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Plants without borders: new records of two presumed Thai endemic Gesneriaceae in Laos

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ABSTRACT. Botanical expeditions in Laos through a collaboration between Thailand (Queen Sirikit Botanic Garden) and Laos (Pha Tad Ke Botanic Garden) to document plant diversity and collect plants for ex situ conservation, led to the discovery of two species of Gesneriaceae previously believed to be endemic to Thailand: *Damrongia trisepala* (Barnett) D.J.Middleton & A.Weber and *Didymocarpus formosus* Nangngam & D.J.Middleton. Information on these species is provided.

Keywords. *Didymocarpus albiflorus*, *Didymocarpus middletonii*, endemism, Lao flora, lithophyte, Sainyabuli, Thai flora

Introduction

Among the countries of Southeast Asia, Laos is one of the least botanically explored (Middleton et al., 2019). According to a preliminary checklist of the Lao flora, there are about 5000 species of vascular plants (Newman et al., 2007) with a more recent estimation of between 8000–11,000 species (Jin et al., 2016). Even though this latter estimate is likely to be too high, new species and new records are being published for Laos.

Thailand and Laos are similar in terms of both natural history and botanical geography. They share a border of 1700 km along the Mekong river and about 40% of the Lao flora is also found in Thailand (Zhu, 2017). Recent publications have shown that many presumed Thai endemic taxa are also present in Laos, e.g. *Argostemma ebracteolatum* E.T.Geddes (Rubiaceae) (Lanorsavanh & Chantaranonthai, 2019), *Heterostemma succosum* Wight (Apocynaceae) (Thammarong et al., 2019), *Meladerma deciduum* Kerr (Apocynaceae) (Rodda, 2020) and *Zingiber parishii* Hook.f. subsp. *phuphanense* Triboun & K.Larsen (Zingiberaceae) (Souvannakhommane & Leong-Škorničková, 2018). Given similar habitats in both countries and the very much lower collection density in Laos compared to Thailand (Middleton et al., 2019), it is to be expected that as Laos is further explored that species known from Thailand but not from Laos will be discovered there.

On a recent expedition in Laos as part of a collaboration between Thailand (Queen Sirikit Botanic Garden) and Laos (Pha Tad Ke Botanic Garden), two species belonging to Gesneriaceae were found. After careful identification, they were identified

as *Damrongia trisejala* (Barnett) D.J.Middleton & A.Weber and *Didymocarpus formosus* Nangngam & D.J.Middleton. Both species were previously recorded as endemic to Thailand. Descriptions of the Lao material are provided below.

New records

Damrongia trisejala (Barnett) D.J.Middleton & A.Weber, *Taxon* 60: 778 (2011); Puglisi & Middleton, *Thai Forest Bull., Bot.* 45: 90 (2017). – *Chirita trisejala* Barnett, *Nat. Hist. Bull. Siam Soc.* 20: 18 (1961). – TYPE: Thailand, Kao Sabap, 6 July 1927, *Put 905* (lectotype K [K000545608], designated by Barnett (1961: 255); isolectotypes ABD, BKF [BKF257925]). (Fig. 1 & 2).

Damrongia cyanantha Triboun, *Thai Forest Bull., Bot.* 38: 109 (2010). – TYPE: Thailand, Kamphaeng Phet, Klong Lan waterfall, 16 June 2009, *Triboun & Yothakaew 4289* (holotype BK; isotypes BKF, E).

