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A NEW SPECIES OF *GLOBBA* UNDER SECT. *HAPLANTHERA* (ZINGIBERACEAE) FROM MYANMAR

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Abstract

Globba zwegabinensis sp. nov., under sect. *Haplanthera* (Zingiberaceae) is newly described and illustrated from the Zwegabin Mountain of Kayin State in southern Myanmar. *G. zwegabinensis* is morphologically allied to *G. sessiliflora* and *G. lithophila* but differs in having the leaves with a foetid smell, glabrous blade, completely yellow filament, glabrous ovary, larger cuneiform labellum with bifid apex, glabrous and oblong to ovate fruit, lack of bulbils and anther appendages. A description and photographic data, along with the comparative characteristics of the closely allied species, are provided.

Introduction

Globba L. is one of the largest genera in Zingiberaceae, comprising about 140 species (Williams *et al*., 2004; Souvannakhoummane *et al*., 2023; POWO, 2024). They are circumscribed under seven sections namely *Haplanthera* Horan., *Ceratanthera* (Horan.) Petersen, *Globba* (previously G. sect. *Marantella* (Horan.) Benth. & Hook.f.), *Nudae* K. Larsen, *Substrigosa* K.J. Williams, *Sempervirens* K.J. Williams, and *Mantisia* (Sims) K.J. Williams. It is one of three genera within the tribe *Globbeae*, alongside *Gangnepainia* K.Schum. and *Hemiorchis* Kurz (Cao *et al*., 2018). Its distribution spans Sri Lanka, India, Nepal, Bhutan, Bangladesh, tropical China, and all of Southeast Asia, extending eastward to Australia and the Solomon Islands.

The genus *Globba* is distinguished from the other two genera by unique characteristics, including the presence of anther appendages, the absence of a central stripe or point on the labellum, the labellum being partially fused with the floral tube or free, a reflexed floral tube, and its flowering during the entire rainy season (Williams *et al*., 2004). They are distributed throughout tropical and sub-tropical Asia to northeast Australia (POWO, 2024). In Myanmar, they are represented by 27 species (Kress and Htun, 2003; Williams, *et al*., 2004). However, in the neighboring Thailand, 66 species of *Globba* have been recorded (Sangvirotjanapat and Newman, 2023), highlighting the necessity for further exploration in this area. Given that the forest ecosystems and climatic conditions in Myanmar are similar to those of neighboring Thailand, it is likely that several new plant species may be discovered in Myanmar. Additionally, local communities in Myanmar utilize *Globba* species for ornamental and religious purposes, leading to significant loss of the natural habitats of several *Globba* species.

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In July 2023, one of the co-authors (MKN) found an interesting *Globba* species on the peak of Zwegabin Mountain (ca. 722 m. asl.) and suspected it to be a new species because of its distinct and unique morphological characteristics, especially the large size of the flower and labellum, and the foetid smell of leaf differed from other *Globba* species. A critical examination of the morphology of the species was carried out along with the closely allied species. Besides, relevant literature (Williams *et al*., 2004; Tanaka *et al*., 2015; Joe *et al*., 2019; Sangvirotjanapat *et al*., 2019; Ding *et al*., 2022; Sangvirotjanapat and Newman, 2023; Souvannakhoummane *et al*., 2023) and type specimens housed at various herbaria *viz*. E, K, RAF, etc., were consulted either virtually or in-person. Our observation led us to conclude that our collection belongs to a new species, which we describe here as *Globba zwegabinensis* Latt, M.K. Naing & Joongku Lee under sect. *Haplanthera* (Zingiberaceae).

Materials and Methods

The first floristic survey was conducted in Pha-an Township, Kayin State (Fig. 1) in 2023 during the flowering season. Morphological characteristics were recorded, and a detailed description was prepared. The plants were monitored in their natural habitat for another year to record variations in the morphological traits, particularly the production of bulbils. In 2024, the morphological traits of the species were re-examined, referring to our earlier collections and photographs to confirm our identification of new species. GPS coordinates were recorded, and photo documentation was done.

