

***Globba amicitia* (Zingiberaceae: Globbeae), a new species from Phou Khao Khouay National Protected Area, Bolikhamxay Province, Laos**

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ABSTRACT

Globba amicitia (Zingiberaceae: Globbeae), a new species from Laos is described and illustrated. This species is morphologically most similar to *G. larsenii*, a species from Thailand, in having erect inflorescences and entirely yellow flowers without spots, but easily recognizable by its sessile cincinni and puberulent lateral staminodes. A proposed IUCN Red List assessment and notes on distinguishing characters are provided. A key to species of *Globba* subgenus *Globba* in the Indo-Chinese region is included.

KEYWORDS: Cambodia, gingers, *Globba larsenii*, Indo-China, South-East Asia, Vietnam.

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INTRODUCTION

Globba L. is the largest genus in tribe Globbeae, Zingiberaceae, comprising about 120 species restricted to tropical and subtropical Asia. They are perennial herbs, usually having a distinct dormancy period in the dry season, while about a quarter of the species, those that are distributed in Peninsular Malaysia and the Malay Archipelago, are evergreen. The genus is distinguishable by its unique floral morphology, in particular, in having a long-arched filament. Previous studies in the taxonomy and phylogenetics of this genus have clarified the infrageneric classification, with three subgenera and seven sections currently recognized (William *et al.*, 2004; Sangvirotjanapat *et al.*, 2019a; 2019b; 2022).

In Laos, studies on the diversity and taxonomy of *Globba* have been scarce. Most of this work dates from the early 20th century. Schumann (1904) reported only a single species of *Globba* from Laos in Das Pflanzenreich. Some years later, Gagnepain (1908) included four more species in Flore générale

de l'Indo-Chine. After these publications, hardly anything was added to the literature on Laotian *Globba* for almost a century. In 2007, Newman *et al.* published a checklist of the vascular plants of Laos in which eighteen *Globba* species were listed (Newman *et al.*, 2007); of these, only nine are now considered as accepted species and four are still of doubtful status. Recently, five additional species of *Globba* were recorded from Laos, increasing the total number to fourteen (Sangvirotjanapat *et al.*, 2019b, 2020, 2022; Sangvirotjanapat & Newman, 2021), excluding the four doubtful ones.

During a field survey for the Flora of Laos, a new species of *Globba*, named here as *G. amicitia* Sangvir. & Souvann., was found near the border of Bolikhamxay Province near the Mekong River. This location lies within one of Laos' most important protected areas, the Phou Khao Khouay National Biodiversity Conservation Area, where several endemic plant species occur (Tagane *et al.*, 2018; Mattapha *et al.*, 2021; Souvannakhoummane *et al.*, 2021).

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The new species belongs to subgenus *Globba*, which is characterized by the four appendages on the anthers and by the globose fruit. *Globba amicitia* is morphologically closest to *G. larsenii* Sangvir. & M.F.Newman, a species described from Bueng Kan and Nakhon Phanom, Thailand, with which it is compared in the diagnosis below. A key to species of *Globba* subgenus *Globba* in the Indo-Chinese region is also provided here.

MATERIALS AND METHODS

The description format follows Sangvirodjanapat *et al.* (2019a, 2019b). The measurements are based on a living specimen from the type collection. The floral parts were measured from dissected materials. Herbarium specimens at BK, BKF, QBG, SING were examined. Digitized specimens of *Globba* were also studied via Global Plants on JSTOR and the online collections of the Muséum national d'Histoire naturelle (MNHN - Paris, France). The assessment of conservation status was carried out following IUCN guidelines (IUCN standards and Petitions Subcommittee, 2022). Our key to species of *Globba* subgenus *Globba* in the Indo-Chinese region was made using the protologues and other relevant literature (Gagnepain 1901, 1903, 1907, 1908; Sangvirodjanapat *et al.*, 2019a, 2020, 2022; Sangvirodjanapat & Newman, 2021, 2023; Schumann 1904).

TAXONOMIC TREATMENT

DESCRIPTION

Globba amicitia Sangvir. & Souvann., **sp. nov.** (subgenus *Globba*). Figs. 1–2.

