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DOI: <https://doi.org/10.3897/arphapreprints.e69957>

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***Hemiboea chanii* (Gesneriaceae), a new species from limestone areas of northern Vietnam**

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Abstract

Hemiboea chanii, a new species of Gesneriaceae from Ha Giang Province, northern Vietnam, is here described and illustrated. It has many branched stems up to 90 cm, with 12–16 nodes, involucre diamond with two cirrose opposite apices, pink corolla with red spotted inside, and flowering time in January–February. Among congeners with abaxially hairy corolla new species morphologically most close to *H. crystallina* and *H. sinovietnamica*. Diagnostic discriminative features between all mentioned species are discussed.

Keywords

Endemism, Gesneriaceae, limestone flora, new taxon, plant diversity, plant taxonomy, Vietnam

Introduction

The genus *Hemiboea* Clarke (1798) (Gesneriaceae) contains 23 species and 5 varieties, distributed mainly in southern China, northern Vietnam, and southern Japan (Weber 2004; Li and Wang 2004). The previous genus, *Metabriggsia* Wang (1983), with two species was revised and merged with *Hemiboea* (Weber et al. 2011). During last two decades, 14 new taxa have been found and described in China and Vietnam: 13 new species and one new variety from Guangxi, Guizhou and Yunnan provinces of southern China (Li and Liu 2004; Xu et al. 2010, 2012; Huang et al. 2011; Wen et al. 2011, 2013; Pan et al. 2012; Zhou et al. 2013; Zhang et al. 2014; Li et al. 2018; Chen et al. 2018;; Wu et al. 2019; Huang et al. 2020) and one from Thanh Hoa Province of northern Vietnam (Nguyen et al. 2019). Additionally, based on extensive morphological, phenological, and molecular studies, *H. subcapitata* var. *pteroaulis* Z.Y.Li (2004) and *H. subcapitata* var. *guangdongensis* (Z.Y.Li) Z.Y.Li and a population of *H. subcapitata* var. *pteroaulis*, were accepted in rank of different distinct species as *H. pterocaulis* (Z.Y.Li) J.Huang, X.G.Xiang & Q.Zhang in Huang et al. (2017) and *H. guangdongensis* (Z.Y.Li) X.Q.Li & X.G.Xiang in Li et al. (2019), respectively. In total, before our study, the genus *Hemiboea* comprises at least 39 species and 5 varieties.

During the botanical fieldwork in limestone areas of Ha Giang Province in northern Vietnam in spring 2021, we collected an unusual species of *Hemiboea*. After consulting relevant literature of *Hemiboea* (Wang et al. 1998; Pham 2000; Li and Wang 2004; Wei et al. 2010; Do et al. 2016; Luu et al. 2018; Wei 2018) and some new published species from Vietnam (e.g. *Michaelmoelleria* F. Wen, Y.G. Wei & T.V. Do in Wen et al. 2020) as well as the examining of herbarium specimens, we identified our plants as a new species, well segregated from all known

species of *Hemiboea* by its morphological characters. This new species is described and illustrated here as *H. chanii* C.H.Nguyen & Aver..

Material and methods

All collected and studied specimens of the newly discovered species are presently stored in the Herbaria of China, Russia, and Vietnam (IBK, IBSC, KUN, LE, PE, VNF). The photographs used for the species illustration were taken in the species natural habitats. Morphological observations and measurements were made on living plants, dry specimens, and materials preserved in alcohol. Morphological characters are described using the terminology proposed by Wang et al. (1998).

Taxonomic treatment

Hemiboea chanii C.H.Nguyen & Aver, sp. nov.

Figs 1, 2

Type. VIETNAM. Ha Giang Province: Vi Xuyen District, Minh Tan Village, primary evergreen broad-leaved forest at elevation 500–700 m a.s.l., 19 January 2021, *N.V. Ly*, *NVL 20210119001* (holotype: VNF!; isotype: LE!).

Diagnosis. The new species is similar to *H. crystallina* in the form of the leaf blade, flower shape, and the corolla pubescent outside but differs in tall subterete stems up to 90 cm, entire calyx margin, corolla red-spotted inside, and 3 staminodes. It also morphologically resembles *H. sinovietnamica* but differs in having numerous branches, stem of 12–16 nodes, repand-crenate leaf margin, involucre diamond with cirrose apex, pink corolla and flowering period (Fig. 1, Table 1).