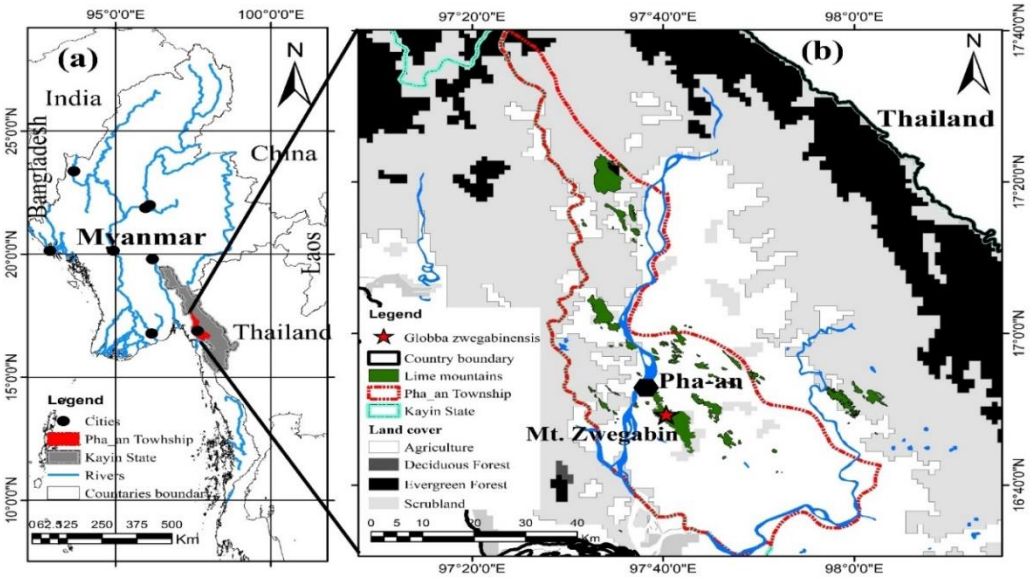

Fig 1. (a) Location of Pha-an Township, Kayin State where floristic survey was carried out, (b) location of Zwegabin Mountain where *Globba zwegabinensis* was found and its defragmented forest condition

The terminology for descriptions followed Beentje (2016) and Gledhill (2008). The collected accessions of the new species were compared with descriptions of allied species (Curtis, 1811; Sangvirotjanapat and Newman, 2023). Images of herbarium specimens were examined in the database of e-Flora of Thailand (https://botany.dnp.go.th/eflora/index.html), Flora of China (http://www.efloras.org/flora_page.aspx?flora_id=2), e-Flora of India (https://efloraofindia.com/),

Plants of the World Online (https://powo.science.kew.org/) (POWO, 2024), and Global Biodiversity Information Facility (https://www.gbif.org/). The conservation status of this species was decided following the IUCN (2024), considering the distribution, populations under current ecological habitat and human's use. Detailed photographs of all parts of the species were taken before and after specimen collection. Inflorescences were preserved in 70% ethanol for microscopic analysis. Herbarium specimens were processed following standard methods (Jain and Rao, 1977), and the voucher specimens were deposited at the herbarium of the Forest Research Institute, Yezin, Myanmar (RAF), and Forest Resources Taxonomy Laboratory at Chungnam National University, Korea.

Results and Discussion

Taxonomic treatment

Globba zwegabinensis Latt, M.K.Naing & Joongku Lee, **sp. nov.** (**Figs 2–3**).

Type: MYANMAR. Kayin State: Zwegabin Mountain, Pha-an Township, Pha-an District, in flaked lime rocks on Zwegabin Mountain, *c*. 700 m asl., N 16° 49' 17.6" and E 97° 40' 17.1", June 2024, *Min Khant Naing MY 8041* (holotype RAF; isotype RAF)

Vernacular name: "Zwe-gabin Badein-ngo" (proposed here). "Badein-ngo" and "Badein-ma-naing" are the local names of *Globba* species in Myanmar, whereas "Zwegabin" refers to the name of the mountain where it was found first.

Diagnosis: *Globba zwegabinensis* is morphologically similar to *G. sessiliflora* Sims under the same sect. *Haplanthera* and *G. macrochila* Sangvir. & M.F. Newman under sect. *Nudae* but can be distinguished by glabrous leaf-blade, the foetid smell of leaf, totally yellow filament, glabrous ovary, larger cuneiform labellum with bifid apex, glabrous and oblong to ovate fruit, and lack of bulbils.

