

A NEW SPECIES OF *RAPHIOCARPUS* (GESNERIACEAE) FROM VIETNAM

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The new species *Raphiocarpus axillaris* D.J.Middleton from Tam Đảo National Park in northern Vietnam is described and illustrated.

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Introduction

The genus *Raphiocarpus* Chun in the Gesneriaceae was described by Chun (1946), but the single species was generally included as a species of *Didissandra* C.B.Clarke until resurrected and the genus more widely defined by Weber & Burt (1998). There are currently 14 species distributed in China and Vietnam (Weber, 2004; Zhang *et al.*, 2010; Phuong *et al.*, 2012; Chen *et al.*, 2015). Möller & Clark (2013) note, however, that further work is needed to establish whether *Raphiocarpus* is monophyletic. The genus is placed in subfamily Didymocarpoideae, tribe Trichosporeae, subtribe Didymocarpinae by Weber *et al.* (2020).

There are currently six species of *Raphiocarpus* recorded from Vietnam: *R. annamensis* (Pellegr.) B.L.Burt, *R. clemensiae* (Pellegr.) B.L.Burt and *R. evardii* (Pellegr.) B.L.Burt from Central Vietnam, and *R. asper* (Drake) B.L.Burt, *R. petelotii* (Pellegr.) B.L.Burt and *R. tamdaoensis* Phuong, Xuyen & Y.G.Wei from northern Vietnam.

A collection from Vĩnh Phúc Province, Tam Đảo National Park, Nguyễn Quốc Bình *et al.* VMN-B1494, collected in 2011, is of an undescribed species of *Raphiocarpus*. It is placed in *Raphiocarpus* due to the combination of 4 fertile stamens and 2-lobed stigma. Tam Đảo National Park is also the type locality of *Raphiocarpus tamdaoensis* but is easily distinguishable from that species in its whitish to pale-pink corolla (versus pale yellow in *R. tamdaoensis*) and glabrous ovary (versus densely velutinous in *R. tamdaoensis*). Of the other two northern Vietnam species, it can be distinguished from *Raphiocarpus asper* in the short axillary inflorescences in the lower leaf axils and leafless stem below these, and the corolla whitish to pale pink (versus long subterminal inflorescences and corolla yellow in *R. asper*), and from *R. petelotii* in the calyx lobes free to base (versus calyx lobes fused into a tube in

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R. petelotii). Nguyễn Quốc Bình et al. VMN-B1494 can also easily be distinguished from the Chinese and Central Vietnamese species in a number of leaf shape, indumentum, calyx and corolla characters.

Species description

Raphiocarpus axillaris D.J.Middleton, sp. nov.

Affinities within the genus uncertain but differs from all other species by the combination of densely pubescent stems and leaves, symmetrical leaf bases, short axillary inflorescences, narrowly elliptic and densely pubescent calyx lobes free to the base, whitish to pale-pink corolla, and glabrous ovary. – Type: Vietnam, Vĩnh Phúc Province, Tam Đảo National Park, Tam Đảo 2, 21°28'44.0"N, 105°37'39.6"E, 1044 m, 22 ix 2011, Nguyễn Quốc Bình, Jana Leong-Škorničková, Trần Hữu Đăng VMN-B1494 (holotype SING; isotypes E, P, PR, VNMN). [Figure 1](#).

