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The genus *Rhynchoglossum* Blume (Gesneriaceae) in Thailand

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ABSTRACT. The genus *Rhynchoglossum* Blume in Thailand is revised. Three species are recognised, *R. obliquum* Blume, *R. mirabilis* Patthar. and *R. saccatum* Patthar., the latter two newly described here and endemic to Thailand. A key to the species and illustrations are provided.

KEY WORDS: Taxonomy, *Rhynchoglossum*, new species, Thailand.

INTRODUCTION

The genus *Rhynchoglossum* Blume was established by Blume (1826) when he described *Rhynchoglossum obliquum* Blume, a widespread species occurring from India to New Guinea. Burtt (1962) recognised 13 species of *Rhynchoglossum*, including all species of the synonyms *Antonia* R.Br., *Glossanthus* J.G.Klein ex Benth., *Klugia* Schltdl. and *Loxotis* R.Br. ex Benth. He recognised four morphological groups in the genus: 1) large corollas, four fertile stamens, anthers all coherent; 2) large corollas, four fertile stamens, anthers coherent in pairs, one pair larger; 3) large corollas, two fertile stamens; and 4) small corollas, two fertile stamens. Later, Weber (2004) recognised only ten species of *Rhynchoglossum*, nine species in Tropical Asia, and one in Central America (Mexico to Peru). Weber (2004) referred the genus to the informal Epithematoid Gesneriaceae group but later (Weber et al., 2013) it was formally placed in subfamily Didymocarpoideae, tribe Epithemateae, subtribe Loxotodinae. Phylogenetic studies of *Rhynchoglossum* (Mayer et al., 2003) has shown the genus to be sister to the remaining Epithemateae. In the same study, two groups were identified within *Rhynchoglossum*: 1) perennial herbs with large flowers, four stamens; and 2) annual herbs with small flowers and two stamens.

In Thailand, Barnett (1962) only recorded a single species, *Rhynchoglossum obliquum*, as did Burtt (2001). In the last decade many more specimens of Gesneriaceae have been collected, revealing the two new species described here, *Rhynchoglossum mirabilis* Patthar. and *R. saccatum* Patthar. Both species are annual herbs, not rhizomatous, have inflorescences arising along the petioles, short, open-mouthed (ringent) corollas (i.e. not closed (personate) as in *Rhynchoglossum obliquum*), four fertile stamens with one pair slightly larger than the other, and several tufts of hairs inside the corolla tube. Thus, they do not belong to any of the groups of Burtt (1962) or Mayer et al. (2003). In Malesia, Kartonegoro (2013) recognised five species of *Rhynchoglossum* with only one species, *R. borneense* Merr. from Borneo, having two unequal pairs of stamens. However, this species has larger personate flowers and medusoid-like pilose hairs inside the corolla tube. The other species that also have four stamens and larger flowers, but without these pilose hairs inside the corolla tube, are *Rhynchoglossum azureum* (Schltdl.) B.L.Burtt from Mexico to Peru, *R. gardneri* W.L.Theob. & Grupe from Sri Lanka, *R. notonianum* (Wall.) B.L.Burtt from southern India and Sri Lanka, and *R. omeiense* W.T.Wang from southern China. These species also differ from *Rhynchoglossum mirabilis* and *R. saccatum* in their perennial and rhizomatous habits.

Burtt (2001) noted under the genus *Monophyllaea* R.Br. that a collection, *Shimizu et al. T-27066* (**BKF**, **L**), was likely to be a hybrid between *Rhynchoglossum* and *Monophyllaea* because of its unusual features, including inflorescences arising

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from the middle of the petioles, the pedicels being sharply deflexed after flowering, and the short, open-mouthed (ringent) corolla. Both new species have the characteristics noted by Burtt, and the Shimizu collection belongs to *Rhynchoglossum mirabilis*. Some floral characters, such as the pedicels being longer than the calyx and deflexed after flowering, are similar to those of *Monophyllaea* but the oblique leaves, unilateral racemose inflorescences, and bilabiate corollas clearly show these taxa belong to *Rhynchoglossum*.

This revision is based on herbarium material from the herbaria BK, BKF, CMU and QBG, abbreviations in accordance with *Index Herbariorum* (Thiers [continuously updated]). Additional herbaria are included for collections which have been confirmed by reviewers and editors of this paper.

Thai names for the species are coined by the author.

TREATMENT

Rhynchoglossum Blume, Bijdr. Fl. Ned. Ind. 14: 741. 1826 "*Rhinchoglossum*".— *Antonia* R.Br. in Wall., Pl. As. Rar. 3: 65. 1832, non Pohl.— *Klugia* Schltdl., Linnaea 8: 248. 1833.— *Loxotis* R.Br. ex Benth., Scroph. Ind.: 57. 1835.— *Glossanthus* Klein ex Benth., Scroph. Ind.: 57. 1835. – Type species: *Rhynchoglossum obliquum* Blume

Herbs, 5–100(–150) cm high; stem terete, branched or not, glabrous or puberulous to pubescent. *Leaves* alternate, exstipulate, petiolate; lamina membranous to subcoriaceous, ovate to lanceolate; apex acute to acuminate; margin entire to serrate; base cuneate to cordate, often oblique. *Inflorescence* a unilateral raceme, axillary or terminal, sometimes arising along the petiole, few- to many-flowered; bracts present or absent; bracteoles linear or absent, arising from the base or the middle of pedicel. *Calyx* actinomorphic, 5-lobed, connate at base, sometimes winged at line fusion, calyx lobes triangular to acute, entire. *Corolla* zygomorphic; tube cylindrical, gradually or abruptly widening, sometimes swollen at the ventral curve; glabrous or with puberulent or pilose tufted hairs arising from sparse yellow to orange-brown spots inside the corolla tube; limb 2-lipped, personate or not, upper lip 2-lobed, shorter than the 3-lobed lower lip. *Stamens* 2 or 4, adnate to the corolla tube near the middle, anthers coherent, in pairs or altogether when 4. *Ovary* ovoid, 1-locular; placentae 2, parietal; disc annular or cupular; stigma 1, terminal, subglobose, dilated or obliquely elongated. *Fruit* a capsule, ovoid, shorter or longer than the calyx, loculicidally dehiscent to base, 2-valved, straight, not twisted. *Seeds* minute, ellipsoid, without appendages.