Rhizomatous annual herb, 15–40 cm tall, lithophyte, growing in cracked or between the slides of rocks. False stem stout, glabrous. Bladeless leaf sheaths up to 3, purple-greenish, glabrous; leaf sheaths pale greenish; ligule membranous, erect inside base of leaf blade, 1–2 mm long; petiole open, *c*. 4 cm long, pale green, glabrous; blades up to 5, with foetid smell, ovate or broadly elliptic, 5–13 × 3–5.5 cm, base obtuse, apex acuminate to attenuate, adaxially dark green, glabrous, abaxially pale green, pubescent. Inflorescence panicle, erect, lax, stout, 8–10 cm long; peduncle 2–4 cm long beyond leaf sheaths, green, glabrous; rachis green, glabrous; bracts at base of every secondary rachis, green, lanceolate to linear, 20–30 × 5–8 mm, diminishing size to top of rachis, apex acuminate, green, both abaxial and adaxial surface glabrous; bracteole persistent, opposite to flower, ovate to lanceolate, 2–5 × 2–3 mm, glabrous, apex acute; Flowers yellow, 2.6–3 cm long, same ♂ and ☿; pedicle *c*. 3 mm long, glabrous, green; calyx infundibuliform, *c.* 7 mm long, unequally trilobed with acute apices, green, glabrous; floral tube *c*. 12 mm long, yellow, glabrous; dorsal corolla lobe cybiform, ovate, *ca*. 8 × 5 mm, apex acute, greenish yellow, glabrous or minutely pubescent; lateral corolla lobes narrowly ovate, *c*. 7 × 4 mm, apex obtuse, yellow, glabrous; lateral staminodes obliquely oblong, 10–12 × 4–5 mm, apex obtuse to emarginate, yellow, glabrous; labellum cuneiform, *c*. 11 × 6 mm, bilobed, base truncate, puberulous, apex bifid, yellow without spot; nectar tube 3–5 mm long; filament *c*. 7–9 mm long, yellow, glabrous, stigma yellow, simple, crest rounded, *c*. 2–3 × 1.5–2 mm; anther narrow ovate to lanceolate, *c*. 3.5 × 2.5 mm, without appendages; anther thecae *c*. 1.5–2 mm long, dehiscing along entire length, yellow, glabrous, pollen white; ovary ellipsoid, ridged, *c*. 3 mm long (∞) , green, glabrous; style whitish yellow, tiny, threadlike string, glabrous; stigma cup-shaped, *c*. 1.5 mm, glabrous. Fruits oblong to ovate, glabrous, *c*. 6 cm long, *c*. 5 mm in diam. (young fruit), shallowly trisulcate, rugose, green.

Seeds globose, glabrous, brown, 1.5–2 mm in diameter, 4–14 seeds, with translucent membranous cover. Bulbils lacking.

Habitat and ecology: *Globba zwegabinensis* is restricted to limestone rocks in the Zwegabin Mountain range, where humidity remains high during the rainy season but decreases considerably in the dry season. The species is predominantly observed at the mountain's peak, with no records from the foothills or lower slopes. It was commonly associated with *Begonia* species, ferns, and various members of the Araceae and Gesneriaceae.

Phenology: Flowering in June–July. Fruiting: July–September.

Distribution: Myanmar. Thus far, it is known only from the type locality.

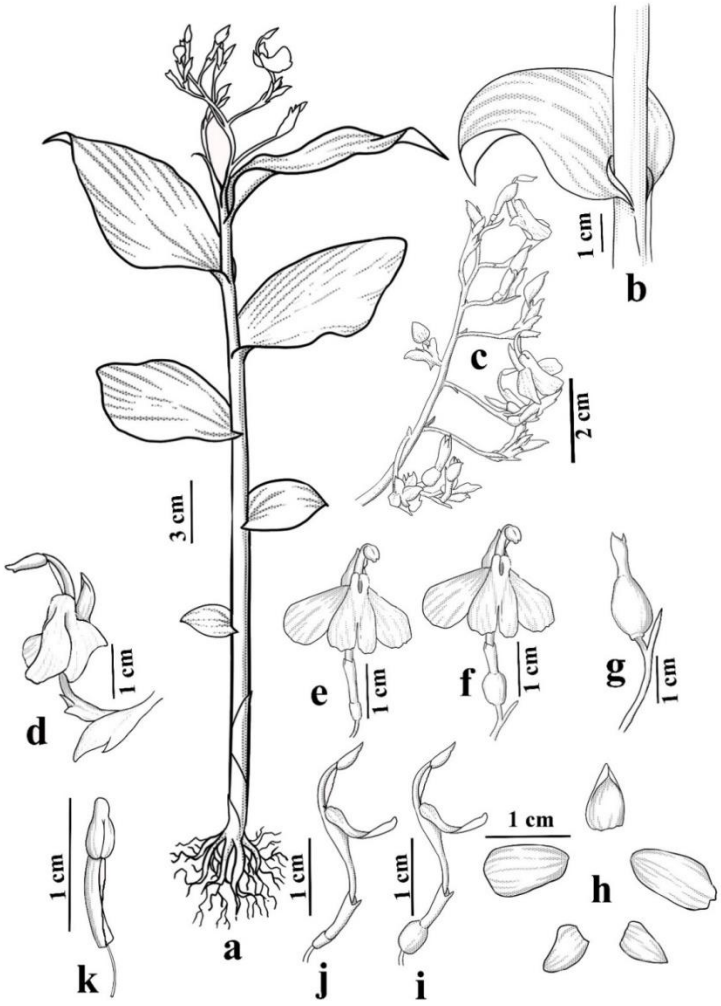

Fig. 2. Illustration of *Globba zwegabinensis* a. habit, b. leaf and ligule, c. inflorescent, d. side view of flower and cincinni, e. male flower, f. female flower, g. fruit, h. corolla lobes, i. anther, filament, labellum and ovary of the female flower, j. anther, filament and labellum of male flower, and k. anther and labellum.

