



## *Zingiber longii* (Zingiberaceae), a new species from Southeast Yunnan, China

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**ABSTRACT:** *Zingiber longii* Y.H.Tan & H.B.Ding, sp. nov. (Zingiberaceae) from southeast Yunnan, China, is described and illustrated here. It belongs to the *Zingiber* sect. *Dymczewiczia* due to the terminal inflorescence on the leafy shoot. It is similar to *Z. rufopilosum* in its rufous pilose leaf sheaths and ligules but differs from it by emarginate labellum, glabrous margins of the laminae and ostiole (vs. distinctly bifid labellum with an incision about 1/3 of its length, margins of laminae pilose and ciliate ostiole).

**KEY WORDS:** *Dymczewiczia*, Malipo County, *Zingiber atroporphyreum*, *Zingiber cardiocheilum*, *Zingiber rufopilosum*.

### INTRODUCTION

*Zingiber* Miller (1754) is one of the largest genera of the ginger family (Zingiberaceae) with about 205 species (Ding *et al.*, 2020, 2021; Lý *et al.*, 2021; Jayakrishnan *et al.*, 2021), distributed throughout tropical and subtropical Asia (Wu and Larsen, 2000; Lý *et al.*, 2021; Ding *et al.*, 2021). The genus is traditionally divided into four sections based on the position of the inflorescence: sect. *Zingiber* having radical inflorescence with long erect peduncle, sect. *Dymczewiczia* (Horaninow, 1862) Bentham and Hooker (1883) having terminal inflorescence, sect. *Pleuranthesis* Bentham & Hooker (1883) having inflorescence emerging laterally through the leaf sheath and sect. *Cryptanthium* Horaninow (1862) having radical inflorescence with procumbent peduncle (Leong-Škorničková *et al.*, 2015, Jayakrishnan *et al.*, 2021). So far at least 15 terminally flowering species (sect. *Dymczewiczia*) were described, namely *Zingiber atroporphyreum* Škorničková & Q.B.Nguyễn (Leong-Škorničková *et al.*, 2015), *Z. brevifolium* N.E.Br. (Brown, 1886; Newman, 2015), *Z. calcicola* Y.H.Tan & H.B.Ding (Ding *et al.*, 2021), *Z. capitatum* Roxb. (Roxburgh, 1810; Tanaka and Aung, 2017), *Z. cardiocheilum* Škorničková & Q.B.Nguyễn (Leong-Škorničková *et al.*, 2015), *Z. castaneum* Škorničková & Q.B.Nguyễn (Leong-Škorničková *et al.*, 2015), *Z. flavofusiforme* M.M. Aung & Nob. Tanaka (Tanaka and Aung, 2017), *Z. gramineum* Noronha ex Blume (Blume, 1827; Newman, 2015), *Z. mellis* Škorničková, H.Đ.Trần & Šída f. (Leong-Škorničková *et al.*, 2015), *Z. molle* Ridl. (Ridley, 1909), *Z. nitens* M.F.Newman (Newman, 2015), *Z. plicatum* Gagnep. (Gagnepain, 1906), *Z. plicatum* Škorničková & Q.B.Nguyễn (Leong-Škorničková *et al.*, 2015), *Z. rufopilosum* Gagnep. (Gagnepain, 1903), *Z. sirindhorniae*

Triboun & Keeratikit (Triboun and Keeratikit, 2016), of which only *Z. calcicola* was recorded to occur in China.

During a botanical survey in Malipo County, Yunnan Province in 2022, an interesting unknown species of *Zingiber* was collected. After careful taxonomical studies of this plant, we described and illustrated it as a new species here. The new species belongs to the *Zingiber* sect. *Dymczewiczia* because the inflorescences are produced terminally on the leafy shoots. All descriptions are based on living material, and the terminology follows Beentje (2016).