Perennial herb to c.70 cm tall. *Stems* erect, semidecumbent at base, densely appressed hirsute throughout but slightly glabrescent with age. *Leaves* opposite, those of a pair more or less equal to rather unequal in size; petioles 1.5–4.5 cm long, densely appressed hirsute; blades symmetrical, elliptic, 6–16.5 × 3.2–7.8 cm, 1.9–2.6 times as long as wide, base cuneate, apex shortly acuminate, margin entire, appressed hirsute above and beneath, more densely so on venation, 7–9 pairs of secondary veins, eucamptodromous, tertiary venation ramified. *Inflorescences* arising in the axils of lower leaves and below these in leaf scar axils, 1- or 2-flowered, up to 3 inflorescences arising from a single axil, 5–6 cm long (including flower); all axes with long gland-tipped hairs; peduncle 7–22 mm long; bracts narrowly elliptic, 3–4 mm long, with long gland-tipped hairs; flowers held almost horizontally to slightly pendent; pedicels 7–16 mm long. *Calyx* of 5 lobes free to base, lobes 6–7.5 × 1.5–1.9 mm, with long gland-tipped hairs outside, glabrous inside. *Corolla* whitish to pale pink, infundibuliform, 38–45 mm long, sparsely covered with long gland-tipped hairs outside, glabrous inside, with two prominent ridges ventrally from throat into upper tube, limb 2-lipped; tube 31–35 mm long, the lower 11–13 mm narrower but slightly wider at very base, the upper part widening towards throat; upper lip 2-lobed, 5.5–6.5 mm long, lobes 5.5–6.5 × 6.5–9.5 mm, sinus 4.5–6 mm deep; lower lip 3-lobed, 15–17.5 mm long, lateral lobes 7–9 × 8–10 mm, middle lobe 8–10.5 × 5.7–7.5 mm. *Stamens* 4, in 2 pairs, each pair adnate at their apices, divergent, glabrous, anther thecae confluent; posterior pair inserted at 17.5–19 mm from corolla base, filaments 10–11 mm long, glabrous, anthers 1–1.2 × 1.4–1.5 mm; anterior pair inserted at c.17 mm from corolla base, filaments c.15 mm long, glabrous, anthers 1.5–1.9 × 1.7 mm; staminode 1, slightly clavate, 3–4 mm long. *Disc* annular, weakly 5-lobed, 1.5–1.7 mm high. *Pistil* 22–25 mm long, glabrous throughout; ovary 16–17 mm long; style 5–7 mm long; stigma c.1 mm, 2-lobed. *Fruit* green when young, mature fruit unknown.



Figure 1. *Raphiocarpus axillaris* D.J.Middleton, sp. nov. A, Habit; B, flowers; C and D, inflorescences on bare stems; E and F, corolla from the front; G, very young fruit; H, undersurface of leaf. All photographs of the type collection, taken by J. Leong-Škorničková.

Distribution. Currently known only from Tam Đảo National Park.

Etymology. The epithet *axillaris* refers to the short axillary inflorescences in this species.

Habitat and ecology. On rocks in montane evergreen broadleaved primary forest, from 1044 to 1101 m.

Conservation status. The species is currently known only from Tam Đảo National Park. As well as the collection from the type location, a second smaller population was seen and photographed along the Máy Giấy trail at 21°26'59.2"N, 105°39'05.9"E, which is about 4 km from the type population. Tam Đảo National Park is a legally protected area, but because each population is small enough to be affected by a stochastic event such as a tree fall, we propose a provisional assessment of Vulnerable (VU D2) (IUCN Standards and Petitions Subcommittee, 2019).

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References

- Chen W-H, Chen R-Z, Yu Z-Y, Zhu X-T, Shui Y-M. 2015. *Raphiocarpus jinpingensis*, a new species of Gesneriaceae in Yunnan, China. *Plant Diversity and Resources*. 37:727–732.
- Chun WY. 1946. Gesneriacearum Plantae Novae Sincarum. *Sunyatsenia*. 6(3–4):271–304.
- IUCN Standards and Petitions Subcommittee. 2019. Guidelines for Using the IUCN Red List Categories and Criteria, version 14. Prepared by the Standards and Petitions Committee. <https://www.iucnredlist.org/resources/redlistguidelines>
- Möller M, Clark JL. 2013. The state of molecular studies in the family Gesneriaceae: a review. *Selbyana*. 31(2):95–125.
- Phuong VX, Xuyen D-T, Wen F, Wei Y-G. 2012. *Raphiocarpus tamdaoensis* sp. nov. (Gesneriaceae) from Vietnam. *Nordic Journal of Botany*. 30(6):696–699.
- Weber A. 2004. Gesneriaceae. In: Kubitzki K, Kadereit JW, editors. *The Families and Genera of Vascular Plants*. Volume VII, Flowering Plants. Dicotyledons. Lamiales (except Acanthaceae including Avicenniaceae). Berlin: Springer, pp. 63–158.
- Weber A, Burt BL. 1998 [1997]. *Didissandra*: redefinition and partition of an artificial genus of Gesneriaceae. *Beiträge zur Biologie der Pflanzen*. 70:153–177.
- Weber A, Middleton DJ, Clark JL, Möller M. 2020. Keys to the infrafamilial taxa and genera of Gesneriaceae. *Rheedeana*. 30(1):5–47.
- Zhang M-D, Shui Y-M, Chen W-H, Zhang R-M, Li G-Y. 2010. *Raphiocarpus maguanensis* (Gesneriaceae), a new species from China. *Annales Botanici Fennici*. 47:71–75.