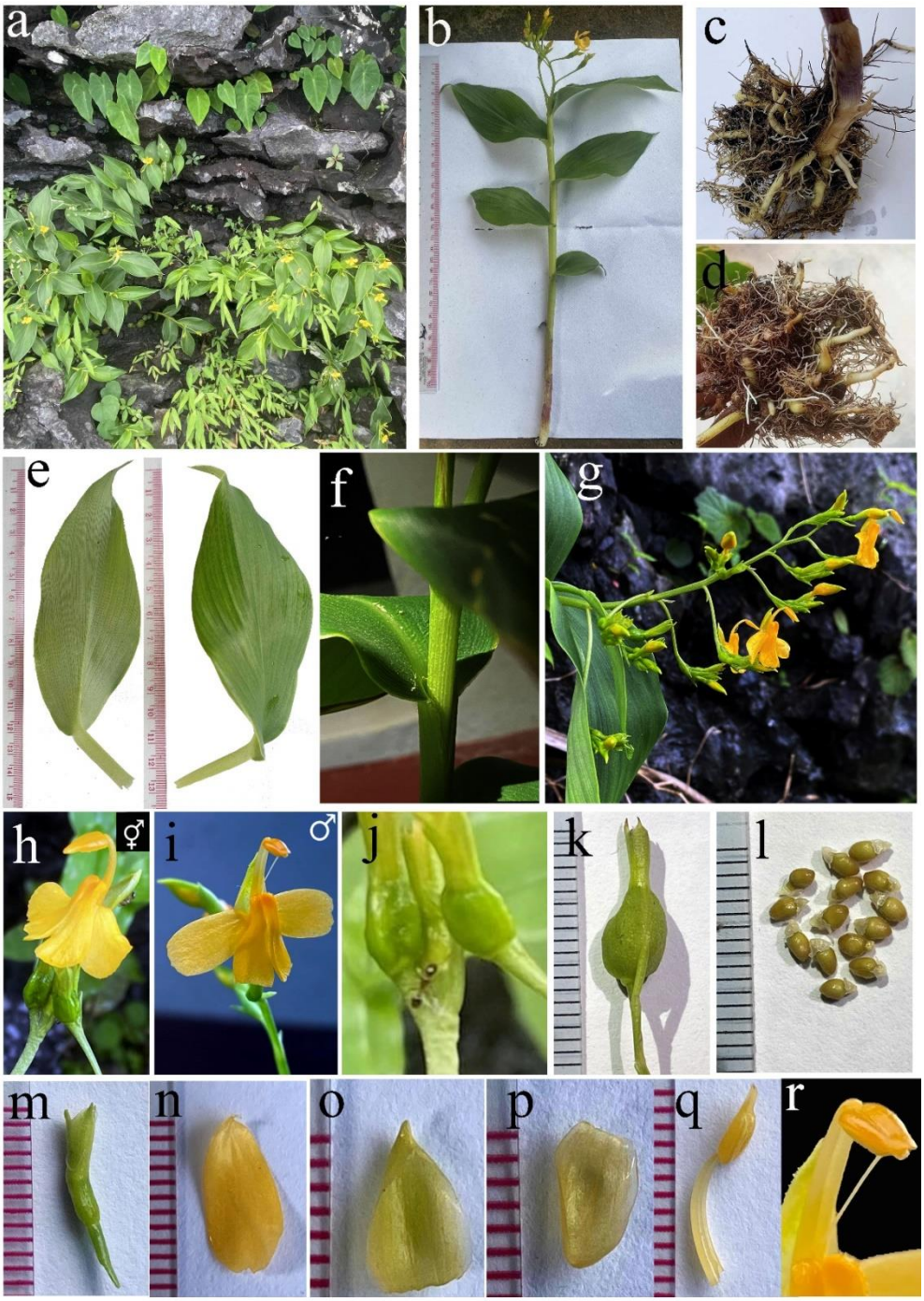

Fig 3. *Globba zwegabinensis* a. growing in crack or flaked limestone, b. habit, c-d. rhizome, e. leaves, f. leaf and ligule, g. inflorescent, h. bisexual flower (∞), i. male flower (♂), j. ovary, k. fruit, l. seeds, m. calyx tube, n. lateral staminode, o. dorsal corolla lobe, p. lateral corolla lobe and q-r. filament and anther.