### TAXONOMIC TREATMENT

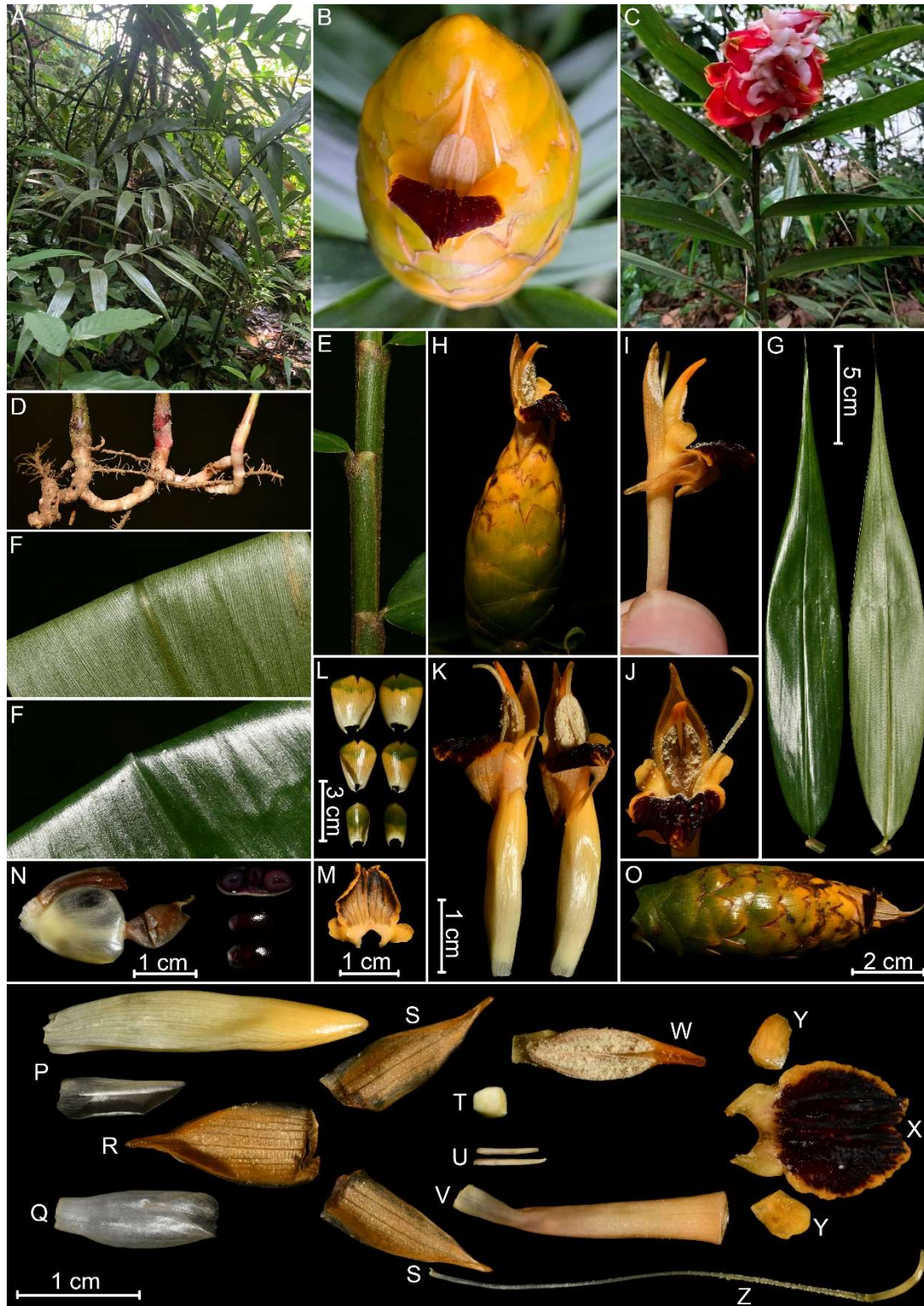
*Zingiber longii* Y.H.Tan & H.B.Ding, sp. nov.

龙氏姜 Fig. 1

**Type:** CHINA. Yunnan Province: Malipo County, Datangzi Village, 23°02'N, 104°43'E, elevation 989 m, 2 September 2022, H.B.Ding & M.F.Long D319 (holotype: HITBC![0080743], isotype: HITBC![0080744]).

