

Balanophora subcupularis (Balanophoraceae), a new record from Thailand

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ABSTRACT. *Balanophora subcupularis* Tam is newly discovered in the montane forest from Phu Hin Rong Kla National Park, Phitsanulok and Nam Nao National Park, Phetchabun. It is characterised by the reddish inflorescences, monoecious plant, 2–3 rows of tiny male florets occurring at the base of inflorescence, actinomorphic floret with (3–)4 perianth lobes and synandria with (3–)4 anthers. A taxonomic description, illustration, photographs and distribution are provided.

KEYWORDS: *Balanophora*, diversity, new discovery, parasitic plant, Thai flora

INTRODUCTION

Balanophora J. R. Forst. & G. Forst. is a small genus of parasitic plants belonging to the family Balanophoraceae. There are *ca.* 23 species mainly distributed in temperate to tropical Asia but some are found in tropical Africa, Australia and the Pacific Islands (Hansen, 1972; The World Checklist of Vascular Plants, 2022). The species belonging to *Balanophora* can be either dioecious or monoecious (Su *et al.*, 2012). The genus is characterised by achlorophyllous parasitic plants with unisexual florets,

reduced female floret without perianth, consisting of a pistil situated on the main axis of the inflorescence and on the stalk of spadicle (Hansen, 1972). In Thailand, six taxa of *Balanophora* were previously reported, viz. *B. abbreviata* Blume, *B. fungosa* J. R. Forst. & G. Forst. var. *indica* (Arn.) B. Hansen, *B. fungosa* var. *minor* (Eichl.) B. Hansen, *B. harlandii* Hook. f., *B. latisepala* (Tiegh.) Lecomte and *B. laxiflora* Hemsl. (Hansen, 1972). During the revision of the genus *Balanophora* in Thailand, the

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specimen collections housed in BKF and QBG were investigated. *Balanophora subcupularis* Tam was found as a new record for the Thai flora. The taxonomic description, illustration, photographs and distribution of this species as well as the comparison with a similar species are also provided.

MATERIALS AND METHODS

This study was based on the specimens kept at BKF and QBG. Taxonomic literature of the genus based on the works on plants in China (Shumei & Murata, 2003), Myanmar (Tanaka *et al.*, 2006), Japan

(Murata, 2016) and Vietnam (Tung *et al.*, 2017) were also consulted. Morphological characters were examined under the stereomicroscope. Line drawings of distinctive characters were illustrated with the drawing program, Sketchbook, on the electronic device.

TAXONOMIC TREATMENT

Balanophora subcupularis Tam, Fl. Fujianica 1: 602, f. 459. 1982. Type: China, Yunnan, northeast, on a rock at 1,450 m elevation, 15 Oct. 1939, *Li Minggang 592* (holotype IBSC). Figs. 1–2.



FIGURE 1. *Balanophora subcupularis*: A. habit; B. inflorescences occurring on the rhizome. Photos by C. Maknoi.