About 13 species, 12 in tropical Asia, 1 in Central America.

KEY TO THE SPECIES

1. Stamens 2; inflorescences axillary or terminal; corolla mouth usually closed (personate); corolla tube without hairs inside **2. R. obliquum**
1. Stamens 4; inflorescences arising along the petioles; corolla open-mouthed (ringent); corolla tube with several tufts of hairs inside
   2. Inflorescence peduncle swollen at base; corolla ca 0.8–1.2 cm long; stigma dilated, slightly 2-lobed at top **3. R. saccatum**
   2. Inflorescence peduncle not swollen at base; corolla ca 0.5–0.7 cm long; stigma minute, obliquely elongated **1. R. mirabilis**

1. Rhynchoglossum mirabilis Patthar., **sp. nov.**

Differs from *Rhynchoglossum borneense* Merr. by its smaller flowers, calyx with wings, corolla whitish or whitish with purplish stripes on the corolla tube and lower lip, several orange-brown spots covered with tufts of pilose hairs inside the corolla tube. – Type: Thailand, Tak, Mae Sot, Pha Wo, alt. 700 m, 16°46'22"N, 98°41'53"E, 5 Nov. 2010, *Pooma, Pattharahirantricin, Sirimongkol & Supachok 7509* (holotype **BKF**; isotype **E**). Figs. 1, 4A–E, 6A–B, 7A–B.

Lithophytic or terrestrial herb, 5–19 cm high; stem glabrous. *Leaves* ovate, 9.5–5.5 × (2–)3.5–6.5 cm; apex acute to acuminate; margin entire, glabrous to pubescent; base equal or oblique, cordate or obtuse; lamina membranous, glabrous or slightly hairy, sometimes with brown sessile glands on the lower surface; secondary veins 8–11 pairs; petioles 5–7 cm long. *Inflorescences* arising along the petioles, rarely axillary, 2–13 cm long, with 3–15 flowers; peduncles to 4 cm long; pedicels glabrous, 2–10 mm long, deflexed or spreading; bract absent; bracteoles