**Diagnosis:** *Zingiber longii* is similar to *Z. rufopilosum* in having terminal inflorescences, rufous pilose leaf sheaths and ligules but differs from it in lamina having caudate apex extending to 5 cm, broadly ovate labellum having an emarginate apex, glabrous margins of the laminae and ostiole (vs. lamina having an acuminate apex, oblong labellum having distinctly bifid apex with an incision about 1/3 of its length, margins of laminae pilose and ciliate ostiole).

**Description:** Perennial rhizomatous herbs, 100–150 cm tall, forming a loose clump. **Rhizome** to 1 cm in diam., branched, 3–7 cm between leafy shoots. **Leafy shoot** slender, with 18–25 leaves, basal part of pseudostem 1/3–1/2 leafless; bladeless sheaths 3, reddish green with a faint dark red tinge to towards base, rufous pilose; leaf sheaths



**Fig. 1.** *Zingiber longii* Y.H. Tan & H.B. Ding, *sp. nov.* **A.** Habit; **B.** Inflorescence (top view); **C.** Inflorescence; **D.** Rhizomes; **E.** Leaf sheath and ligules; **F.** Surfaces of a leaf blade (adaxial (down) and abaxial (up) views); **G.** Leaf blade with scales, adaxial (left) and abaxial (right) views; **H.** Inflorescence with one flower (side view); **I.** Flower (side view); **J.** Flower (front view); **K.** Flowers with scale; **L.** Sterile bracts; **M.** Labellum with lateral staminodes (back view); **N.** Immature fruit, the cross-section of fruit and seeds with aril; **O.** Inflorescence with scale; **P.** Bract and bracteole; **Q.** Calyx; **R.** Dorsal corolla lobe; **S.** Lateral corolla lobes; **T.** Ovary; **U.** Epigynous glands; **V.** Floral tube; **W.** Stamen; **X.** Labellum; **Y.** Lateral staminodes; **Z.** Style. Photographed by Ming-Feng Long (**A–C**); Photographed by Hong-Bo Ding (**D–Z**).

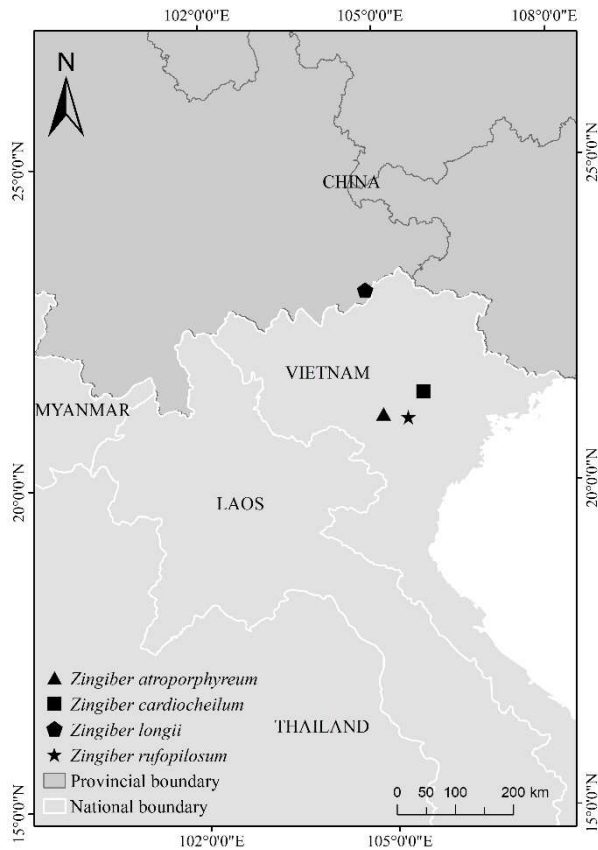


Fig. 2. Distribution map of *Zingiber longii*, *Z. rufopilosum*, *Z. atroporphyreum* and *Z. cardiocheilum*.