Morphologically similar to *Globba larsenii* (Fig. 3) in its erect inflorescence, dark reddish brown peduncle, and yellow-orange flower without spots on the labellum, but differs by sessile cincinni (versus prolonged cincinni in *G. larsenii*), puberulent lateral staminodes (versus glabrous lateral staminodes), and small plant size, about 15–25 cm tall (versus 30–80 cm tall)(Table 1). Type: Laos, Bolikhamxay Province, Thaphabath District, Tad Tek waterfall, 18°28'27.0"N 103°30'23.1"E, 180 m elevation, 16 Aug. 2020, S. Lanorsavanh & K. Souvannakhoummane KS2224 (holotype **HNL**; isotypes **BKF**, **FOF**, **SING**).

Rhizomatous herb, 15–25 cm tall. *Bladeless leaf sheaths* 3–4, purple-greenish, puberulent; leaf sheaths pale greenish, puberulent; ligule shallowly bilobed, to 1.5 mm long, sparsely puberulent; petiole sessile, or to 4 mm long, pale green, puberulent; blades 8–9, ovate or narrowly elliptic, 5–15 × 2–3 cm, base attenuate or obtuse, apex acuminate to caudate, adaxial dark green, glabrous, adaxial pale green, pubescent. *Inflorescence* erect, lax, 12–18 cm long (measured when lying flat); peduncle 4.5–8 cm long beyond leaf sheaths, reddish brown, puberulent; rachis reddish-brown to green, puberulent; bracts caducous, narrowly elliptic, 4–12 × 2–6 mm, apex acute to acuminate, yellowish green or green, adaxial puberulent; bracteoles elliptic, 4–10 × 2–6 mm, apex acute, greenish-yellow or yellow; cincinni sessile, or to 3 mm long. *Flowers* 2.8–3.2 cm long; calyx infundibuliform, 3–3.8 mm long, unequally trilobed with acute apices, yellow-orange, puberulent; floral tube ca 15 mm, yellow-orange, puberulent; dorsal corolla lobe hooded, narrowly elliptic, ca 8 × 1.5 mm, apex mucronate, yellow-orange, puberulent; lateral corolla lobes narrowly elliptic, ca 7 × 1.5 mm, apex acute, yellow-orange; lateral staminodes obliquely elliptic, 13–15 × 4–5 mm, apex acute or obtuse, yellow-orange, puberulent; labellum obtriangular, ca 10 × 5 mm, bilobed, base truncate, apex acute, yellow-orange without spot; nectar tube 5–6 mm long; filament 18–22 mm long, yellow-orange; anther elliptic, 1.4–1.5 × 1–1.2 mm, connective tissue orange, appendages 4, triangular, 1.8–2.5 × 0.5–1.2 mm, upper pair bigger, apex acuminate, curved, with a minute pair in the middle, orange; anther thecae ca 1.5 mm long, dehiscing along entire length, white, glabrous, pollen white; ovary ellipsoid, 2.8–3 × 2.1–2.2 mm, light green, sparsely puberulent to glabrous, unilocular, parietal placentation; epigynous glands 2, cylindrical with slender pointed, 2–3 mm long, white; style white, glabrous; stigma cup-shaped, ca 1 mm, pubescent. *Fruits* globose, ca 6 mm in diam. (young fruit), shallowly trisulcate, rugose, green. *Seeds* not seen. *Bulbils* not seen.

Distribution.— Endemic to Laos.

Ecology.— On rocky slopes with wet seepage near streams at 180–240 m elevation.

Etymology.— Latin, '*amicitia*' refers to the friendship between Lao and Thai cultures, and also to the collaboration between Lao and Thai botanists.

Vernacular name.— ดอกฮ้างเจ้ามิดตะພາບ (Dok Houang Khao Mitthaparb)(Proposed here).

Proposed IUCN conservation status.— Critically Endangered (CR). *Globba amicitia* is only known from the type locality, Phou Khao Khouay National Park, Bolikhamxay. No previously collected specimen of this species are known. The population size is less than 30 mature individuals. Following

IUCN (2022) guidelines, the species is assessed as Critically Endangered under criterion D because the number of mature individuals is less than 50.