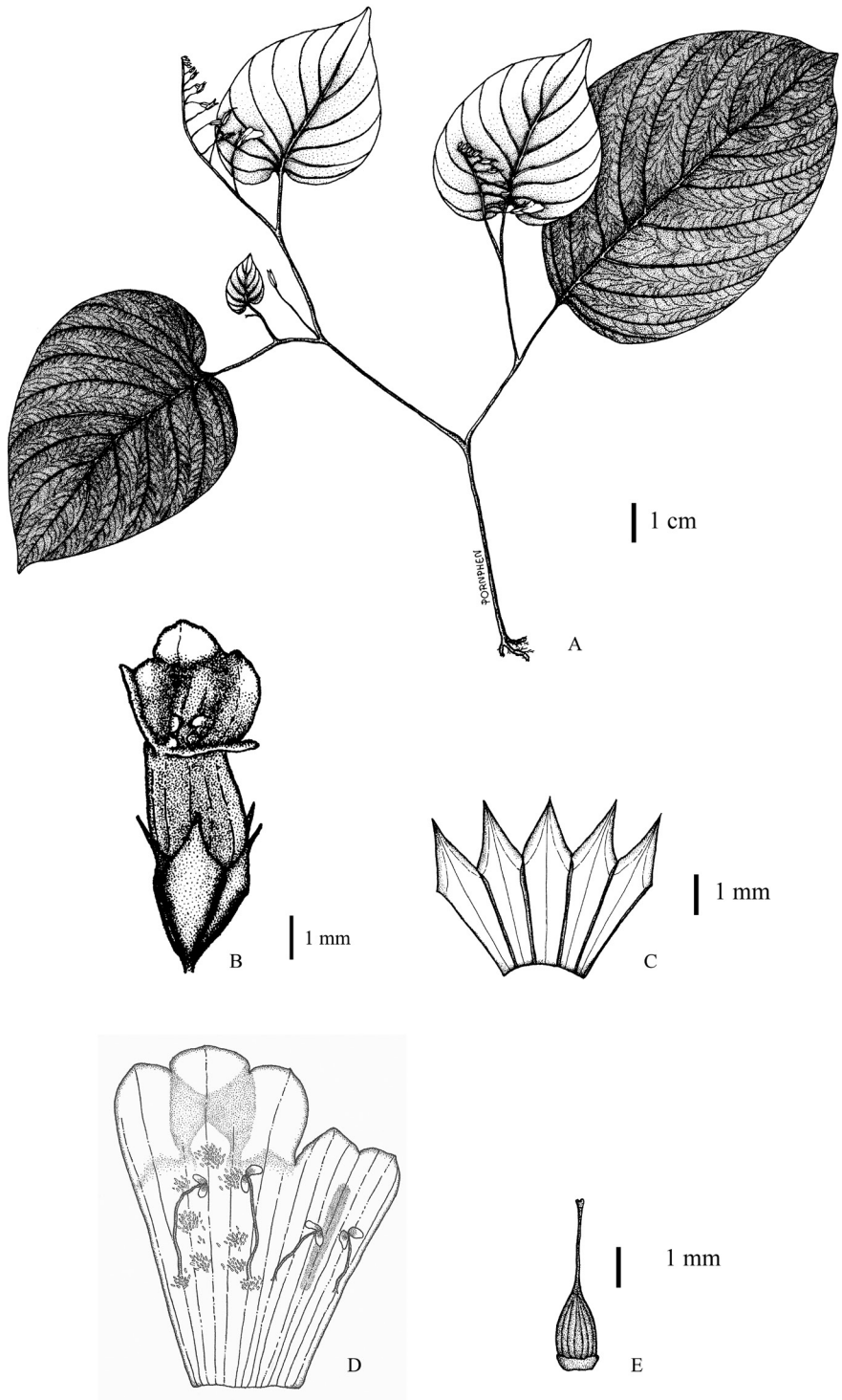

Figure 1. *Rhynchoglossum mirabilis* Patthar.: A. habit; B. flower; C. calyx; D. corolla; E. pistil. *Pooma et al. 7520* (BKF).

linear, arising from the base of the pedicel, 1–3 mm long or absent. *Calyx* campanulate, glabrous, pale green; tube to 4 mm long, with a narrow wing running from the base to each of the five sinuses; lobes reflexed or not, triangular, 1–1.5 mm long, acute to acuminate, glabrous, entire. *Corolla* ringent, 5–7 mm long, throat white, often with purplish stripes, or whitish-green to whitish-brown; tube cylindrical, gradually widening to an open mouth, 3–5 mm long, with several orange-brown spots covered with tufts of pilose hairs; upper lip weakly 2-lobed, lobes 1–2 mm long; lower lip obscurely to distinctly 3-lobed, whitish to purplish-white, 2–3 mm long. *Stamens* 4, coherent in pairs; filaments glabrous, the longer pair 3–4 mm long and adnate to the lower lip, the shorter pair 1.5–1.8 mm long and adnate to the upper lip; anthers whitish, oblong, subequal, 0.5–1 mm long; pollen spheroidal, tricolpate, with rugulate sculpturing, ca 18 µm diameter. *Disc* cupular to annular, slightly undulate. *Ovary* ovoid, glabrous, with longitudinal ridges, 1.5–2 mm long; style glabrous, 2–4 mm long; stigma minute, obliquely elongated. *Capsule* ovoid, glabrous, 3–4 mm long, enclosed by calyx; style persistent, to ca 4 mm long. *Seeds* ellipsoid, dark brown, 280–300 × 140–160 µm, surface untidily striate.

Thailand.— NORTHERN: Tak [Mae Sot, Pha Wo, alt. 700–850 m, 12 Oct. 1979, *Shimizu, Toyokuni, Koyama, Yahara & Santisuk T-18485* (**BKF**); Mae Sot, Wat Tham Inthanin, km 65 Tak-Mae Sot road no. 105, 15 Sept. 2005, *Pooma 5682* (**BKF**); ibidem, alt. 600 m, 21 Nov. 2005, *Pooma, Berg & Poopath 5735* (**BKF**, **E**, **L**); ibidem, alt. 650 m, 16° 46'N, 98° 40' 20"E, 5 Nov. 2010, *Pooma, Pattharahirantricin, Sirimongkol & Supachok 7520* (**BKF**)], Phitsanulok [Thung Salaeng Luang National Park, Ban Mung Station, Duean-Dao Cave, alt. 240 m, 25 Sept. 2013, *Nangngam 2065* (**BKF**, Herbarium, Faculty of Science, Naresuan University)]; SOUTH-WESTERN: Uthai Thani [Tham Pathun Non Hunting Area, near Pathun Cave, alt. 100 m, 14 Dec. 2013, *Poopath, Bunma, Kaewpranee & Phoemphun 521* (**BKF**)], Kanchanaburi [Sangkhla Buri, Lai Wo Subdistrict, Ban Sano Pong (Karen village), Thung Yai Naresuan Wildlife Sanctuary, alt. 350 m, 7 Oct. 1993, *Maxwell 93-1151* (**BKF**, **L**); Ti Pugae, Thong Pha Phum, 10 Oct. 2008, *Triboun 4032* (**BK**, **BKF**, **E**); Ti Pukae, Thong Pha Phum, 14° 56' 30"N, 98° 39' 44"E, alt. 350 m, 28 Oct. 2009, *Middleton & Triboun 5200* (**BK**, **BKF**, **E**); Sangkhla Buri, roadside from Sangkhla Buri to Thong Pha Phum, Tham Sukho, alt. 180 m, 17 Dec. 2009, *Pooma, Pattharahirantricin, Thumcharoen & Meeboonya 7431*; Sangkhla Buri, Tambon Nong Lu, Tham Kaeo Sawan Bandan Temple, 15° 10' 17"N, 90° 24' 57"E, alt. 320 m, 25 Aug. 2010, *Chamchumroon, Esser, Suphuntee, Sirimongkol & Somngam 4798* (**BKF**, **M**)]; PENINSULAR: Surat Thani [Pha Nom district, Khao Sok National Park, 26 Dec. 1976, *Santisuk 858* (**BKF**); ibidem, alt. 100–200 m, 12 Dec. 1979, *Shimizu, Toyokuni, Koyama, Yahara & Niyomdham T-27066* (**BKF**); Phanom district, Khao Sok, km 99 trail from the road towards the reservoir, 8.940 N, 98.610 E, alt. 250 m, *Middleton, Hemrat, Lindsay, Suddee & Suwanachat 4039*, 26 Feb. 2006 (**BKF**, **E**)].

