉSUMÉ

Nianhochloa *gen. nov. (Poaceae, Bambusoideae), un nouveau genre de bambou endémique du Mont Bidoup, au sud du Viêtnam.*

Un bambou grimpant endémique du Mont Bidoup, au sud du Vietnam, constitue un nouveau genre endémique monotypique, *Nianhochloa* H.N.Nguyen & V.T.Tran, gen. nov. (Gramineae, Bambusoideae), décrit et illutré dans cet article. *Nianhochloa* gen. nov. diffère de *Kinabaluchloa* K.M.Wong et de *Bambusa* subg. *Lingnania* Chia & Fung par des synapomorphies morphologiques : chaume à port grimpant et entre-nœuds du rachis courts. Parmi les autres caractères diagnostiques, un complément de branche dérivé d'un seul bourgeon sur un nœud de tige, se développant en 3-4 branches égales, celles-ci équivalentes à l'entre-nœud de la tige principale ; entre-nœuds de tige courts ; limbes foliaires droits ; et lodicules protubérantes et glabres.

MOTS CLÉS
Poaceae,
Bambusoideae,
Bambusa subg.
Lingnania,
Holttumochloa,
Kinabaluchloa,
Nianhochloa gen. nov.,
Nianhocloa bidoupensis,
Viêtnam,
genre nouveau,
espèce nouvelle.

INTRODUCTION

Two genera and one subgenus of Asian woody bamboos in the tribe Bambuseae Kunth ex Nees, subtribe Bambusinae J.S.Presl characterised by having pachymorph, short-necked rhizomes, erect or suberect culms, and a branch complement with subequal branches have been documented. One of these, *Kinabaluchloa* K.M.Wong (Wong 1993), was separated from *Bambusa* to accommodate two species, *K. wrayi* (Stapf) K.M.Wong and *K. nebulosa* K.M.Wong of Malaysia, characterised by the branch complement derived from a single bud at the culm node, developing into a dense cluster of subequal branchlets; pseudospikelets each immediately subtended by a large prophyll; and the ovary glabrous to sparsely hairy at the summit, when young slender-cylindric and tapering upwards (Wong 1993, 1995). The other genus is *Holttumochloa* K.M.Wong (Wong 1993), which was separated from *Bambusa* to accommodate three species, *H. magica* (Ridl.) K.M.Wong, *H. pubescens* K.M.Wong and *H. korbuensis* K.M.Wong, endemic to Peninsular Malaysia, characterised by a branch complement derived from many primary buds at a culm node developing into a cluster of subequal branchlets; bud prophylls divided into very unequal lobes; pseudospikelets each subtended by a bract distinctly smaller than the lemmas; and the ovary with a hairy summit, when young obovoid-ovoid becoming cylindrical (Wong 1993, 1995). The last one, *Bambusa* subg. *Lingnania* Chia & Fung, was established (Chia & Fung 1980) for the *Lingnania* species they transferred to *Bambusa*, characterised by the presence of many subequal braches and absent on lower culm, culm leaf blades narrow (McClure 1940; Xia *et al.* 2006).

During our investigation of the bamboos from Hon Giao Peak, Bidoup Mountain, Lac Duong District, Lam Dong Province, southern Vietnam, in June 2006, we found several populations of a bamboo growing sparsely scattered in high mountain forest (alpine), between 1600-1800 m a.s.l. Specimens of rhizomes, branches, culm leaves and flowering branches were collected. All collected specimens were dissected and studied. We confirmed the presence of 3-4 subequal branches per node, pseudospikelets consisting of 1-3 small empty bracts, two (rarely one or three) perfect flowers (florets) and a terminal vestigial flower (floret), as was found in *Kinabaluchloa* and *Holttumochloa*. Otherwise, the branch complement was derived from a single bud at the culm node, developing into a few of subequal branches, resembling that of *Kinabaluchloa* and *Bambusa* subg. *Lingnania*. However, detailed studies of this material revealed that these specimens are differentiated among other characters by clambering culms, the culm leaf blades typically erect, a mid-culm branch complement derived from a single bud at the culm node, developing into 3-4 subequal branches, subequalling internodes. Beside the vegetative characters surveyed, additional features supporting the distinction of this species from *Kinabaluchloa* and *Bambusa* subg. *Lingnania* are found in flower characters. It may be distinguished from *Kinabaluchlo*a by its glumes shorter than the lowest lemma and short rachilla internodes between the flowers. It also may be distinguished from *Bambusa* subg. *Lingnania* in having two perfect flowers (rare one or three) in the spikelet (Table 1; Figs 1, 2). These distinctive features indicate that this bamboo is easily diagnosed and deserves recognition as a new monotypic genus. Therefore, we here propose to name it *Nianhochloa* gen. nov., with *N. bidoupensis* sp. nov. as the type species.