Notes.— There are 18 known species, one variety, and six doubtful species of *Globba* subgenus *Globba* in the Indo-Chinese region; of those, 15 species and one variety plus four doubtful species are found in Laos. *Globba amicitia* is placed in subgenus *Globba*

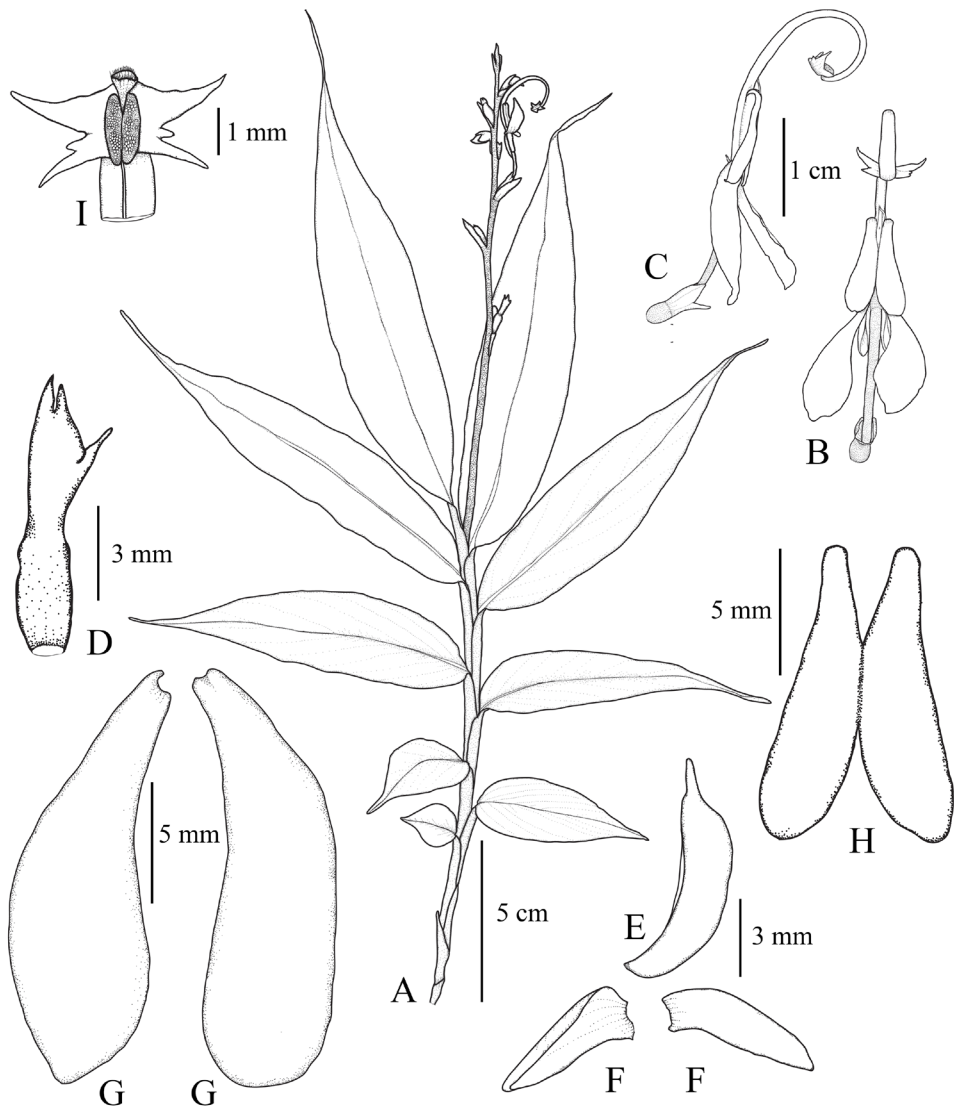


Figure 1. *Globba amicitia* Sangvir. & Souvann. (*Lanorsavanh & Souvannakhoummane KS2224*), A. habit; B–C. flower in front and lateral views; D. ovary with calyx; E. dorsal corolla lobe; F. lateral corolla lobe; G. lateral staminode; H. labellum; I. anther with part of filament. Drawn by K. Souvannakhoummane.