green, pilose. **Ligule** 1.5–2 mm long, rufous pilose, apex emarginate; **petiole** absent; **lamina** narrowly ovate, 15–30 × 2.5–4 cm, gradually slightly acute to caudate apex extending to 5 cm, base obtuse, adaxially dark glossy green and smooth (no prominent plication), abaxially lighter green, glabrous both sides. **Inflorescence** terminal on leafy shoots, peduncle sessile, spike ovoid to narrowly ovoid, 6–8 cm long, 2–3 cm broad, consisting of 25–50 bracts; lowermost ca. 15 bracts, sterile, up to 2.5 × 2.5 cm, greenish yellow with brownish yellow tinge to towards base, broadly ovate, glabrous, apex emarginate to shallowly bilobed; enclosing 2 flowers at the other upper bracts, up to 3 × 2.5 cm (gradually smaller towards the apical part of inflorescence), brownish yellow, broadly ovate, glabrous, apex shallowly bilobed to obtuse; **bracteole** lanceolate, 7–11 mm long, involute, 4–5 mm wide when flattened, translucent cream-white, glabrous, apex acute to obtuse. **Flower** 4–4.5 cm long, much exerted beyond the bracts; **calyx** tubular, 1.2–1.4 cm long, ca. 3 mm in diam. at base; slightly swollen in the middle, 4–5 mm in diam., semi-translucent cream-white, glabrous, with a unilateral incision, up to 6 mm deep, apex truncate with two inconspicuous teeth; **floral tube** 2.2–2.5 cm long, widening gradually towards apex, cream-white and glabrous at the base, brownish yellow

and glabrous towards the apical part; **dorsal corolla lobe** ovate-triangular, 15–18 × 6–8 mm, brownish yellow with semi-translucent veins, glabrous, apex acute, mucronate, mucro ca. 2 mm long; **lateral corolla lobes** ovate triangular, 13–15 × 4–5 mm, brownish yellow with semi-translucent veins, glabrous, apex acute; **labellum** broadly ovate, 11–13 mm long, 10–13 mm broad, adaxially dark maroon with brownish yellow in margins, abaxially brownish yellow; glabrous, margins of the labellum slightly deflexed, apex emarginate, ca. 1.5 mm deep; **lateral staminodes** ovate to oblong, 4–6 × 3–3.5 mm, almost free from the labellum, brownish yellow, glabrous, apex obtuse. **Stamen** 1.5–1.8 cm long with anther crest stretched, **filament** 3–4 mm long, brownish yellow, **anther** ca. 10 mm long (excluding anther crest) by ca. 4 mm broad, connective tissue brownish yellow, glabrous, anther crest beak-shaped, ca. 5 mm long when stretches, brownish yellow. **Style** filiform, ca. 4.3 cm long, cream-white at the base, brownish yellow and thicken towards the apex, glabrous; **stigma** extending to the tip of anther crest, funnel-shaped, brownish yellow, ostiole front-facing, glabrous. **Ovary** cylindrical, slightly swollen in the middle, trilocular, 2.5–3 × 2.5–3 mm, yellowish cream, glabrous; epigynous glands two, linear, 5–7 mm long, yellowish cream. **Fruit** ovoid to obovoid, 1.4–1.6 × 1–1.3 cm, with persistent calyx, pericarp semi-translucent, yellowish cream. **Seeds** ellipsoid, ca. 7 × 3 mm, black, enveloped by the aril. **Aril** white, deep denticulate at apex, enveloping 1/3 of the length of the seeds. Bracts turning red when fruit matured and splits.

**Phenology:** Flowering from August to September, fruiting from October to November.

**Distribution and Habitat:** *Zingiber longii* is known only from its type locality, Malipo County, Yunnan, China (Fig. 2). It grows along a stream in the forest.

**Etymology:** The new species is named after Mr. Ming-Feng Long, who discovered this species. The Chinese name is given as “龙氏姜”.

**Conservation Status:** Due to insufficient field surveys, we have not gotten a clear picture of its natural distribution and population status, making no adequate information to assess its risk of extinction directly or indirectly. Hence, we temporarily list the species as Data Deficient (DD) according to the IUCN Red List Categories (IUCN, 2019). Further field surveys in southeast Yunnan of China may provide more information on its abundance and distribution.