MATERIAL AND METHODS

Living plants of this species were found in Hon Giao, Bidoup Mountain of Lam Dong Province, Vietnam, in June 2006. Fresh flowers were examined under an Olympus SX-41 light Microscope and colour photographs were made using a Canon Power Shot SX10IS; line drawings and descriptions were made from fresh material. Presumably related genera were used for critical comparison.

SYSTEMATICS

Genus *Nianhochloa*
H.N.Nguyen & V.T.Tran, gen. nov.

Habitu Kinabaluchloa *K.M.Wong,* Bambusa *subg.* Lingnania *Chia & Fung similis, sed culmis scandentibus,*

TABLE 1. — A comparison of *Nianhochloa* H.N.Nguyen & V.T.Tran, gen. nov with allied genera.

Characters	*Holttumochloa*	*Kinabaluchola*	*Bambusa* subg. *Lingnania*	*Nianhochloa* gen. nov.
Culm habit	erect to suberect	erect to suberect	erect	clambering
Culm leaf	blade very narrowly linear and reflexed; auricles inconspicuous	blade very narrowly linear and reflexed; auricles inconspicuous	blade narrow, erect or reflexed; auricles conspicuous and inconspicuous	blade triangular, erect; auricles absent
Mid-culm branches	many, derived from many primary buds at a culm node	many, derived from a single bud at the culm node	many, derived from a single bud at the culm node	3-4, derived from a single bud at the culm node
Spikelet	2-5-flowered	1-2-flowered	(2)-many flowered	(1) 2 (3)-flowered
Rachilla internodes	elongate	elongate	elongate	short
Glumes	glumes shorter than the lowest lemma	glumes as long as the lowest lemma	glumes shorter than the lowest lemma	glumes shorter than the lowest lemma
Palea	shorter than lemma	shorter than lemma	shorter (rarely as long as lemma)	equal or subequal lemma
Lodicules	3, margins hairy, no protruding	3, margins hairy, no protruding	1-3, margins hairy, no protruding	3, margins glabrous, protruding
Ovary	summit hairy	summit glabrous to hairy	summit hairy	summit hairy

pseudospiculae bracteis brevioribus lemmatibus, internodiis rhachillis (inter flores) brevibus differt.

TYPE SPECIES. — *Nianhochloa bidoupensis* H.N.Nguyen & V.T.Tran, sp. nov.

ETYMOLOGY. — This genus is named in honor of Prof. Nianhe Xia, in recognition of his contributions to the understanding of the bamboos of Vietnam. The second author was his student, and received from Prof. Xia direction and encouragement in the study of bamboos.

DESCRIPTION

Shrubby bamboo. Rhizome pachymorph. Culms clambering; nodes slightly swollen. Branch complement derived from single bud at a culm node, developing into 3-4 subequal branchlets, subequalling the main culm internode. Culm leaves early deciduous; sheaths attenuate toward the apex; blades triangular, erect, apex acute; ligule a low ciliate rim, the cilia white, auricles absent. Leaf blades oblong-obovate, slightly narrow or obtuse at the base, shortly pseudopetiolate; auricles rim low or inconspicuous with slender bristles. Inflorescences of pseudospikelets, initiating at the end of a leafy branch; pseudospikelets consisting of 2-3 small empty bracts, 1-2 bracts subtending prophyllate buds, 1-3 glumes (shorter than the lowest lemma); two (rarely one or three) perfect flowers and a terminal vestigial flower; lemma glabrous; palea 2-keeled, equal or subequal to the lemma; lodicules 3, transparent, protruding at the base; stamens 6, filaments free; stigmas 3, plumose, sessile; ovary densely covered with white hairs at the apex; caryopsis flattened on one side.

REMARKS

This remarkable genus is similar to *Kinabaluchloa* K.M.Wong in general appearance, but is distinct in its clambering culm habit, pachymorph rhizomes with extended necks, glumes shorter than the lowest lemma, and short rachilla internodes between flowers. The distinguishing characters are summarised in Table 1.

Nianhochloa bidoupensis
H.N.Nguyen & V.T.Tran, sp. nov.
(Figs 1; 2)

Rhizomata sympodiales, culmi scandentes, 0.3-0.4 cm in diam., internodiis 20-22 cm longis. Inflorescentiae terminales, spiculae 2 florae, pseudospiculae bractea brevior lemmate, internodii rhachillae 2-3 mm longae, flos cum 3 lodiculis, 6 staminibus filamentis liberis, atque 3 stigmatibus.