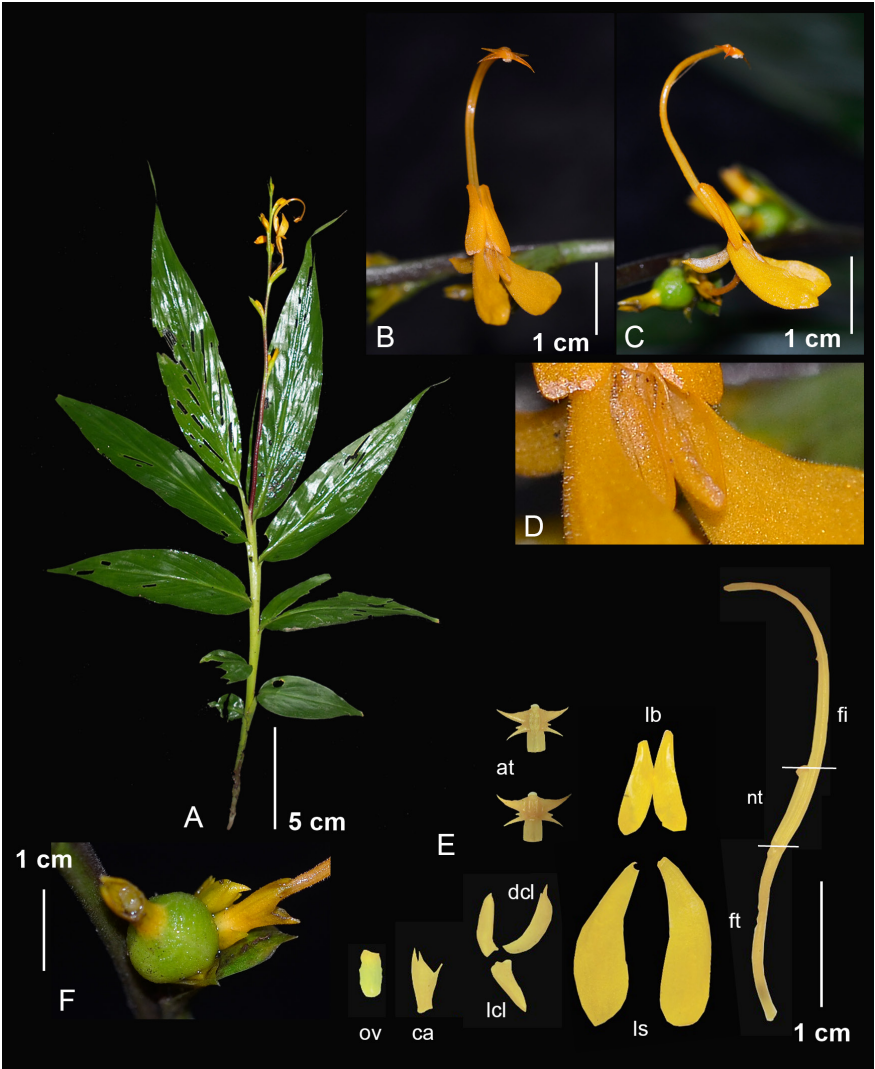


Figure 2. *Globba amicitia* Sangvir. & Souvann. (*Lanorsavanh & Souvannakhoummane KS2224*), A. habit; B–C. flower front and side views; D. indumentum on lateral staminodes; E. dissection of flower: ov=ovary, ca=calyx, dcl= dorsal corolla lobe, lcl= lateral corolla lobe, ls=lateral staminode, lb=labellum, ft=floral tube, nt=nectar tube, fi=filament, at=anther (front and back views), F. fruit. Photographed: A & E by K. Souvannakhoummane; B–D, F by S. Lanorsavanh.

Table 1. Distinguishing characters between *Globba amicitia* and *G. larsenii*.

Characters	<i>G. amicitia</i>	<i>G. larsenii</i>
Cincinni	sessile, or to 3 mm long	1–4 cm long (see Fig. 3)
Lateral staminodes	puberulent	glabrous
Habit size	15–25 cm tall	30–80 cm tall
Fruit	shallowly trisulcate, rugose	strongly trisulcate, smooth
Distribution	endemic to Laos, only known from Bolikhamxay	endemic to Thailand, known from Bueng Kan and Nakhon Phanom



Figure 3. *Globba larsenii* Sangvir. & M.F.Newman. Photographed by Naiyana Tetsana.