**Additional specimens examined (paratypes):** CHINA. Yunnan Province: Malipo County, Datangzi Village, 23°02' N, 104°43' E, elevation 989 m, 20 October 2022, H.B. Ding & M.F. Long D417 (HITBC); Same locality as holotype, 23°02' N, 104°43' E, elevation 989 m, 30 December 2022, H.B. Ding & M.F. Long D457 (HITBC).

**Notes:** *Zingiber longii* belongs to *Z.* section *Dymczewiczia* due to the terminal inflorescence on the leafy shoot. It is also similar to *Z. atroporphyreum* Škorničk. & Q.B.Nguyễn in Leong-Škorničková *et al.* (2015) and *Z. cardiocheilum* Škorničk. & Q.B.Nguyễn in

**Table 1.** Morphological comparison of *Zingiber longii*, *Z. rufopilosum*, *Z. atroporphyreum* and *Z. cardiocheilum*.

Characters	<i>Z. longii</i>	<i>Z. rufopilosum</i> <sup>1</sup>	<i>Z. atroporphyreum</i> <sup>2</sup>	<i>Z. cardiocheilum</i> <sup>3</sup>
Leaf sheaths	distinctly pilose 1.5–2 mm long	densely pilose 2 mm long	mostly glabrous 3–5 mm long	glabrous 3–5 mm long
Ligule	apex emarginate prominent pilose	truncate densely pilose	shallowly bilobed sparsely pubescent	shallowly bilobed glabrous
Margins of the laminae	glabrous	pilose	glabrous	glabrous
Inflorescence	ovoid	fusiform	ovoid	fusiform
Colour of bract	brownish yellow	unknown	glossy green	glossy green
Length of bracteole	7–11 mm	ca. 20 mm	ca. 18 mm	4–10 mm
Sterile bracts	15	unknown	5	5
Flowers per bract	2	unknown	3	2
Colour of corolla lobe	brownish yellow	unknown	pale yellow	light yellow
Labellum	emarginate, almost free from the labellum, brownish yellow	distinctly bifid labellum with incision about 1/3 of its length	connate to the labellum by basal 2/3, yellow	entire, connate to the labellum by basal 1/2, yellow or with red patch
Lateral staminode	significant 4–6 × 3–3.5 mm	significant unknown	insignificant ca. 4 × 2 mm	insignificant 1.5–3 × 1.5 mm
Stamen	15–18 mm long	unknown	12–13 mm long	12 mm long
Filament	3–4 mm long, brownish yellow	unknown	2 mm long, cream-white	2–3 mm long, light yellow
Connective tissue	brownish yellow	unknown	cream-white	light yellow
Ostiole	glabrous	ciliate	glabrous	glabrous
Ovary	yellowish cream	unknown	white	white
Epigynous glands	yellowish cream	unknown	cream-white	ochraceous

**Notes:** <sup>1</sup> Data from specimens (P00289180, P00289181, P00451012, P00451013) and Gagnepain (1903); <sup>2</sup> and <sup>3</sup> data from specimens (P00781752, E01059007, E01059015) and Leong-Škorničková *et al.* (2015).

Leong-Škorničková *et al.* (2015) from Vietnam (Fig. 2) in having terminal inflorescence and similar lamina, but it differs from *Z. atroporphyreum* in its rufous pilose leaf sheaths and ligules (vs. glabrous leaf sheaths and sparsely pubescent ligules), enclosing 2 flowers per bract (vs. 3 flowers per bract), larger lateral staminodes (4–6 × 3–3.5 mm vs. 4 × 2 mm), shorter bracteoles (7–11 mm long vs. 18 mm long), and brownish yellow bracts and corolla lobes (vs. green bracts and semi-translucent pale yellow corolla lobes). It differs from *Z. cardiocheilum* in its pilose leaf sheaths and ligules (vs. glabrous), brownish yellow bracts (vs. green), longer anther crest (5 mm long vs. 1.5–2 mm long), emarginate labellum (vs. entire). The comparison of the above four species is provided in Table 1.