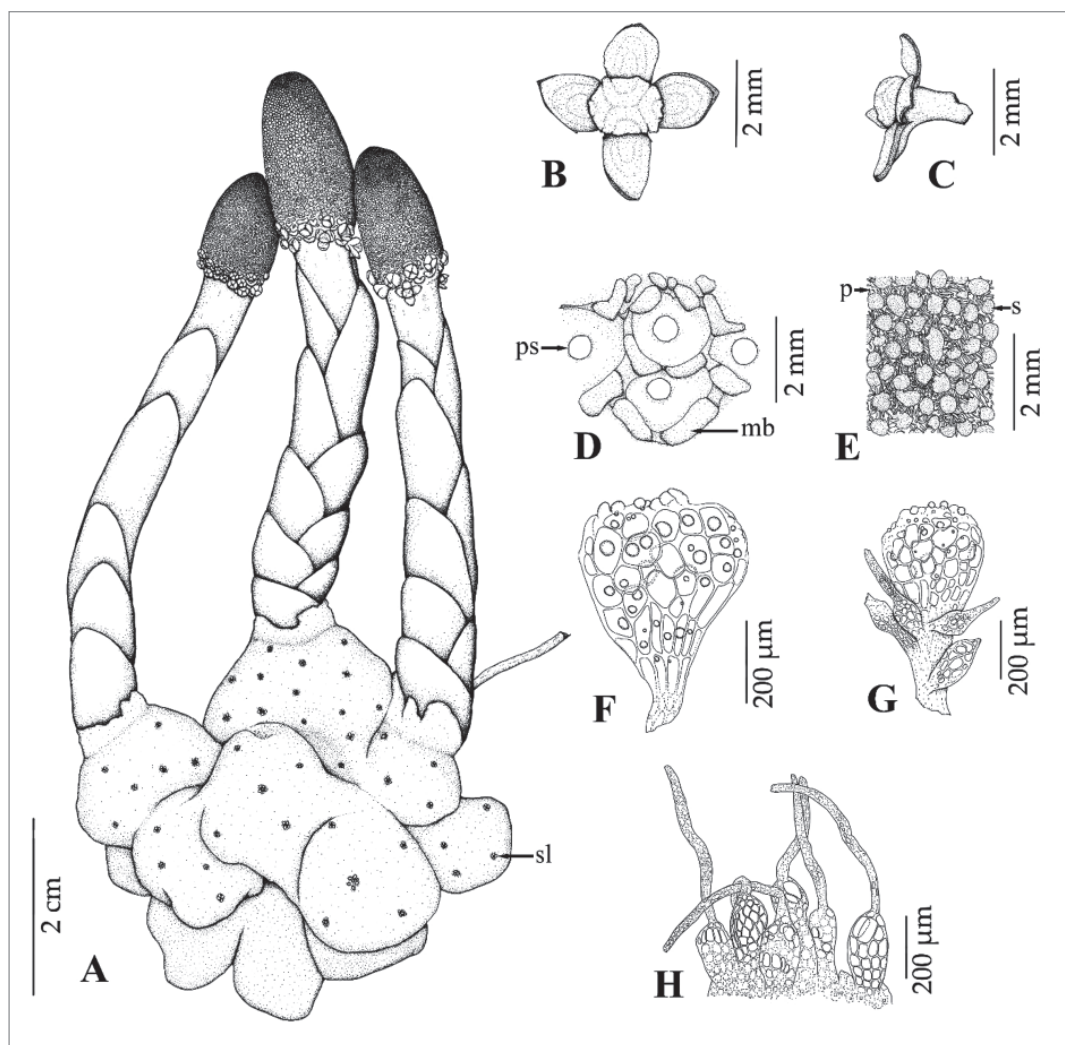


FIGURE 2. Line drawing of *Balanophora subcupularis*: A. plant with inflorescences growing on a rhizome showing stellate lenticels (sl); B.–C. male florets, B. front view, C. side view; D. male bract (mb) subtending male floret (ps = peduncle scar); E. cluster of pistils (p) surrounding spadicle (s), in front view; F. spadicle; G. pistils at the base of spadicle; H. pistils at inflorescence axis. Drawn by N. Chaiwerawattana based on *C. Maknoi 6397* (BKF, QBG).

Monoecious root-parasite plant, 7–14.5(–17.5) cm tall, reddish, herbaceous. *Rhizome* subglobose, 5–9 × 4.5–7 cm, yellowish to brownish, branched into unclear mass, surface with granular warts and scattered yellow stellate lenticels. *Scapes* 0.7–1 × 2.5–5.5 cm, reddish to coral pink.

Leaves 4–12, ovate, reddish, sessile, distichous, slightly imbricate, concave, cucullate, 1.2–1.8 × 1.2–2.3 cm, apex truncate or emarginate, margin entire, leaves at base of scapes shorter than others at the upper part. *Inflorescences* ovoid, 0.8–1.8 × 1.5–3.5 cm, reddish. *Male florets* 15–40, basally on

