Two Gingers, *Zingiber orbiculatum* and *Z. flavomaculosum* (Zingiberaceae), Newly Recorded from Myanmar

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Abstract In the course of taxonomic studies of Zingiberaceae in Myanmar, field expeditions to Shan State and Mandalay Region revealed that *Zingiber orbiculatum* S.Q.Tong, and *Z. flavomaculosum* S.Q.Tong were present. These represent first records of these species for the flora of Myanmar. Detailed descriptions and photographs of these two species are provided.

Key words: Myanmar, new record, *Zingiber orbiculatum* S.Q.Tong, *Zingiber flavomaculosum* S.Q.Tong, Zingiberaceae.

Introduction

The Zingiberaceae are the largest family in the order Zingiberales with 53 genera and over 1200 species (Kress et al., 2002). The genus *Zingiber* is distinct from other genera of the family by the presence of a single anther with a beak or horn-like appendage which embraces the upper part of the style (Sabu, 2003), it is represented by 141 species, distributed throughout S and SE Asia to China and Japan and to northern Australia with its center of diversity in monsoon continental Asia (Larsen, 2005). Thus far 19 species of *Zingiber* have been recorded from Myanmar (Kress et al., 2003, Tanaka, 2012a, 2012b), however, still relatively few collections have made from the region. Therefore it is considered that there may be many more taxa to be recorded.

To clarify the species diversity of *Zingiber* in Myanmar, field explorations were conducted in Chin, Kachin, Kayah, Mandalay, Sagaing, Shan and Yangon Regions. Of these, the excursions to Mt. Popa, Mandalay Region and eastern part of Shan State led us to collect two species of the genus *Zingiber*, which did not match any descriptions of taxa thus far recorded from Myanmar. As the result, two gingers that had not recorded from the country were discovered and reported here with their descriptions, and their photographs are additionally provided for identification.

Materials and Methods

Field excursions were carried out in Mandalay Region and Shan State to collect the zingiberaceous plants, and herbarium specimens were made in the field. Besides the herbarium specimens, the living materials were planted in the nursery of the Forest Research Institute (FRI), Forest Department of Myanmar and morphologi-
Results and Discussion

As results of the identifications, it was concluded that these taxa were *Z. orbiculatum* S.Q.Tong and *Z. flavomaculosum* S.Q.Tong; both of which were described from Yunnan, S. China. They are recorded from Myanmar for the first time. Both species belong to sect. *Cryptanthium* Horan. having the radical inflorescences borne on procumbent peduncles. The taxonomic treatment with detailed descriptions based on our materials and Tong (1987) and taxonomic discussion for each species is provided as follows.

**Zingiber orbiculatum** S.Q.Tong in S.Q.Tong & Y.M.Xia, Acta Phytotax. Sin. 25: 463. 1987; Wu, T. L. and K. Larsen in Fl. of China 24: 329. 2000. Type: China, South Yunnan, in forest; Mengla Xian, alt. 620 m. in forest, 20 July 1981, *S. Q. Tong 24804* (Holotype, HITBC). [Fig. 1. A–C]

**Plant** rhizomatous, 1.5–2 m in height. **Rhizomes** whitish brown externally, creamy white internally, aromatic. **Leafy stems** glabrous, red-dish green covered with white. **Leaves** 7–10 pairs, sessile; leaf blade lanceolate, 45–60 × 7–9 cm, glabrous, mid-vein basally enlarged and densely red dotted on both sides, base cuneate, pulvinus, thick, red, apex acuminate; ligule green–white, 1.3–1.5 cm long, glabrous, apex subtruncate. **Inflorescences** arising from rhizomes, ovoid or capitate, 8–10 cm long, 3.5–5 cm wide; peduncle 2.2–3.0 cm long. **Bracts** ovate or broadly ovate, 3–5 cm long, 2–2.5 cm wide, dark red, apex acute or shortly acuminate. **Bracteoles** linear lanceolate, pale proximally, red distally, tubular, ca. 4 cm long and ca. 8 cm wide, white pubescent. **Flowers** white, blooming in the morning; calyx tubular ca. 3 cm long, white, membranous, puberulent except densely pubescent at base, apex 3-toothed; corolla tube 3.4–3.6 cm long; corolla lobes 3, creamy white; dorsal lobe creamy white with red apex, oblanceolate, 3–3.3 cm long, ca. 1 cm wide, lateral lobes ca. 2.2 cm long, ca. 7 mm wide; **labellum** trilobed, white, orbicular; mid-lobe semi-orbicular, margin entire, apex slightly trilobed, emarginate, ca. 2.5 cm long, ca. 1.2 cm wide; lateral lobes auriculate, ca. 1.7 cm long, ca. 7 mm wide. **Stamen** ca. 2.2 cm long; filament sessile; anther yellow, thecae parallel, ca. 1.3 cm long, connective appendage ca. 1 cm long, recurved. **Ovary** pale yellow, sub-ellipsoid, densely pubescent, trilocular with many ovules, placenta axe; epigynous glands linear, two, ca. 7 mm long, white. **Capsule** dark red with brown basally, oblong, 4–5 cm long, 2–2.5 cm wide, triangular. **Seeds** black, obovoid.