Distribution.— Endemic to Thailand.

Ecology.— On limestone, mixed deciduous forest, 100–850 m alt. Flowering and fruiting August–February.

Etymology.— The specific epithet refers to the remarkable characters.

Vernacular.— Sainam yot (สายน้ำหยด).

Note.— Some populations present flowers with white corollas while others consistently have corollas with purplish streaks near the throat. Further investigation may reveal there are actually two taxa.

2. Rhynchoglossum obliquum Blume, Bijdr. Fl. Ned. Ind. 14: 741. 1826; Burtt, Thai Forest Bull., Bot. 29: 106. 2001; Kartonegoro, Reinwardtia 13(5): 426. 2013.— *Wulfenia obliqua* Wall., Tent. Fl. Nepal t. 35. 1826.— *Loxotis obliqua* (Wall.) Benth., Scroph. Ind.: 57. 1835.— *Rhynchoglossum obliquum* (Wall.) DC., Prodr. 9: 275. 1845, non Blume.— *Antonia obliqua* (Wall.) R.Br. in Wall., Pl. Asiat. Rar. 3: 65 1832.— *Loxotis intermedia* Benth., Scroph. Ind.: 57. 1835.— *Rhynchoglossum obliquum* (Wall.) DC. var. *intermedium* (Benth.) DC., Prodr. 9: 275. 1845.— *R. blumei* DC., Prodr. 9: 274. 1845.— *R. rheedei* DC., Prodr. 9: 274. 1845.— *R. zeylanicum* Hook., Bot. Mag. 71: t. 4198. 1845.— *R. obliquum* Blume var. *parviflorum* C.B.Clarke in A.DC. & C.DC., Monogr. Phan. 5(1): 162. 1883, ("*parviflora*").— *R. hologlossum* Hayata, Icon. Pl. Formosan. 5: 131. 1915.— *R.*

obliquum Blume var. *hologlossum* (Hayata) W.T.Wang, Bull. Bot. Res., Harbin 4(1): 31. 1984.— *R. papuae* Schltr., Bot. Jahrb. Syst. 58: 299. 1923; B.L.Burtt, Notes Roy. Bot. Gard. Edinburgh 24: 171. 1962. Figs. 2, 5, 7C–D.

Herb up to 1.5 m high; stem glabrous to hairy. *Leaves* ovate, 3–14 × 1–6 cm; apex acute to acuminate; margin entire; base oblique, acute to obtuse; lamina membranous, glabrous to hairy on both surfaces; secondary veins 10–12 pairs; petioles 1–5 cm long. *Inflorescence* axillary or terminal, to 20 cm long, with 1–24 flowers; peduncles to 5 cm long; pedicel glabrous or pubescent, 2–5 mm long; bracteoles linear, arising from the middle of pedicel, 1–2 mm long. *Calyx* campanulate, glabrous or pubescent, pale green, tube 3–5 mm long; lobes triangular, 1–2 mm long, acute, glabrous to hairy, entire. *Corolla* personate, 10–16 mm long; tube glabrous, 3–8 mm long, pinkish to pale blue or dark purple; upper lip 2-lobed, 5–10 mm long, lobes 1–2 mm long; lower lip 3-lobed or slightly undulate, 10–16 mm long, with a white to bright yellow spot at its centre. *Stamens* 2; filaments glabrous, adnate to the ventral surface, 3 mm long; anthers whitish to purplish, suboblong, 1–2 mm long; pollen spheroidal, tricolpate, surface sculpturing microreticulate with granules, 12–13 µm diameter. *Disc* flat. *Ovary* ovoid, ca 1 mm long; with longitudinal ridge, 4–5 mm long; style glabrous, 5–10 mm long; stigma minute, capitate. *Capsule* ovoid, glabrous, 3–5 mm long, enclosed by calyx; style persistent, 3–5 mm long. *Seeds* ellipsoid, dark brown, 240–300 ×120–130 µm, surface tessellate with granules.

Thailand.— NORTHERN: Mae Hong Son, Chiang Mai, Chiang Rai, Phayao, Nan, Lampang, Tak, Phitsanulok, Kamphaeng Phet; NORTH-EASTERN: Loei; SOUTH-WESTERN: Kanchanaburi; CENTRAL: Saraburi, Nakhon Nayok; SOUTH-EASTERN: Chon Buri, Rayong; PENINSULAR: Surat Thani, Phangnga, Trang.

Distribution.— India, Nepal, Myanmar, South China, Taiwan, Laos, Vietnam, Cambodia, throughout Malesia.

Ecology.— Limestone areas, in evergreen and mixed deciduous forests, also in open areas near streams, lowland secondary forest, 20–2000 m alt. Flowering and fruiting August–December(–April, in Peninsular).

Vernacular.— Cho muang (ช่อม่วง), khom sai krading (โคมสายกระดิ่ง), chawian fa (เฉวียนฟ้า).

Note.— The nomenclatural history of this species has been somewhat complicated by the fact that the same species was independently, by Blume and by Wallich, described with the same species epithet in the same year. The pollen and seed surfaces of R. obliquum are different to those of *R. mirabilis* and *R. saccatum* [figs. 6, 7 and Palee et al. (2003) p. 235, pollen of *R. obliquum*].

3. Rhynchoglossum saccatum Patthar., **sp. nov.**

Differs from *Rhynchoglossum mirabilis* Patthar. by its larger flowers; inflorescence peduncle swollen at base; corolla tube pouch-like ventrally; stigma dilated, slightly 2-lobed at top. – Type: Thailand, Phitsanulok, Tham Pha Tha Phon Non-hunting area, Tham Tao, alt. ca 230 m, 20 Feb. 2014, *Pooma, Karaket, Pattharahirantricin & Supachok 7917* (Holotype **BKF**; isotype **E**). Figs. 3, 4F–G, 6C–D, 7E–F.