Acaulescent herb to 20–25 cm tall. **Leaf** arrangement not clear; petiole 7–13 cm, fleshy, light green, densely eglandular strigose; blade papery when dry, dark green and shiny above, pale green beneath, blue-green when dry, elliptic, 11–16 × 4–7 cm, c. 2.3 times as long as wide, apex acute to acuminate, base cuneate, unequal, margin irregularly crenate-serrate, eglandular hirsute above, especially along the veins, veins slightly raised beneath, 6–7 pairs, tertiary venation visible. **Inflorescences** scapose, sub-umbellate, 2–5-flowered; peduncles pink to brown, 6–12 cm long, densely hirsute at the proximal part to sparsely hairy at the distal part; bracts green, paired, ovate to lanceolate, 9–11 × 8–6 mm, sparsely hairy to glabrescent, apex broadly acute, base sessile, each pair joined at the base, margin slightly serrate-crenate; pedicels 6–22 mm long, hispid to sparsely hispid. **Calyx** tripartite, the upper three sepals partially or fully fused, dark green, eglandular hairy to glabrescent outside, glabrous inside; tube 13–15 mm; lobes lanceolate, the upper 3 larger than the 2 lower, 5–10 mm long, 4–7.5 mm wide, apex acute, margin entire to irregularly and shallowly serrate. **Corolla** funnellform, purple with darker markings ventrally, 4.5–4.7 cm long, outside and inside with sessile and stalked glands; tube 3.3–3.8 cm; upper lip 11–13 mm, lower lip 14–15 mm; lobes elliptic, upper lobes c. 8 × 10–12 mm, lateral lobes c. 9 × 9–11 mm, lower lobe 6–9 × 8–12 mm. **Stamens** included, inserted 10–12 mm from corolla base; filaments 9–10 mm long, c. 0.6 mm diam., straight; anthers c. 2.2 × 0.7 mm, thecae completely divergent; staminodes 3, the lateral 2–3 mm long, the central c. 1 mm long, arising c. 10 mm. **Disk** 0.9–2.2 mm high, annular, shallowly 5-lobed. **Pistil** 20–25 mm long; ovary green, 4–6 mm long, 1–1.5 mm diameter, densely covered in sessile and shortly stalked glands; style purple, 15–20 mm long, c. 0.7 mm diam., densely glandular hairy; stigma pale purple, lip shallowly bilobed, 1.2–2 mm long. **Capsules** unknown in Laos.

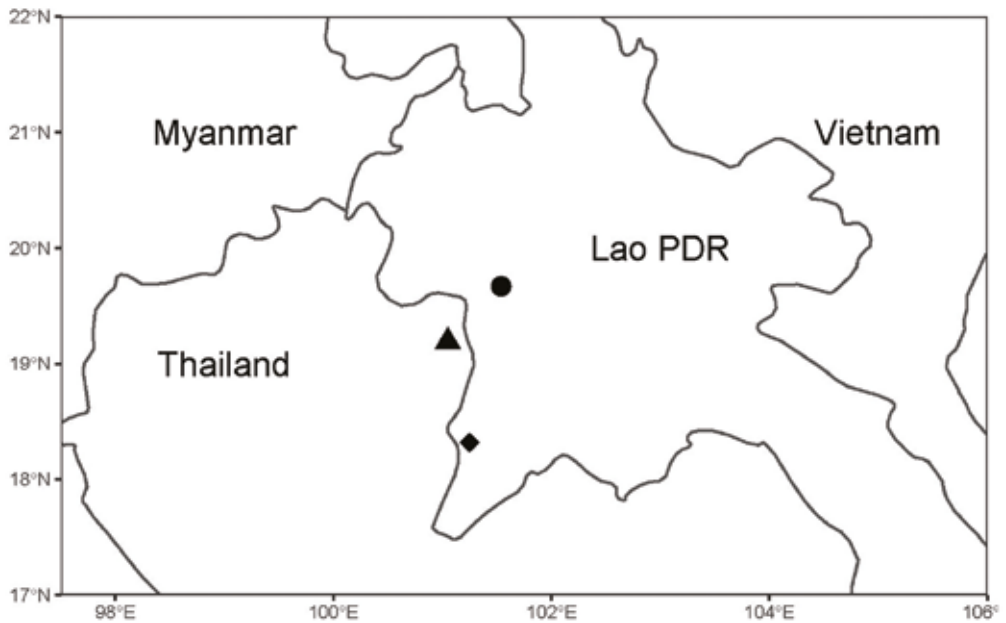


Fig. 1. Distribution of *Damrongia trisejala* (Barnett) D.J.Middleton & A.Weber in Laos (◆) and distribution of *Didymocarpus formosus* Nangngam & D.J.Middleton in Laos (●) and Thailand (▲).