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## LITERATURE CITED

- Beentje, H.** 2016 The Kew Plant Glossary, an illustrated dictionary of plant terms (second edition). Royal Botanic Gardens Kew: Kew Publishing, pp. 1–184.
- Bentham, G., Hooker, J.D.** 1883 Genera Plantarum: ad exemplaria imprimis in Herbariis Kewensibus servata definita Vol:3(2). L. Reeve & Co. & Williams & Norgate, London, pp. 1–811.
- Blume, C.L.** 1827 Enumeratio plantarum Javae et insularum adjacentium: minus cognitarum vel novarum ex herbariis Reinwardtii, Kuhlilii, Hasseltii et Blumii curavit Carol. Ludov. Blume. Lugduni Batavorum, Apud J.W. van Leeuwen, pp. 1–274.
- Brown, N.E.** 1886 New garden plants. Gard. Chron. **26**: 390.
- Ding, H.B., Quan, D.L., Zeng, X.D., Li, J.W., Tan, Y.H.** 2021 *Zingiber calcicola* (Zingiberaceae), a new species from a limestone area in south Yunnan, China. Phytotaxa **525**(1): 65–69.
- Ding, H.B., Yang, B., Lu, X.Q., Tan, Y.H.** 2020 *Zingiber porphyrochilum* (Zingiberaceae), a new species from Yunnan, China. Ann. Bot. Fenn. **57**(4–6): 197–201.
- Gagnepain, F.** 1903 Zingiberacées nouvelles de l'herbier du muséum (1). Bull. Soc. Bot. France **49**(5): 247–269.
- Gagnepain, F.** 1906 Zingiberacées nouvelles de l'herbier du muséum. Bull. Soc. Bot. France **53**(2): 132–150.
- Horaninow, P.** 1862 Prodrum monographiae Scitaminearum. Academia Caesarea Scientiarum, St. Petersburg, pp. 1–45.
- IUCN Standards and Petitions Committee** 2019 Guidelines for Using the IUCN Red List Categories and Criteria. Version **14**. Prepared by the Standards and Petitions



- Committee. Downloadable from [http://www.iucnredlist.org/documents/RedListGuidelines.pdf]
- Jayakrishnan, T., Joe, A., Hareesh, V.S., Sabu, M.** 2021 Two new *Zingiber* (Zingiberaceae) species from Arunachal Pradesh, Northeastern India. *Taiwania* **66(1)**: 101–112.
- Leong-Škorničková, J., Binh, N.Q., Dang, T.H., Šída, O., Rybková, R., Vuong, T.B.** 2015 Nine new *Zingiber* species (Zingiberaceae) from Vietnam. *Phytotaxa* **219(3)**: 201–220.
- Lý, N.S., Đỗ, Đ.G., Cao, N.G., Trương, B.V., Nguyễn, V.T., Leong-Škorničková, J.** 2021 *Zingiber magang* and *Z. tamii* (Zingiberaceae), two new species from central Vietnam. *Taiwania* **66(2)**: 232–240.
- Miller, P.** 1754 The Gardeners Dictionary, ed. 4. **Vol. 3**. Printed for the author, London, pp. 1–529.
- Newman, M.F.** 2015 A new species of *Zingiber* (Zingiberaceae) from Lao P.D.R. *Gard. Bull. Singapore* **67(1)**: 123–127.
- Ridley, H.N.** 1909 The Scitamineae of the Philippine islands. *Philipp J. Sci.* **4**: 155–197.
- Roxburgh, W.** 1810 Description of several of the Monandrous Plants of India, belonging to the natural order called Scitamineae by Linnaeus, Cannae by Jussieu, and Drimyrhizea by Ventenat. *Asiatic Researches* **11**: 318–362.
- Tanaka, N. and Aung, M.M.** 2017 A new species of *Zingiber* (Sect. *Dymczewiczia*: Zingiberaceae) from northwestern Myanmar. *Phytotaxa* **316(2)**: 195–199.
- Triboun, P. and Keeratikiet, K.** 2016 *Zingiber sirindhorniae*, a remarkable new species in *Zingiber* section *Dymczewiczia* (Zingiberaceae) from Thailand. *The Thailand Natural History Museum Journal* **10(1)**: 1–6.
- Wu, T.L., Larsen, K.** 2000 Zingiberaceae. In: Wu, Z.Y. and Raven, P.H. (eds) *Flora of China*, **Vol. 24**. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis, pp. 333–346.