Note

Stemodia L. (Scrophulariaceae), a Newly Naturalized Genus in Taiwan

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Abstract: *Stemodia verticillata* (Mill.) Hassl. (Scrophulariaceae) was found in the lowlands of northern Taiwan. This represents a new naturalization not only for this species but also for the genus on this island. A taxonomic account of *S. verticillata* is treated in this study. A line-drawing, distribution map and photographs of this species are also provided to aid in identification.

Key words: Newly naturalized plant, Scrophulariaceae, *Stemodia verticillata*, Taiwan.

INTRODUCTION

Seven newly recorded genera, namely *Ensete* (Chen et al., 2007), *Flaveria* (Tseng et al., 2009), *Melampyrum* (Chen and Wang, 2009), *Oldenlandiopsis* (Jung et al., in press), *Pseudoconyza* (Jung et al., 2009), *Rivina* (Tseng et al., 2008), *Spartina* (Scholz et al., 2009), have been reported for the flora of Taiwan since 2007. In our recent botanical surveys, we found a hydrotrophic weed: *Stemodia verticillata* (Mill.) Hassl. at a riverbank, a paddy and an urban park in northern Taiwan. *Stemodia* L. comprises 56 species widely distributed in tropical America, Asia, and Africa (Sutton and Hampshire, 2001; Fischer, 2004; USDA, NRCS. 2004, Rahmanzadeh et al., 2005). The genus was traditionally belonged to Scrophulariaceae *s.l.* However, based on recent molecular systematic researches, this genus together with other genera, i.e. *Bacopa*, *Deinostema*, *Digitaris*, *Dopatrium*, *Ellisiophyllum*, *Hemiphragma*, *Limnophila*, *Mecardonia*, *Microcarpaea*, *Scoparia*, *Veronica* and *Veronicastrum* were suggested to be transferred into Plantaginaceae *s.l.* (APG II, 2003; Oxelman et al., 2005; Tank et al., 2009) or partly into Gratiolaceae (Rahmanzadeh et al., 2005). However, circumscriptions about these families are usually tentative because they are difficult to be diagnosed and differentiated morphologically (Simpson, 2006). Following the concepts of Liu (1998), Sutton and Hampshire (2001), Fischer (2004), and Chen and Wang (2009), we tentatively placed this genus in Scrophulariaceae. Herein we describe this newly naturalized genus and species for the flora of Taiwan and provide color photos and a line-drawing to aid in identification.

TAXONOMIC TREATMENT

1. ***Stemodia verticillata*** (Mill.) Hassl., Trab. Mus. Farmacol. 21: 110. 1909. Sutton and Hampshire in Hollowell et al., Fl. Nicaragua 85: 2367. 2001.—*Erinus verticillatus* Mill., Gard. Dict., ed. 8, no. 5. 1768. 輪葉孿生花 (新擬中名) Figs. 1, 2

Perennial herbs, decumbent to prostrate, 4.5-12 cm tall, glandular hairy. Phyllotaxis opposite or 3-leaves whorled; petiole 3-13 mm long, winged; blade ovate, base cuneate, margin crenate to double crenate, slightly reflexed, apex acute, strigose and glandular on both surfaces, 6-15 mm long, 3-12 mm wide. Flowers solitary, 2-3-flowered per node, axillary, pedicel 1-2.5 mm long; calyx deeply 5-lobed, lobes linear to lanceolate, apex acute, 3-4.5 mm long, persistent; corolla 5-7 mm long, bilabiate, violet with dark purplish nerves, sparsely hairy outside; upper lip slightly 2-lobed, lobes broadly ovate; lower lip 3-lobed, lobes ovate to broadly ovate, lower side of corolla tube pubescent inside; stamens 4, didynamous, inserted on 2/3 deep of corolla tube, anther with 2 thecae, thecae separate; fertile stamens 2, filament ca. 1.5 mm long, anther ca. 0.3 mm long; staminodes 2, longer than fertile stamens, filament ca. 2 mm long, anther ca. 0.2 mm long, shorter than fertile ones; pistil 1, ovary ellipsoid, slightly compressed, ca. 1.2 mm long, glabrous, with axile placentation, style 1.5-2 mm long, glabrous, persistent, stigma bilabiate. Capsule subglobose to ovoid, slightly compressed, brownish when mature, to 2.5 mm long, 2.5 mm wide, loculicidal and septicidal dehiscence. Seeds many, ellipsoid, gray, round on both apex, 8-rugose.

Specimens examined: Taiwan. Taipei City, Wenshan District, Wanlong, 14 Mar 2010, *M.-J. Jung 4889* (TNU). New Taipei City, Bali District, Bali, 23 Jun 2009, *Y.-S. Liang s. n.* (TNU); same loc., 10 Feb 2010, *M.-J. Jung 4818* (TNU); Sanchi District, Sanchi, 6 Jun 2008, *Y.-C. Kao s. n.* (TAIF); same loc., 15 Jan 2010, *M.-J. Jung 4708* (TNU).