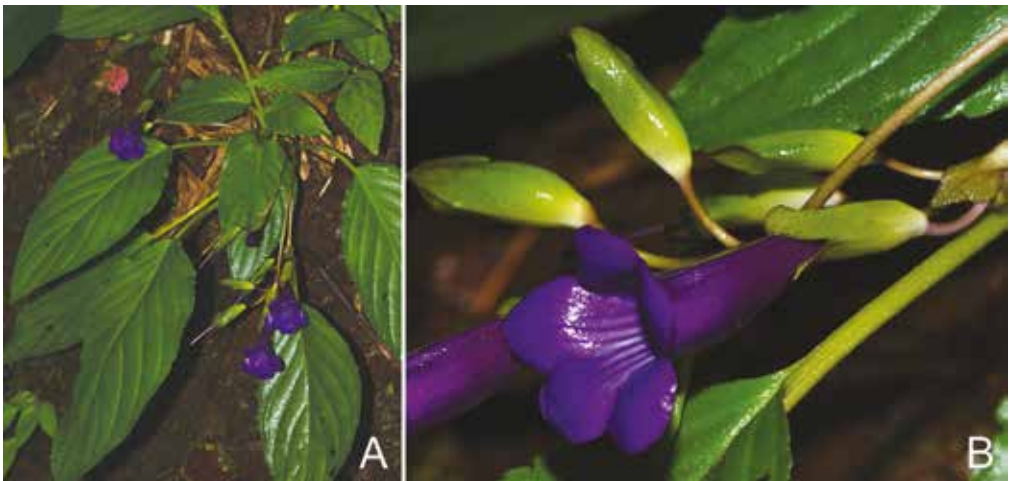


Fig. 2. *Damrongia trisejala* (Barnett) D.J.Middleton & A.Weber. **A.** Habit. **B.** Flower. (Photos: W. Tanming).

Distribution. Laos and Thailand.

Ecology. Lithophyte, on boulders in shade by river in dry evergreen forest.

Specimen examined. LAOS: **Sainyabuli:** Thongmixai district, Muang Thong sub-district, Ban Nam Muang village, Huay Tiw stream, 18°19'27.6"N 101°15'18"E, 499 m, 24 Aug 2019 (fl.), *Maknoi et al. L18-237* (QBG).

Notes. The genus *Damrongia* has 11 species from southern China to Sumatra (Puglisi & Middleton, 2017; Puglisi et al., 2016) with a centre of distribution in Thailand. However, this is the first record of the genus for Laos. The genus is characterised by its infundibuliform-tubular corolla and a chiritoid stigma (Puglisi et al., 2016).

Damrongia trisejala can be distinguished by its rough leaves, the long corolla tube and the three large calyx lobes. The material from Laos is similar to the Thai specimens which were described in Puglisi & Middleton (2017). Some variation was observed, including the smaller size and greater degree of hairiness. However, most of the key characteristics match to the Thai specimens, for example, the bluish green colour of the abaxial leaf surface when dry and the tripartite calyx.

Didymocarpus formosus Nangngam & D.J.Middleton, Thai Forest Bull., Bot. 42: 37 (2014). – TYPE: Thailand, Nan, Bo Kluea District, Doi Phu Kha National Park, 1280 m, 15 August 2012, *Middleton, Karaket, Suddee & Triboun 5604* (holotype E). (Fig. 1 & 3)