Lithophytic herb, 10–18 cm high; stem glabrous, often swollen at the nodes. *Leaves* ovate to ovate-oblong, 3.6–6.5 × 1.8–4.5 cm; apex acute; margin entire; base equal or slightly oblique, obtuse or truncate; lamina chartaceous, glabrous; secondary veins 6–7 pairs; petioles 0.8–5.5 cm long. *Inflorescences* arising along the petioles, 1.5–7 cm long, with 2–12 flowers; peduncle swollen at the base, to 2 cm long; pedicels glabrous, 3–15 mm long, deflexed; bracts absent or, if present, linear, arising from the base of the pedicel, ca 1–1.5 mm long; bracteoles absent. *Calyx* campanulate, glabrous, pale green; tube 3–4 mm long, with a narrow wing running from the base to each of the five sinuses; lobes triangular, ca 1 mm long, acute to acuminate, glabrous, entire. *Corolla* ringent, 10–12 mm long, throat whitish with purplish-red stripes, greenish on ventral surface and pouched ventrally, with several yellow-brown spots covered with pilose hairs on lower part inside, arranged in two lines; tube 8–10 mm long, upper lip undivided to obscurely 2-lobed, lobes acute to slightly dentate, 1–3 mm long; lower lip 3-lobed, whitish, 1–3 mm long. *Stamens* 4, coherent in pairs; filaments glabrous, the longer pair 4–5 mm long and adnate to the lower lip, the shorter pair 2–3 mm long and adnate to the upper lip; anthers dark purplish, with white margins, oblong, subequal, 1–2 mm long;

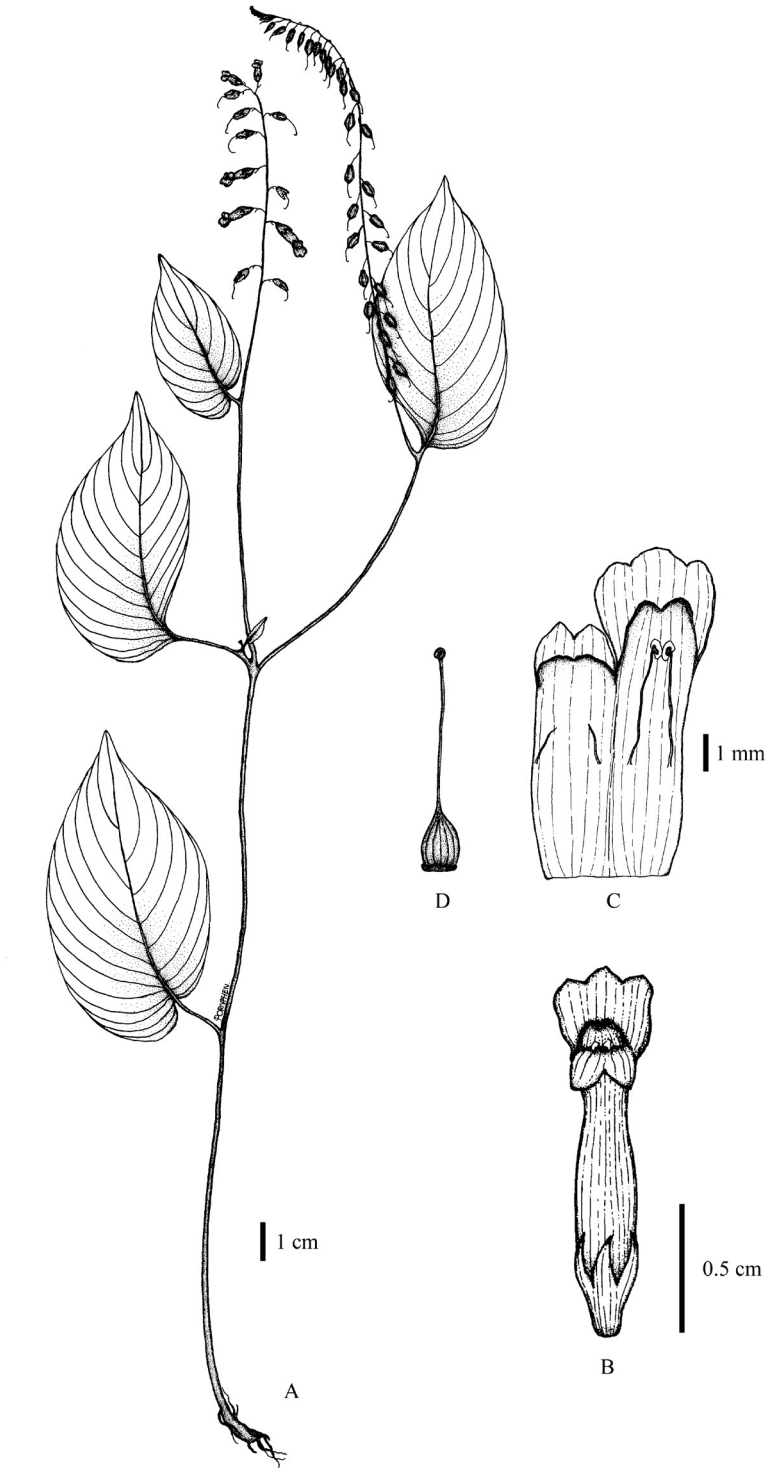

Figure 2. *Rhynchoglossum obliquum* Blume: A habit; B. flower; C. corolla; D. pistil. A. *Nielsen et al. 1806* (BKF), B–D. *Pooma et al. 7432* (BKF).