KEY TO SPECIES OF THE *GLOBBA* SUBGENUS *GLOBBA* IN THE INDO-CHINESE REGION
(CAMBODIA, LAOS, AND VIETNAM)

1. Anther appendages 2
 2. Flower white with yellow patch on labellum **G. macrocarpa**
 2. Flower orange-yellow or yellow throughout with or without red spots on labellum
 3. Flower yellow-orange. Labellum with a red spot. Anther appendages linear or triangular. Bulbils many, corky **G. thorelii**
 3. Flower orange-yellow. Labellum without a coloured spot. Anther appendages rectangular. Bulbils absent **G. pelecantthera**
 4. Blades linear to narrowly elliptic, 11–21.5 × 1–2.3 cm; labellum rectangular **G. securifera**
 4. Blades elliptic, 5–18 × 1.7–5.2 cm; labellum obtriangular
1. Anther appendages 4
 5. Inflorescence lax; rachis clearly visible; cincinni elongate
 6. Inflorescence erect
 7. Labellum with a red or brown spot at centre
 8. Fruit ellipsoid, surface smooth with longitudinal ridges. Leaf blade elliptic, base obtuse, upper surface plicate **G. aranyaniae**
 8. Fruit globose, surface verrucose. Leaf blade elliptic to oblong, base truncate to cordate, upper surface undulate **G. janae**
 7. Labellum without spots
 9. Inflorescences terminal on the leafy shoots only. Flower yellowish orange; lateral staminodes oblong to narrowly obovate **G. expansa**
 9. Inflorescences either lateral, arising from the rhizome or terminal on the leafy shoots. Flower bright yellow; lateral staminodes obovate **G. insectifera**
6. Inflorescence pendent or horizontal
 10. Peduncle straight. Cincinni prolonged; flowers crowded at the tip of cincinni
 11. Rachis short. Flowers crowded at the tip of inflorescence. Lateral staminodes narrowly oblong, up to 2 mm wide **G. rupestris**
 11. Rachis elongate. Flowers well-spaced along the rachis. Lateral staminodes obliquely elliptic, 4–5 mm wide **G. amicitia**
 10. Peduncle reflexed. Cincinni prolonged; flowers well spaced, ca 3 mm apart
 12. Bracts green or yellowish green, sterile ones many. Bulbils many, corky **G. schomburgkii**
 13. Sterile bracts on rachis densely imbricate **G. schomburgkii**
 13. Sterile bracts on rachis lax, not or rarely imbricate **G. schomburgkii** var. **angustata**

- 12. Bracts pink, red, white, or purple, sterile ones a few or absent. Bulbils a few or absent
- 14. Fruit smooth **G. rosea**
- 14. Fruit verrucose **G. adhaerens**
- 15. The 2–4 lowest bracts much larger than the others
- 15. Bracts gradually diminishing in size toward the tip of inflorescence **G. impar**
- 16. Leaf blades elliptic, 10–19 × 2.7–4.5 cm. Lateral staminodes narrowly elliptic
- 16. Leaf blades oblong to narrowly elliptic, 2.5–10 × 0.5–1.5 cm. Lateral staminodes broadly elliptic to ovate
- 5. Inflorescence compact; rachis rarely visible, covered by cincinni; cincinni short
- 17. Bulbils absent or only a few present **Globba spp.** (Cambodgensis group)*
- 17. Bulbils many on sterile bracts
- 18. Bracts green **G. marantina**
- 18. Bracts pink, white, or whitish green
- 19. Sterile bracts separate from fertile ones. Bracts reflexed **G. bicolor**
- 19. Sterile and fertile bracts adjacent, not separated. Bracts patent **G. hilaris**

* Six species in Cambodgensis group: *Globba annamensis* Gagnep., *G. angcorensis* Gagnep., *G. cambodgensis* Gagnep., *G. candida* Gagnep., *G. globulifera* Gagnep., and *G. parva* Gagnep., are omitted from the key since more studies are needed to assess their identities.

because of the four anther appendages that characterize this subgenus. The new species can be distinguished by its sessile cincinni and puberulent lateral staminodes. It resembles *G. larsenii* from Bueng Kan and Nakhon Phanom Provinces, Thailand. These two species occur in the same habitat type on sandstone rock at low elevations around 180–240 m, but *G. amicitia* grows under conditions of high humidity near streams, whereas *G. larsenii* appears to be more tolerant of dry conditions.