TYPUS. — **Vietnam.** Lam Dong Province, Bidoup Mountain, Hon Giao Peak, elevation 1650 m a.s.l., 108°42'54.7"E, 12°11'12.8"N, VI.2006, *H.N. Nguyen, V.T. Tran 62006601* (holo-, FSIV! [Herbarium of Forest Science Institute of Vietnam]).

OTHER MATERIAL EXAMINED. — **Vietnam.** Annam, Nha Trang, 1800 m a.l.s., 26.V.1922, *Poilane 3688* (P!).

DISTRIBUTION, HABITAT AND PROPOSED CONSERVATION STATUS. — The species *Nianhochloa bidoupensis* sp. nov. is endemic to Bidoup Mountain, in the southern highlands of Vietnam and is assessed as Critically Endangered because its EOO (extent of occupancy) is less than 100 km^2. Otherwise, it grows sparsely scattered on Hon Giao peak, Bidoup Mountain, and is not known from any other locality. Therefore, the species should be regarded as Critically Endangered (CR) according to the World Conservation Union (IUCN) threat categories (IUCN 2001). Associated species at the type locality include: *Fokienia hodginsii* Henry & Thomas (Cupressaceae), *Podocarpus imbricatus* Blume, *Podocarpus neriifolius* D.Don (Podocarpaceae), *Quercus macrocalyx* Hick. & Cam., *Quercus langbianensis* Hick. & Cam. (Fagaceae) and *Camellia* sp. (Theaceae).

PHENOLOGY. — Its flowering period extends from June to August (as seen during 2006-2010). New shoots are developed between June and August.

ETYMOLOGY. — The specific epithet refers to the type locality, Bidoup Mountain, Lac Duong District, Lam Dong Province, Vietnam.

DESCRIPTION

Rhizomes pachymorph. Culms scrambling, 3-8 m tall; internodes 20-22 cm long, 0.3-0.4 cm in diameter; walls 0.5-1 mm thick. Branch complement derived from single buds at a culm node developing into 3-4 of subequal branchlets, subequalling internode. Culm leaves early deciduous; sheaths attenuate toward the apex, when young covered with sparsely appressed purple hairs on the abaxial side, margins densely covered with white cilia; 6.5-8 × 1-1.5 cm; blade triangular, apex acute, erect, 2-2.5 × 0.1-0.2 cm, white cilia at the base on the adaxial side; ligule rim low, white cilia *c.* 0.1 cm long. Leaf blades 8-10 per branch, oblong-obovate, slightly narrow or obtuse at the base, margins serrate, 14-16 × 2.5-2.8 cm, veins 5-6 pairs; leaf sheaths purple, margins bearing dense white hairs at the upper part; auricles rim low or inconspicuous with slender bristles 0.4-0.6 cm long; ligule rim low, *c.* 1 mm long, ciliate; pseudopetiole *c.* 1mm long. Inflorescences iterauctant, of pseudospikelets, initiating at the end of a leafy branch; pseudospikelets typically 1-2 cm, consisting of 2-3 small empty bracts, 1-2 bracts subtending prophyllate buds, 1-3 empty glumes (shorter than the lowest lemma); two (rarely one or three) perfect flowers and a terminal vestigial flower; uppermost glume 5-6 × 2-3 mm, ciliate on the abaxial surface, apex acuminate, mucronate; rachilla internodes between flowers glabrous, 2-3 mm long; lemma glabrous, 7-9 × 3-4 mm, with a mucronate tip, *c.* 1 mm, veins 9-10; palea 2-keeled, equalling or subequalling lemma, glabrous, transparent, veins 9-10; lodicules 3, *c.* 2-3 mm, glabrous transparent, protruding at the base, 2-3 × 1-2 mm; stamens six, filament free, 4-5 × *c.* 0.5 mm; stigmas three, white plumose, arising directly from the ovary summit, hairy; ovary dense white hairs at the apex; caryopsis *c.* 5 × 2 mm, with a flattened surface.