androgynous inflorescences, 2–3 rows, pedicellate, actinomorphic, subtended by bracts; bracts variously shaped, U-shaped or V-shaped, $1.5\text{--}3 \times 1$ mm, reddish, truncate; pedicel ivory, 0.8–1 mm long; perianth lobes (3–)4, ivory at base with reddish apex, ovate, $1\text{--}1.5 \times 1\text{--}2$ mm, apex acute; synandria nearly dome-shaped, $1 \times 1\text{--}1.5$ mm, clear white, sessile; anthers (3–)4, transversally opening, horseshoe-shaped. *Female florets* numerous, in a zone above male florets, clear white, without perianth, single ovary and style; pistils occurring at base of spadicles sessile, while pistil occurring on inflorescences axis pedicellate; gynophore 0.1–0.3 mm long, gynophore of florets occurring at base of spadicles shorter than others developing at main axis of inflorescences; ovary globose to prolate, $0.1\text{--}0.15 \times 0.1\text{--}0.2$ mm; styles 0.3–0.6 mm long; spadicles claviform, $0.3\text{--}0.6 \times 0.4\text{--}0.5$ mm, reddish, stipitate. *Stalk* of spadicles 0.3–0.4 mm long, clear white.

Thailand.—NORTHERN: Phitsanulok [Nakhon Thai, Phu Hin Rong Kla National Park, on the roadsides near the car park for waterwheel, 1,270 m alt., 11 Oct. 2009, *D.J. Middleton, P. Karaket, S. Lindsay, T. Phutthai*

& *S. Suddee 5088* (BKF)]; NORTH-EASTERN: Phetchabun [Nam Nao, Nam Nao National Park, Phu Pha Chit, 1,200 m alt., 14 Nov. 2013, *C. Maknoi 6397* (BKF, QBG)].

Distribution.—China, Japan, Myanmar, Vietnam.

Habitat and Ecology.—In montane forest at 1,200–1,270 m alt.

Notes.—*Balanophora subcupularis* appears similar to *B. abbreviata*, which is also distributed in Thailand. Their morphological comparison is provided in Table 1 (the characters of *B. abbreviata* based on the description of Hansen (1972) and specimens kept at BKF and QBG).

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TABLE 1. Morphological comparison of monoecious species in Thai *Balanophora*.

Morphological feature	<i>B. subcupularis</i>	<i>B. abbreviata</i>
Plant	reddish	creamy white to yellowish
Leaves	reddish	creamy white
Male florets		
Symmetry	actinomorphic	zygomorphic
Synandria	nearly dome-shaped	slightly compressed
Anthers	(3–)4, transversally opening, horseshoe-shaped	16–20, loculi, parallel

REFERENCES

- Hansen, B. 1972. Balanophoraceae. In: **Flora of Thailand**. T. Smitinand & K. Larsen (Eds.), Vol. 2 part 2, pp. 177–181. The ASRCT Press, Bangkok.
- Murata, J. 2016. *Balanophora subcupularis* (Balanophoraceae), new to Japan. **Journal of Japanese Botany** 91(1): 47–48.
- Shumei, H. & Murata, J. 2003. Balanophoraceae. In: **Flora of China**. Z.-Y. Wu, P.H. Raven & D.Y. Hong (Eds.), Vol. 5, pp. 272–276. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis.
- Su, H.-J., Murata, J. & Hu, J.-M. 2012. Morphology and phylogenetics of two holoparasitic plants, *Balanophora japonica* and *Balanophora yakushimensis* (Balanophoraceae), and their hosts in Taiwan and Japan. **Journal of Plant Research** 125(3): 317–326.
- Tanaka, N., Kobayashi, S., Ohi-Toma, T. & Murata, J. 2006. New or noteworthy plant collections from Myanmar (1). *Hydrobryum japonicum*, *Balanophora subcupularis*, *Rhopalocnemis phalloides* and *Sonerila laeta*. **Journal of Japanese Botany** 81(6): 324–331.
- The World Checklist of Vascular Plants. 2022. **A Continuously Updated Resource for Exploring Global Plant Diversity**. Available from: <https://powo.science.kew.org/taxon/957795-1>. Accessed on: 20 February 2022.
- Tung, N.T., Than, N.V. & Hung, N.Q. 2017. *Balanophora subcupularis* P.C. Tam (Balanophoraceae): new record species for Flora of Vietnam. **Journal of Pharmacognosy and Natural Products** 3(2): 1–3.