Etymology. The species epithet is named after the type locality Zwegabin Mountain, where this species was specifically found among the aggregated limestone hills and mountains across Pha-an Township.

Note: *Globba zwegabinensis* is assignable to subgenus *Globba*, sect. *Haplanthera* Horan. based on the lack of anther appendages (Williams *et al*., 2004; Sangvirotjanapat *et al*., 2019). It differs from *G. lithophila* Sangvir. & M.F.Newman (sect. *Nudae*), which has a similar ecological habitat growing on the rock and lacks anther appendages. The foetid smell of the leaf is unique to distinguish it from both *G. sessiliflora*, *G. macrochila* and *G. lithophila*. A comparative account of the morphologically allied *Globba* species to facilitate easy identification is given in Table 1.

Table 1. Morphological comparison of *Globba zwegabinensis* with its allied species.

Morphological characters	*Globba zwegabinensis* sp. nov.	*Globba macrochila*	*Globba sessiliflora*	*Globba lithophila*
Section	*Haplanthera*	*Nudae*	*Haplanthera*	*Nudae*
Habitat	Lime rocky mountain	Bamboo forest	Under forest cover	Small pockets of rock or on soil near cliffs.
Habit	Lithophyte	Terrestrial	Terrestrial	Lithophyte
Leaf-blade	Broadly elliptic to ovate, apex acuminate to attenuate, base obtuse, adaxially glabrous, abaxially pubescent, with foetid smell.	Elliptic to ovate, apex acuminate, base obliquely obtuse, strigose along veins above. No foetid smell.	Lanceolate-oblong, apex acuminate, base cuneate, minutely hairy with densely hairy margins. No foetid smell.	Elliptic to narrowly ovate, apex acuminate, base obliquely cuneate, pubescent along midrib above, pubescent to sericeous below. No foetid smell.
Ligule	1–2 mm long, membranous, erect	2–5 mm long, bilobed or truncate	2–3 mm long, truncate to bilobed	2–5 mm long, bilobed
Inflorescence	Erect, lax, stout, 8–10 cm long	Erect, lax, conical, 5–12 cm long	Erect, cymes, 15–30 cm long	Lax, conical, 7–13 cm long
Flower	Bracteole ovate to lanceolate, glabrous	Bracteoles elliptic, apex and margin pubescent	Bracteoles elliptic, margins pubescent	Bracteoles triangular, apex sparsely pubescent
Calyx	Infundibuliform, *c*. 7 mm long, unequally trilobed with acute apices, green	Infundibuliform, 3–5 mm long, lobes acuminate, green	Infundibuliform, *c*. 7 mm long, trilobed, yellow	Infundibuliform, *c*. 4 mm long, lobes acute, green
Lateral staminodes	Obliquely oblong, 10–12 mm, apex obtuse to emarginate, yellow	Obovate, 12–14 mm, apex acute, orange	Linear, *c*. 10 mm long, apex acute and tends to roll up, yellow	Oblong *c*. 11 mm long, patent, apex round or shallowly bilobed, orange
Labellum	Truncate, *c*. 11 × 6 mm, bilobed, base puberulous, apex bifid	Triangular, 19–20 × 4–7 mm, bilobed, base truncate, apex obtuse	Oblong to obtriangular, 12–15 × 3–5 mm, apex bilobed,	Triangular, 7–8 × 4–5 mm, bilobed, apex round to truncate
Anther	No appendages	4 appendages	No appendages	4 appendages
Fruit	Oblong to ovate	Ellipsoid	Globose to ellipsoid	Triangular
Bulbils	Absent	Present	Present	Present

Conservation status: Due to its medicinal and ornamental value, the demand for *Globba* species in the region is increasing. This demand has led to cultivating, selling, and exporting these plants to neighboring countries, attracting interest from botanists. During our floristic surveys, *G. zwegabinensis* was identified at five locations on Zwegabin Mountain, growing as a lithophyte among cracked or flaked limestone. At each site, the population consisted of less than 20

individuals. Limestone mountains are fragmented by agricultural and settlement areas, creating isolated habitats. We could not locate *G. zwegabinensis* on other mountains, many of which are being excavated for cement production. Consequently, based on the latest IUCN criteria, we provisionally designate *G. zwegabinensis* under the Vulnerable (VU D2) category following IUCN criteria (2024).

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