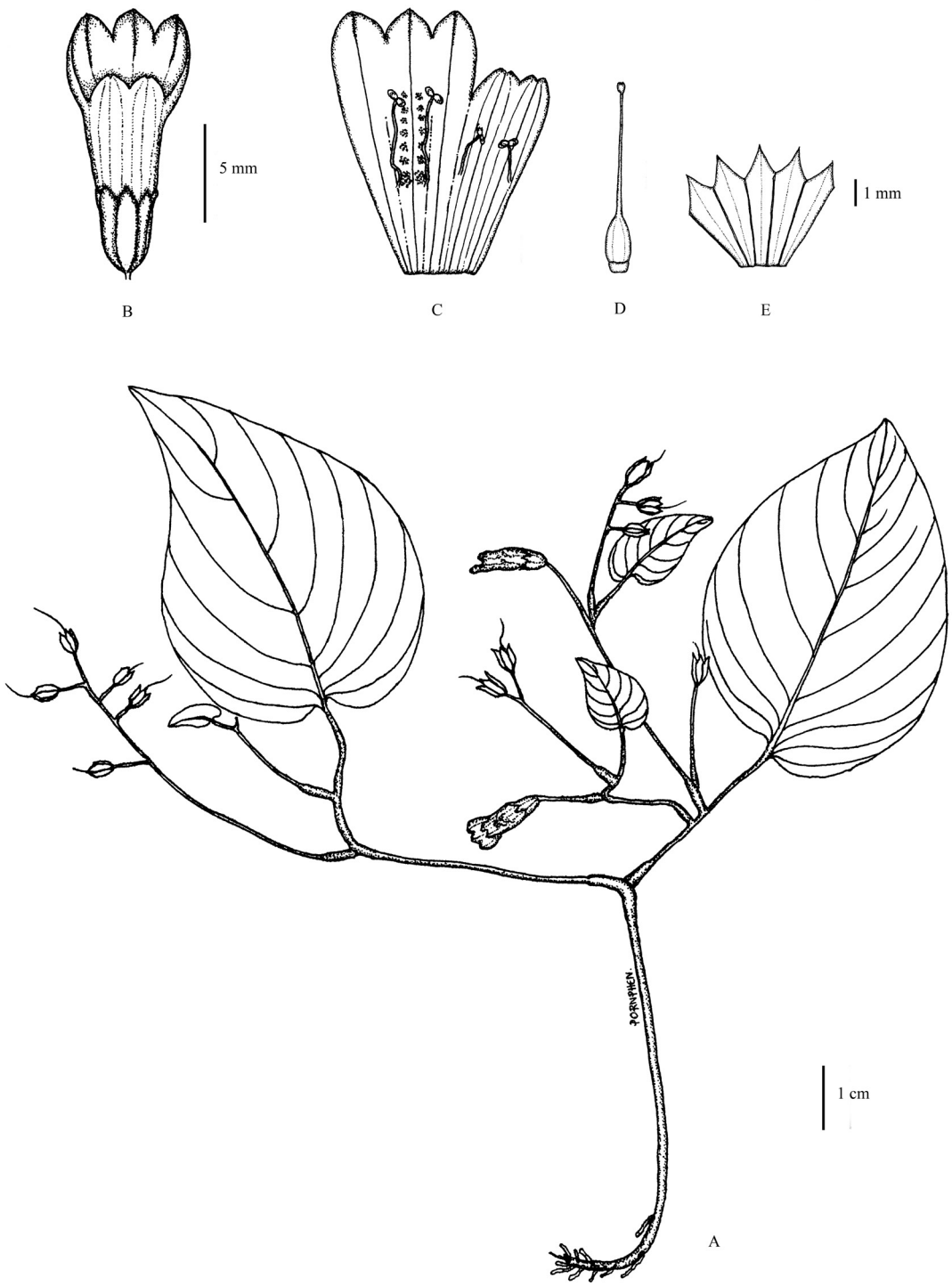

Figure 3. *Rhynchoglossum saccatum* Patthar.: A habit; B. flower; C. corolla; D. pistil; E. calyx. *Pooma et al. 7917* (BKF).