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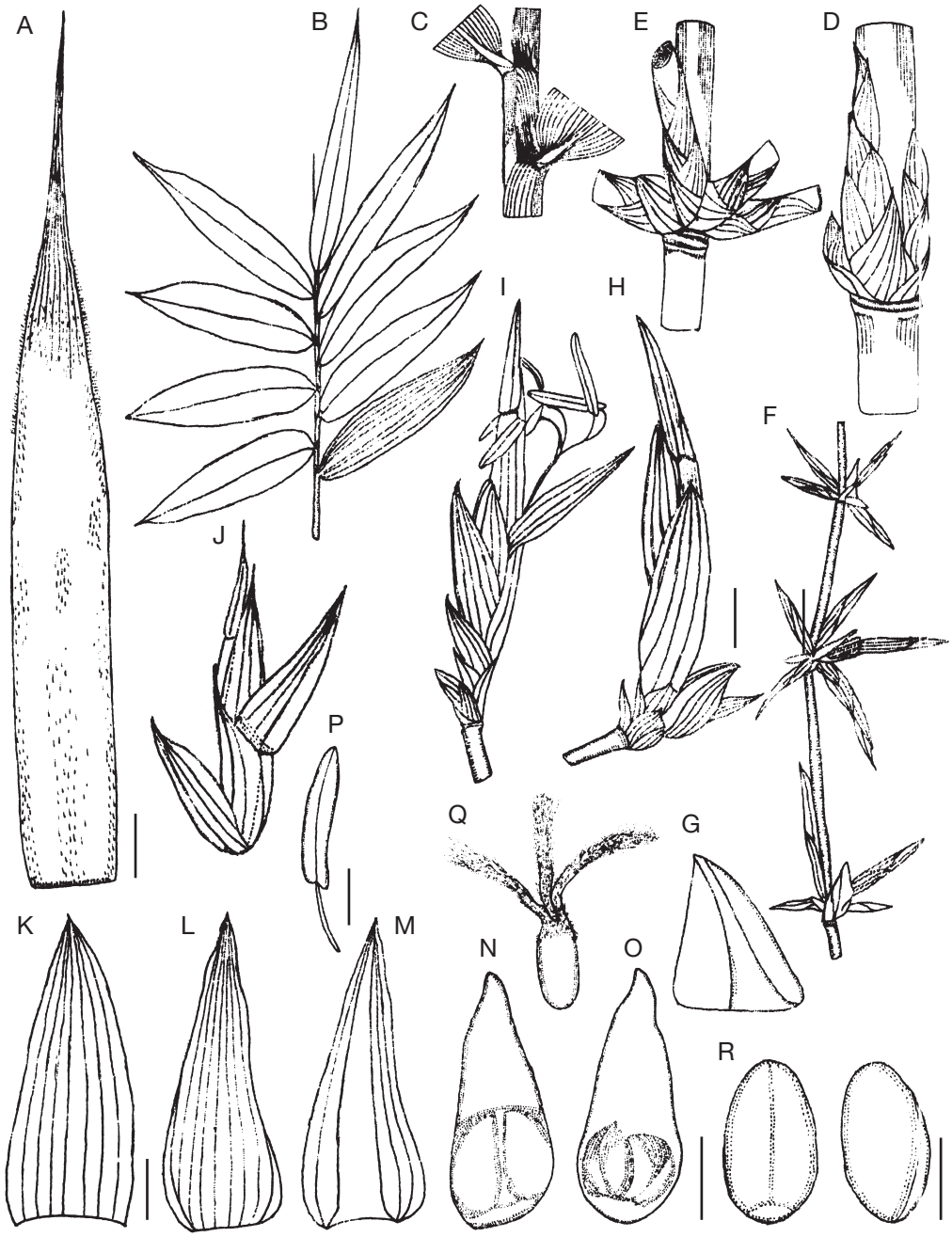

FIG. 1. — *Nianhochloa bidoupensis* H.N.Nguyen & V.T.Tran, sp. nov.: **A**, culm leaf; **B**, leafy branch; **C**, section of leafy branch; **D**, young branches at node; **E**, branch complement at midculm; **F**, leafy flowering branch; **G**, 2-keeled prophyll from the base of inflorescence, ventral view; **H**, pseudospikelet; **I**, pseudospikelet with florets open; **J**, pseudospikelet with rachilla between florets; **K**, lemma; **L**, ventral view of palea; **M**, dorsal view of palea; **N**, ventral view of lodicule; **O**, dorsal view of lodicule; **P**, stamen; **Q**, pistil with three stigmas; **R**, fruit. Drawn from type *H.N. Nguyen, V.T. Tran 62006601*. Scale bars: A, 0.5 cm; B-G, Q, not to scale; H-J, 2.5 mm; K-M, 1.7 mm; N-O, 1.5 mm; P, 1.5 mm; R, 2.5 mm.

Fig. 2.— *Nianhochloa bidoupensis* H.N.Nguyen & V.T.Tran, sp. nov., slides by authors from type locality; **A**, high mountain habitat (alpine forest); **B**, clump, **C**, bottom of clump, **D**, rhizome with extended necks; **E**, young branches at mid-culm; **F**, branch complement at mid-culm; **G**, leafy branch; **H**, section of leafy branch showing lower leaf surfaces; **I**, section of leafy branch showing upper leaf surfaces.