Specimen examined. MYANMAR, Shan State, Kyaingtong Township, 21° 27′40.5″N 99° 55′6.5″E, 868 m alt., 28 June 2014, Mu Mu Aung 027 (RAF, TNS).

**Distribution:** Myanmar (E. Shan), China (S. Yunnan) and Thailand.

**Habitat and Ecology:** Growing at the forest edge under the shade in semi-evergreen forest, ca. 865 m alt. Flowering in June–July, one to three flowers open in the morning simultaneously per inflorescence.

**Notes:** *Zingiber orbiculatum* is characterized by reddish green and waxy white leafy stem, glabrous leaves, basally enlarged mid-vein with densely red dots, white orbicular labellum. It has been reported only from the altitude 600 m above sea level, Yunnan, southern China (Tong and Xia, 1987; Wu and Larsen, 2000), however, it was recently recorded from Thailand (Triboun, 2006; Triboun *et al.*, 2014). This is the first record of this species from Myanmar (Fig. 2).

in the forest, 6 Aug 1981, S. Q. Tong 24806 (Holotype, HITBC). [Fig. 1-D]

**Plant** rhizomatous, 1–1.5 m in height. **Rhizomes** whitish brown externally, creamy white internally, aromatic. **Leafy stems** slightly hairy, reddish brown basally. **Leaves** 3–17 pairs, subsessile; petioles 1.5–2 cm long, leaf blade lanceolate, 20–35 cm long, 4–7 cm wide, adaxially glabrous, abaxially appressed pilosulose, ciliate, base attenuate, apex acute thinly acuminate; ligule membranous, 4 cm long, 2 cm wide, apex subtruncate, sheath abaxially pubescent. **Inflorescences** arising from rhizomes, 8–9 cm long, 4 cm wide, ovate-oblong, apex obtuse. **Bracts** densely imbricate, widely oblong, 3–5 cm long, 1.5–2 cm wide, red, coriaceous, apex convex, acute, pubescent with brown hairs. **Bracteoles** pale red, ca. 3 cm, white puberulent. **Flowers** red; calyx tubular ca. 2 cm long, white, membranous, puberulent except densely pubescent at base, apex 3-toothed; corolla tube red, ca. 3 cm long, yellowish white; corolla lobes 3, red, white hairy abaxially, dorsal lobe lanceolate, ca. 3 cm long, 1.5 cm wide, white hairy abaxially, lateral lobes ca. 2.5 cm long, 1 cm wide; **labellum** trilobed, dark red, yellow spotted; central lobe ligule-like, ca. 2 cm long, 1 cm wide, apex almost emarginate, slightly notched, margin entire; lateral lobes auriculate, ca. 1.5 cm long, 8 mm wide. **Stamen** ca. 3 cm; filament sessile; anther pale yellow, ca. 1.5 cm; anther crest ca. 1.5 cm, cylindrical, recurved. **Ovary** white, subellipsoid, densely pubescent, trilocular with many ovules, placentation axile; style long,
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filiform; stigma white, ciliate; epigynous glands linear, two, ca. 7 mm long, light yellow.

Specimen examined. MYANMAR, Mandalay Region, Along the trail to Mt. Popa peak, Popa Mountain Park, Kyaukpadaung Township, June 2000, N. Tanaka et al. 093 (TNS-spirit).

Distribution: Myanmar (Central), China (S. Yunnan) and Thailand.

Habitat and Ecology: Evergreen forest, wet place, ca. 800 m alt.

Notes: Zingiber flavomaculosum S.Q.Tong was described from Xishuangbanna, South Yunnan, China. Recently Triboun et al. (2014) recognized 56 species of the genus Zingiber in Thailand and Z. flavomaculosum was included therein. This is the first record from Myanmar (Fig. 3), and thus far this is the western limit of the distribution of this species. In the figure of the original protologue by Tong (1987), labellum is somewhat truncate at apex, however, in the plant from Mt. Popa it is slightly notched at apex. This species could be also morphologically related to Z. fragile S.Q.Tong known from Yunnan. Further detail comparison between the Yunnan related taxa and Myanmar ones are required to clarify its rigorous entity and the range of its morphological variations. The gap of the distribution (Fig. 3) might be bridged by further field studies in Myanmar.

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Fig. 3. Distribution map of Zingiber flavomaculosum S.Q.Tong. Solid circle indicates the new habitat in Myanmar, and open circles indicate the previous range of distribution based on Tong (1987) and Triboun (2006).
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