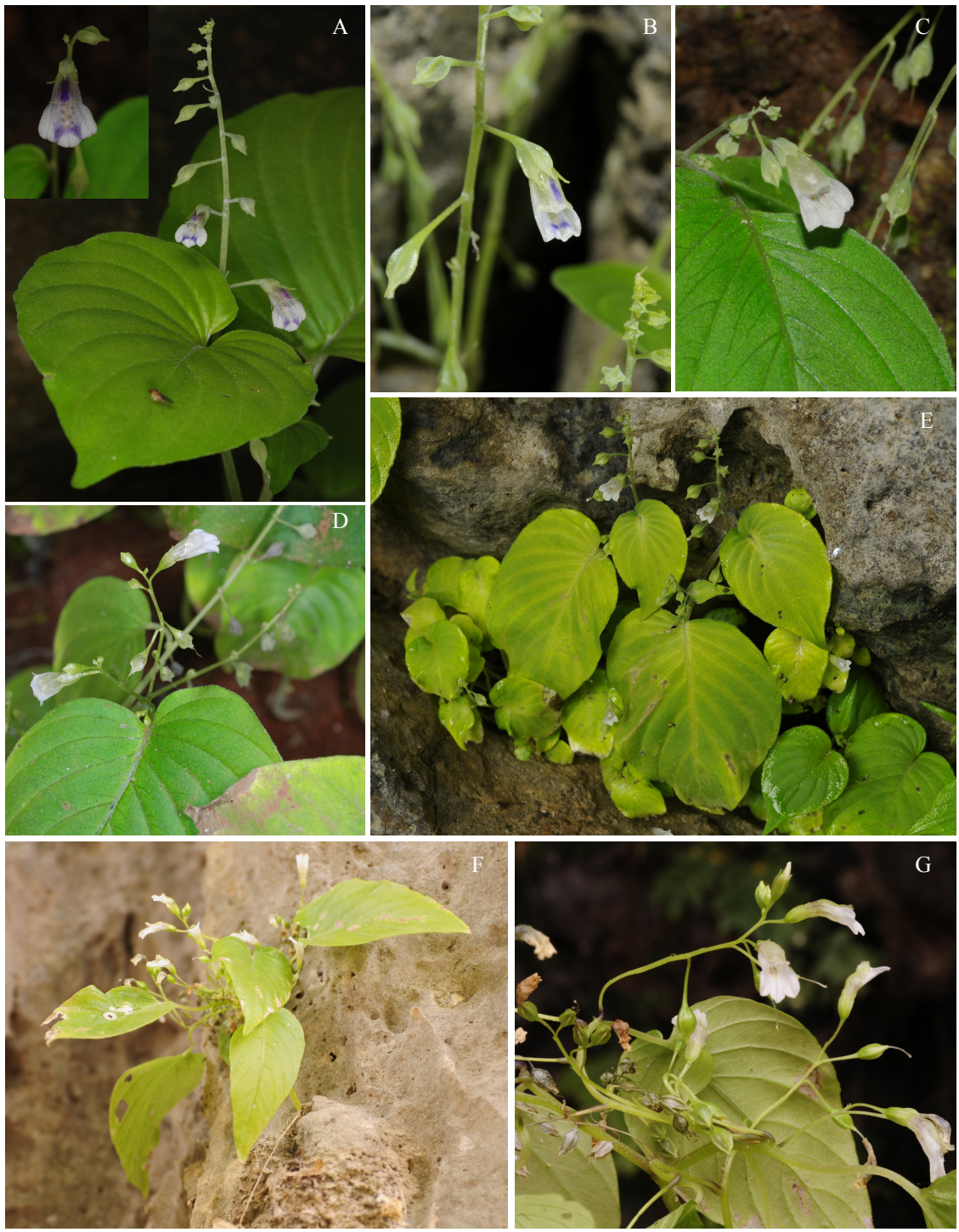

Figure 4. A–E. *Rhynchoglossum mirabilis*; F–G. *R. saccatum*; A–B, D. photographed by R. Pooma; C. photographed by D.J. Middleton; E–G. photographed by P. Karaket.

Figure 5. *Rhynchoglossum obliquum* Blume; photographed by P. Karaket.

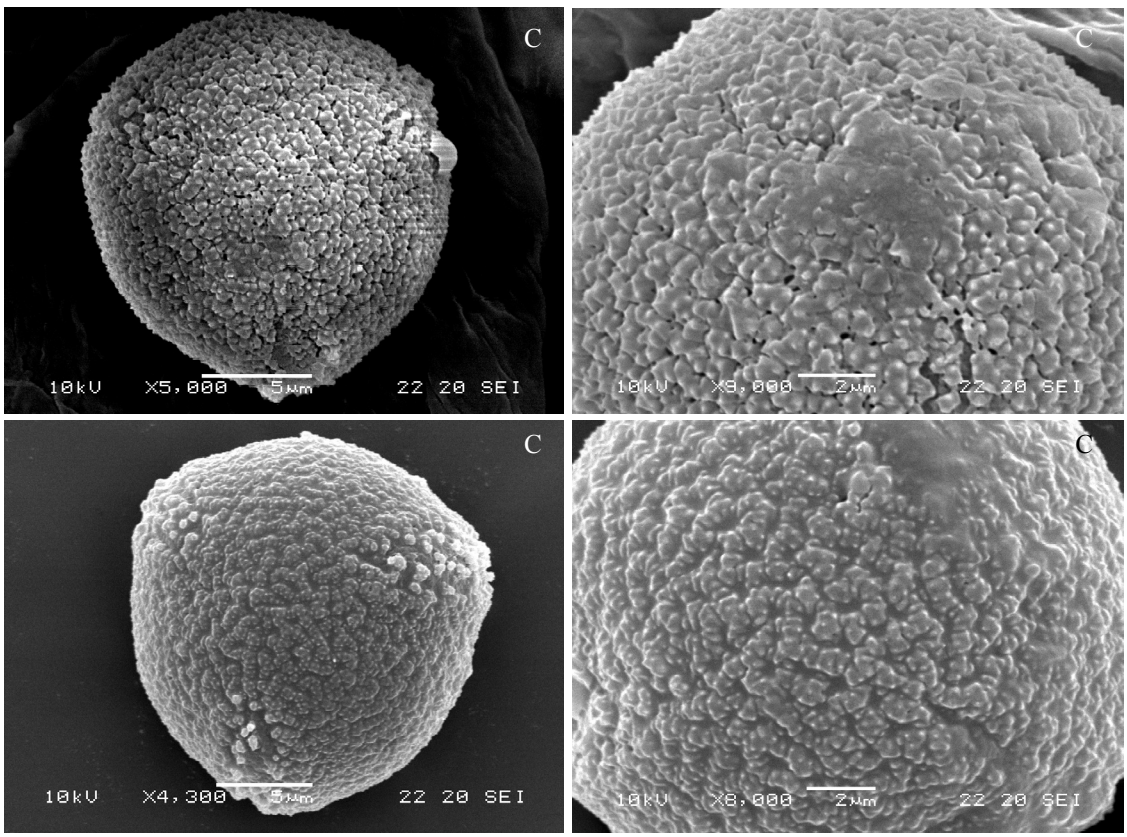

Figure 6. Pollen and sculpturing: A–B. *Rhynchoglossum mirabilis* (from *Pooma et al. 7850*); C–D. *R. saccatum* (from *Pooma et al. 7917*).