Interestingly, an unusual type of anther appendage can be found in *Globba amicitia*, namely, the occurrence of a pair of minute appendages between the two larger pairs (Figs. 1I, 2E(st)), but it is not always present (Fig. 2B, C). This trait used to be described as having six appendages and has been recorded in *G. siamensis* (Hemsl.) Hemsl., *G. atosanguinea* Teijsm. & Binn., and *G. propinqua* Ridl. It is a constant character in *G. siamensis* but can be variable in *G. atosanguinea*. (Cao *et al.*, 2019).

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REFERENCES

- Gagnepain, M.F. (1901). Révision des genres *Mantisia* et *Globba* (Zingibéracées) de l'herbier du muséum. Bulletin de la Société Botanique de France 48: 201–216.
- _____. (1903). Zingibéracées nouvelles de l'herbier du muséum. Bulletin de la Société Botanique de France 49: 247–269.
- _____. (1907). Zingibéracées, Marantacées et Musacées nouvelles de l'herbier du Muséum (17o note). Bulletin de la Société Botanique de France 54: 111–115.
- _____. (1908) Zingibéracées. In: H. Lecomte (ed.) Flore générale de l'Indo-Chine, vol. 6. Masson & Co., Paris, pp. 25–121.
- IUCN Standards and Petitions Subcommittee (2022). Guidelines for Using the IUCN Red List Categories and Criteria, Version 15. Prepared by the Standards and Petitions Subcommittee. Available from: <https://www.iucnredlist.org/resources/redlistguidelines>.
- Mattapha, S., Lanorsavanh, S., Lamxay, V. & Chanthavongsa, K. (2021). Two new species of *Phanera* (Fabaceae: Cercidoideae) from Lao PDR. Kew Bulletin 76, 539–547.

- Newman, M., Ketphanh, S., Svengsuksa, B., Thomas, P., Sengdala, K., Lamxay, V. & Armstrong, K. (2007). A checklist of the vascular plants of Lao PDR. Royal Botanic Garden, Edinburgh.
- Sangvirotjanapat, S. & Newman, M.F. (2021). Eight new species of *Globba* (Zingiberaceae) from Thailand and Lao PDR. *Phytotaxa* 505(2): 139–156.
- _____. (2023). *Globba* L. In: K. Chayamarit & H. Balslev (eds), *Flora of Thailand* 16(2) Zingiberaceae: 516–575. The Forest Herbarium, Bangkok.
- Sangvirotjanapat, S., Denduangboriphant, J. & Newman, M.F. (2019a). A taxonomic revision of *Globba* subsect. *Nudae* (Zingiberaceae). *European Journal of Taxonomy* 503: 1–37.
- _____. (2019b). A taxonomic revision of *Globba* sect. *Nudae* subsect. *Mediocalcaratae* (Zingiberaceae). *Edinburgh Journal of Botany* 77(1): 1–63.
- Sangvirotjanapat, S., Trần, H.Đ. & Newman, M.F. (2020). Ten new species of *Globba* section *Globba* from continental South-East Asia. *Thai Forest Bulletin (Botany)* 48 (2): 212–233.
- Sangvirotjanapat, S., Fér, T., Denduangboripant, J., & Newman, M.F. (2022). Phylogeny of *Globba* section *Nudae* and taxonomic revision of the new *Globba* subsection *Pelecantherae*. *Plant Systematics and Evolution* 308: 5.
- Schumann, K. (1904). Zingiberaceae. In: H.G.A. Engler (ed.), *Das Pflanzenreich*, IV(46), fas.20, pp. 1–458. Leipzig: W. Engelmann.
- Souvannakhoummane, K., Lanorsavanh, S., Rakthai, P., Kumar, P. & Gale, S.W. (2021). *Cymbilabia sourioudongii* (Orchidaceae), a new species from Lao PDR. *Rheedea* 31 (3): 186–190.
- Tagane, S., Dang, V. S., Souladeth, P., Nagamasu, H., Toyama, H., Naiki, A., Tran, H., Yang, C.-J., Prajaksood, A. & Yahara, T. (2018). Five new species of *Syzygium* (Myrtaceae) from Indochina and Thailand. *Phytotaxa* 375: 247–260.
- Williams, K.J., Kress, W.J. & Manos, P.S. (2004). The phylogeny, evolution and classification of the genus *Globba* and tribe Globbeae (Zingiberaceae): appendages do matter. *American Journal of Botany* 91: 100–114.