Perennial herb to 20–30 cm tall, epilithic. **Stem** erect, green, sparsely covered with multicellular eglandular hairs. **Leaves** in 2–3, opposite, decussate, anisophyllous pairs; petiole 1–8 cm, light green, densely eglandular hairs; blade papery, dull brown when dry, ovate, 10–15 × 7–10 cm, c. 1.3 times as long as wide, apex acute to acuminate, base oblique, obtuse, margin serrate or sometimes doubly serrate, covered with eglandular hirsute both side, especially along the veins, veins slightly raised beneath, 8–9 pairs, tertiary venation visible, prominent beneath. **Inflorescences** scapose, cymose, 4–5-flowered, pendulous; peduncles green, 3–4 cm long, covered with glandular hairs; pedicels 3–8 mm long, covered with glandular hairs, bracts unknown. **Calyx** consisting of a tube and 5-lobed margin, symmetrical, campanulate, dark red; tube c. 9 mm long, 4–5 mm diam.; lobes triangular, c. 1 mm long, c. 2 mm wide. **Corolla** funnellform, dark red-maroon, 5–6 cm long, glabrous; tube 3.5–4.5 cm; upper lip 2-lobed, elliptic, c. 8 × 8 mm, lower lip 3-lobed, orbicular, c. 10 × 10 mm. **Stamens** included, inserted c. 3 mm from corolla base; filaments c. 10 mm long, straight, glabrous; anther locules oblong, c. 4 × 2 mm, tips and bases rounded, white-bearded, cream; staminodes 3, reduced to filaments, 2–3 mm long, glabrous. **Disk** pale yellow, c. 2 mm high, cylindrical, irregularly 5-lobed. **Pistil** 30–40 mm long; ovary green, c. 2 mm long, 1–1.5 mm diam., glabrous; style 28–35 mm long, c. 0.5 mm diam., densely glandular hairy; stigma capitate, c. 1.4 mm diam. **Capsule** unknown.

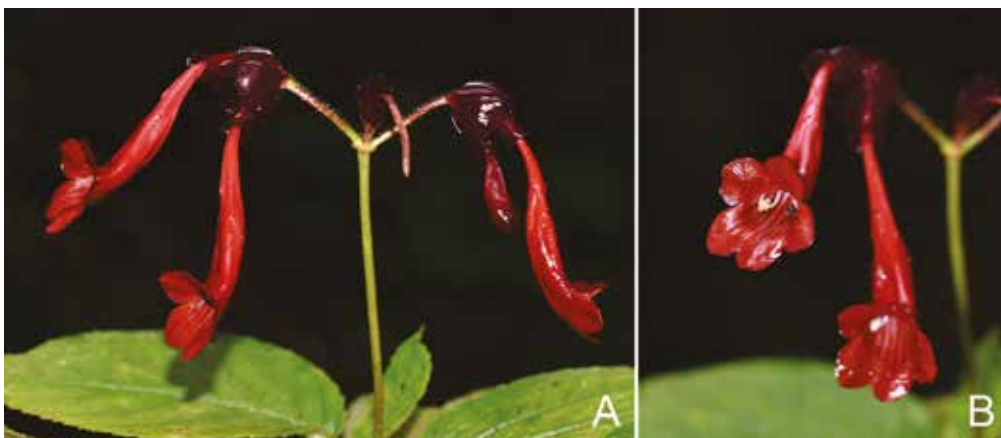


Fig. 3. *Didymocarpus formosus* Nangngam & D.J.Middleton. **A.** Inflorescence. **B.** Flowers. (Photos: W. Tanming).

Distribution. Laos and Thailand.

Ecology. Lithophyte, on boulders in shade by river in dry evergreen forest.

Specimen examined. LAOS: **Sainyabuli province:** Hongsa district, Ban Pak Huay Yang village, 19°40'10.9"N, 101°32'30.7"E, 800 m, 29 August 2019 (fl.), *Maknoi et al. L18-353* (QBG).

Notes. Currently, only two species of *Didymocarpus* have been recorded for the Lao flora, *D. middletonii* Souvann., Soulad. & Tagane, reported from Nam Kading National Protected Area (Souvannakhoumane et al., 2019) and distinguished by its urceolate calyx, and *D. albiflorus* Souvann. & Phonep., reported from Vientiane, central Laos, and distinguished by its white corolla with 9 greyish stripes inside (Souvannakhoumane & Phonepaseuth, 2020).

Didymocarpus formosus can be recognised by its dark red-maroon corolla and a glabrous ovary. The morphology of the Lao material of *Didymocarpus formosus* mostly matches the description in Nangngam & Middleton (2014). However, some variation in the colour of the bracts and flowers was observed. The bracts of the Lao material are dark red-maroon but purple in Thai specimens. The calyx of Thai specimens is pinkish-purple but dark red in the Lao material. The colour of the corolla lobes is similar, dark red-maroon, but the tube is pale to purplish-pinkish towards the base in Thai specimens but pale to light red in Lao specimens.

Didymocarpus formosus was formerly only known from the type locality which is about 60 km from the current locality in Laos (Fig. 1).

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