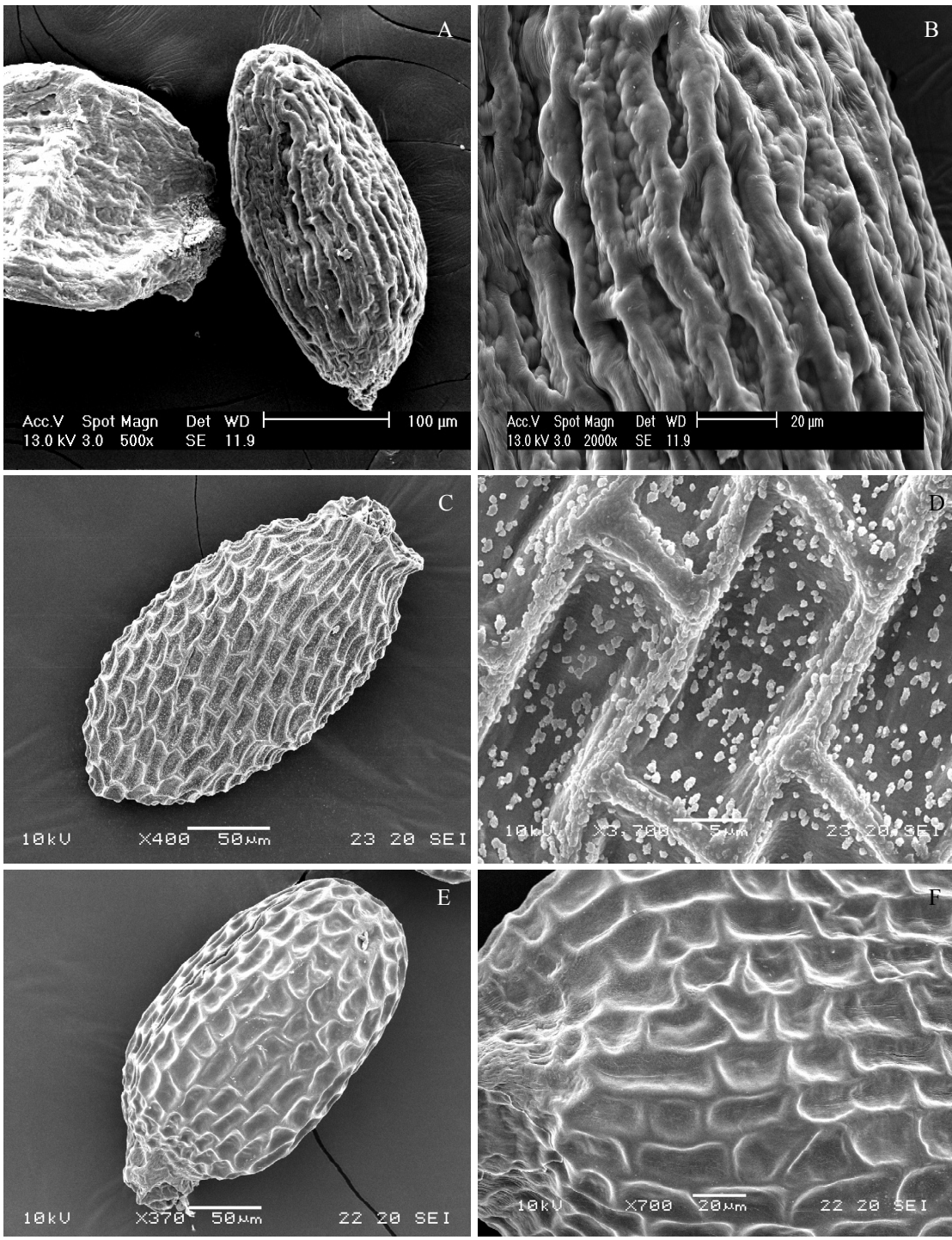

Figure 7. Seed and texture: A–B: *Rhynchoglossum mirabilis* (from *Pooma et al. 7520*); C–D. *R. obliquum* (from *Pooma et al. 5681*); E–F. *R. saccatum* (from *Pooma et al. 7917*).

pollen spheroidal, tricolpate, with rugulate sculpturing, ca 19 µm diameter. *Disc* annular, slightly undulate. *Ovary* ovoid, glabrous, 2–3 mm long; style glabrous, ca 6 mm long; stigma dilated, often slightly 2-lobed at top. *Capsule* ovoid, glabrous, 3–4 mm long, enclosed by calyx; style persistent, ca 6 mm long. *Seeds* ellipsoid, brown, ca 260–350 ×140 µm, surface reticulate.

Thailand.— NORTHERN: Phitsanulok [Tham Pha Tha Phon Non-hunting area, 11 Nov. 2010, *Maknoi 3983* (**QBG**); ibidem, 7 Sept. 2011, *Norsaengsri & Insea 8136* (**QBG**)].

Distribution.— Only known from the type locality.

Ecology.— On limestone, in mixed deciduous forest. Flowering and fruiting September–February.

Etymology.— The specific epithet refers to the pouch-like shape of the ventral curve of the corolla tube.

Vernacular.— Sai namkhang (สายน้ำค้าง).

Note.— Apart from the characters mentioned in the key and diagnosis, the pollen and seed surfaces of *Rhynchoglossum mirabilis* are quite different from those of *R. saccatum* (Figs. 6–7).

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