Description. Perennial lithophytic herb. Stem ascending to erect, glabrous, subterete, 50–90 cm tall, 3–7 mm in diameter, many-branched, with 12–16 nodes. Leaves petiolate, opposite, unequal to sub-equal in a pair; petiole 1.5–4.5 cm long, about 2 mm in diameter, glabrous, green to purple; leaf blade narrowly ovate, ovate, oblong or elliptic, coriaceous when dry, 7.5–12 cm long, 2.5–5 cm wide, glabrous, adaxial surface dark green, abaxial surface pale greenish, at base cuneate, sometimes slightly oblique, apex acute or shortly acuminate, repand-crenate along the margin, median and lateral veins inconspicuous adaxially and protuberant abaxially, lateral veins in 6–10 pairs. Inflorescence subterminal 2–3-flowered cyme; peduncle 0.8–1 cm long, about 1 mm in diameter, glabrous, green to pale green; involucre 1.6–1.8 cm in diameter, outside glabrous, diamond, apex cirrose. Calyx white, actinomorphic, 5-lobed, dissected from the base; segments subequal, narrowly lanceolate 1.3–1.4 × 0.2–0.3 cm, glabrous, margin entire, 1-veined. Corolla infundibular, outside pink with numerous red spots on adaxial lip, inside red spotted, 3.5–4 cm long; syntepalous part (tube) 3.0–3.6 cm long, 1.4–1.6 cm in diameter at the orifice, 3–4 mm in diameter at the base, sparsely glandular puberulent outside; inside with a ring of hairs adnate to 3–4 mm above the corolla base; limb distinctly two-lipped; adaxial lip 3–4 mm long, 2-lobed at apex, lobes subequal, nearly half-round, margin recurved; abaxial lip 6–8 mm long, 3-lobed, lobes unequal, with rounded apex, median lobe largerr, broadly ovate, lateral 2 smaller, slightly obliquely ovate. Stamens 2, adaxial, adnate to 1.1–1.3 cm above the corolla base; filaments filiform, coiled, 1.2–1.4 cm long, 1 mm in diameter; anthers basifixed, globular, 1.5–1.7 mm in diameter, coherent at the apex. Staminodes 3, linear, glabrous, with inflated apex, adnate to 13–15 mm above the corolla base, the middle one 2–3 mm long, lateral ones 9–10 mm long. Disc circular, lemon-yellow, 1.2–1.4 mm high, margin repand, glabrous. Pistil 24–26 mm long; ovary narrowly cylindrical, glabrous, 7–8 mm long, about 2 mm in diameter; style 17–18

mm long, terete, glabrous, about 1 mm in diameter, apex curved; stigma slightly swollen, truncate. Capsule linear, 2.6–3 cm long, glabrous, slightly curved.

Distribution and habitat. The new species grows in cracks of limestone rocks in moist shady places in primary evergreen broad-leaved forests on karstic limestone hills at elevations 500–700 m a.s.l.

Phenology. Flowers in January–February, fruiting in February–April.

Etymology. *Hemiboea chanii* is named in honor of the lecturer, Le Mong Chan, for his outstanding contributions to the conservation of the flora of Vietnam.

Proposed IUCN conservation status.

At present, only one known population with less than 100 mature individuals is confirmed in the field assessment. Its estimated area of occupancy is less than 5 km². The population and habitat are greatly susceptible to various human activities and damages, particularly forest logging, agriculture, and grazing. There is a high risk of habitat degradation in the coming future because it is located close to the local village. Following the IUCN Red List Categories and Criteria (IUCN, 2017), new species may be assessed tentatively as a Critically Endangered [B2ab (ii, iii), D].

Note. *Hemiboea chanii* is morphologically similar to *H. crystallina* and *H. sinovietnamica*. It differs from *H. crystallina* in subterete stem up to 90 cm tall (vs. stem terete up to 40 cm tall), involucre diamond with cirrose apex (vs. involucre quadrangular with 4 wide wings on costas), 1-veined calyx with flat, not recurved margin (vs. calyx 3-veined with revolute margin), corolla red spotted inside (vs. corolla inside purplish-red spotted with pale yellowish lines), and 3 staminodes (vs. 2 staminodes). From *H. sinovietnamica* new species differs in subterete, many-branched stem up to 90 cm tall with 12–16 nodes (vs. stem subtetragonal, simple, up to 45 cm tall with 4–6 nodes), involucre diamond with cirrose apex (vs. involucre triangular with acute apex), corolla pink (vs. corolla yellowish), and a flowering period lasting in January–February (vs. flowering period lasting during August–October). The comparison of the key morphological characters of *H. chanii*, *H. crystallina*, and *H. sinovietnamica* is presented in table.

Table. Morphological characters of *H. chanii*, *H. crystallina* and *H. sinovietnamica*

	<i>H. chanii</i>	<i>H. crystallina</i>	<i>H. sinovietnamica</i>
Stem height and shape of cross-section	50–90 cm, subterete	to 40 cm, terete	25–45 cm, subtetragonal
Number of stem branches	numerous	several	stem simple
Number of stem nodes	12–16	?	4–6
Leaf margin	repand-crenate	repand-crenate	entire
Involucre characters	diamond, not winged, apex cirrose	quadrangular, winged on costas, apex acute	triangular, not winged, apex acute
Calyx characters	margin flat, not recurved, 1-veined	margin revolute, 3-veined	margin flat, not recurved, 1-veined
Corolla color	pink, inside red spotted	white, inside urplish-red spotted with pale yellowish lines	yellowish, inside purple-spotted

Number of staminodes	3	2	3
Flowering time	January–February	November	August–October

Acknowledgments

The studies, results of which are presented in this paper were supported by the institutional research project of the Komarov Botanical Institute of the Russian Academy of Sciences “The Vascular Plants of Eurasia: the systematics, flora and plant resources” (AAAA-A19-119031290052-1). Authors would like to thank the authorities of the Phong Quang Nature Reserve (Ha Giang province, Vietnam) for their support during fieldworks.

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Figure 1. *Hemiboea chanii*. **A** Plants in natural habitat **B** leaf blade, abaxial surface **C** flowering branch **D** flower, frontal view **E–G** flower, side and half side views **H** stamens and staminodes **I** involucre **J** flower inside and outside views **K** ripening capsule, cross section **L, M** pistil and ripening capsule, side view **N** calyx segments. Photos by Nguyen Van Ly, correction and design by C.H. Nguyen.



Figure 2. *Hemiboea chanii*. Isotype specimen detail. *N.V.Ly, NVL 20210119001* (isotypes: LE 01077046!).