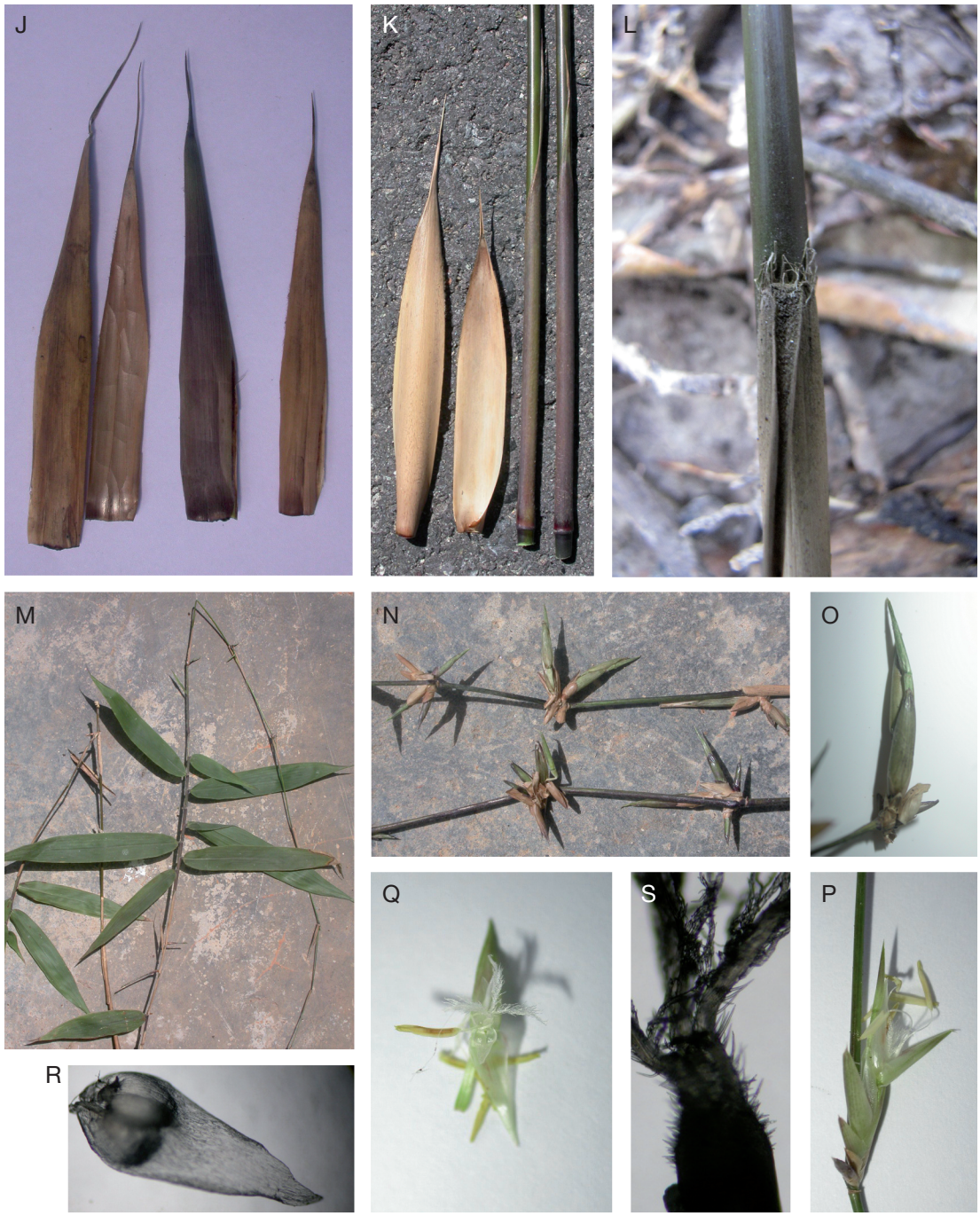

FIG. 2 (continuation). — *Nianhochloa bidoupensis* H.N.Nguyen & V.T.Tran, sp. nov; slides by authors from type locality. **J**, culm sheaths; **K**, culm sheaths and internodes; **L**, section of culm sheath; **M**, leafy flowering branch; **N**, section of flowering branch; **O**, pseudospikelet; **P**, pseudospikelet with florets open; **Q**, floret with lemma, palea, lodicules and stamens; **R**, lodicule; **S**, ovary with three stigmas (detail).

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