Distribution and notes: Vernacular name of

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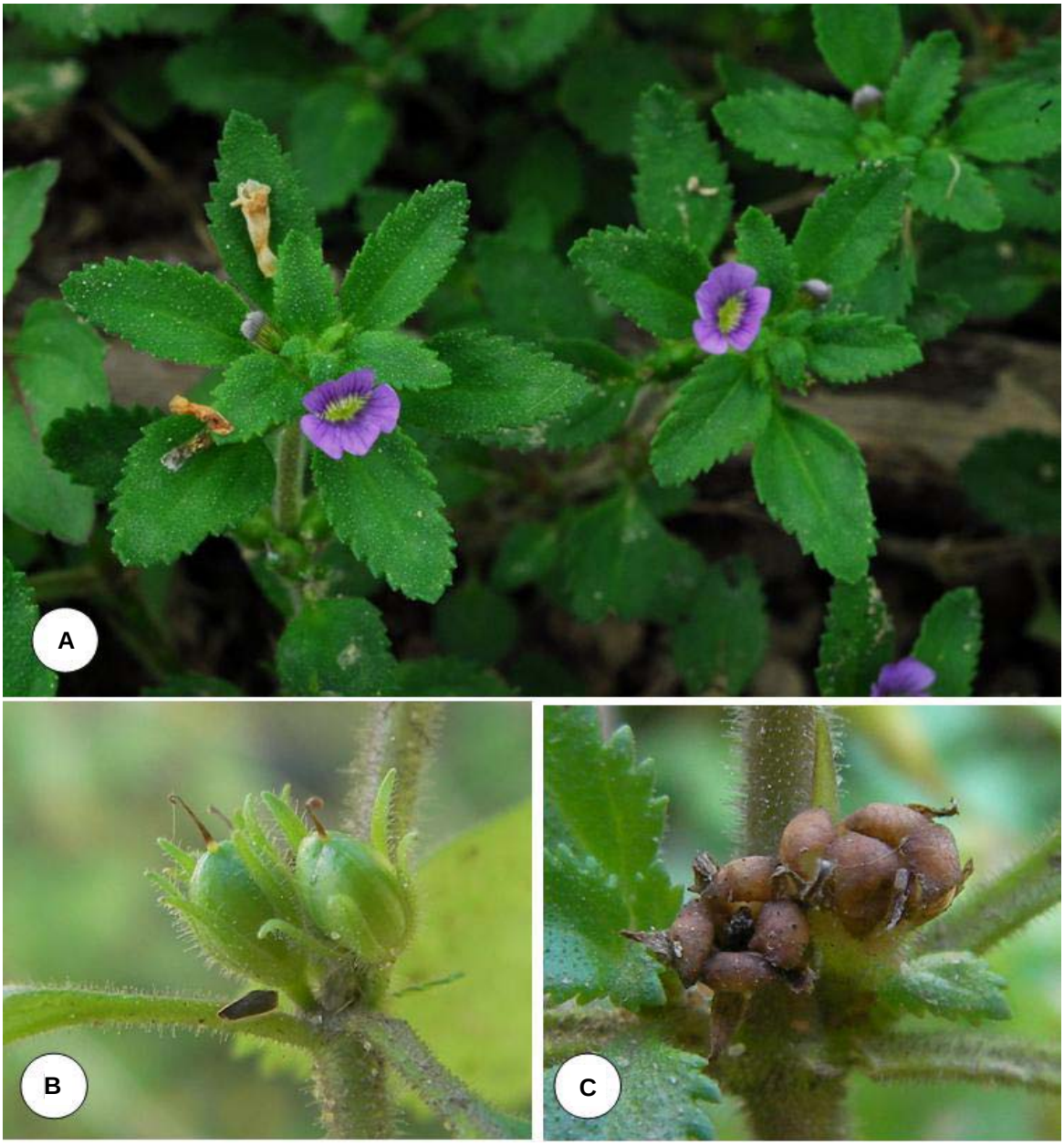


Fig. 1. *Stemodia verticillata* (Mill.) Hassl. A: Habit. B: Immature capsules. C: Dehisced capsules with persistent calyx.

Stemodia verticillata is "whorled twintip". *Stemodia verticillata* is native to Mexico, northern S America, and the Caribbean (Sutton and Hampshire. 2001; USDA, NRCS., 2004). Recently, this species was found from at least three locations in the lowlands of northern Taiwan (Fig. 3). A two-year monitor at Bali and Sanchi by us also revealed the stable maintenance of population in both sites. It suggests that this alien plant has naturalized and established its colony in Taiwan. Moreover, in Sanchi District, this alien weed grows in a paddy with *Alisma canaliculatum* (Alismataceae), a rare and endangered plant in Taiwan. The competition of this naturalized species with the sympatric endangered native species is worthy to be observed.

In outline, *S. verticillata* is similar to *Limnophila* spp. in Taiwan, but differs in flowers and fruits. *Stemodia verticillata* has a deeply 5-lobed calyx while that of Taiwanese *Limnophila* spp. is lobed. Anther thecae of the former are separate, but connected in the

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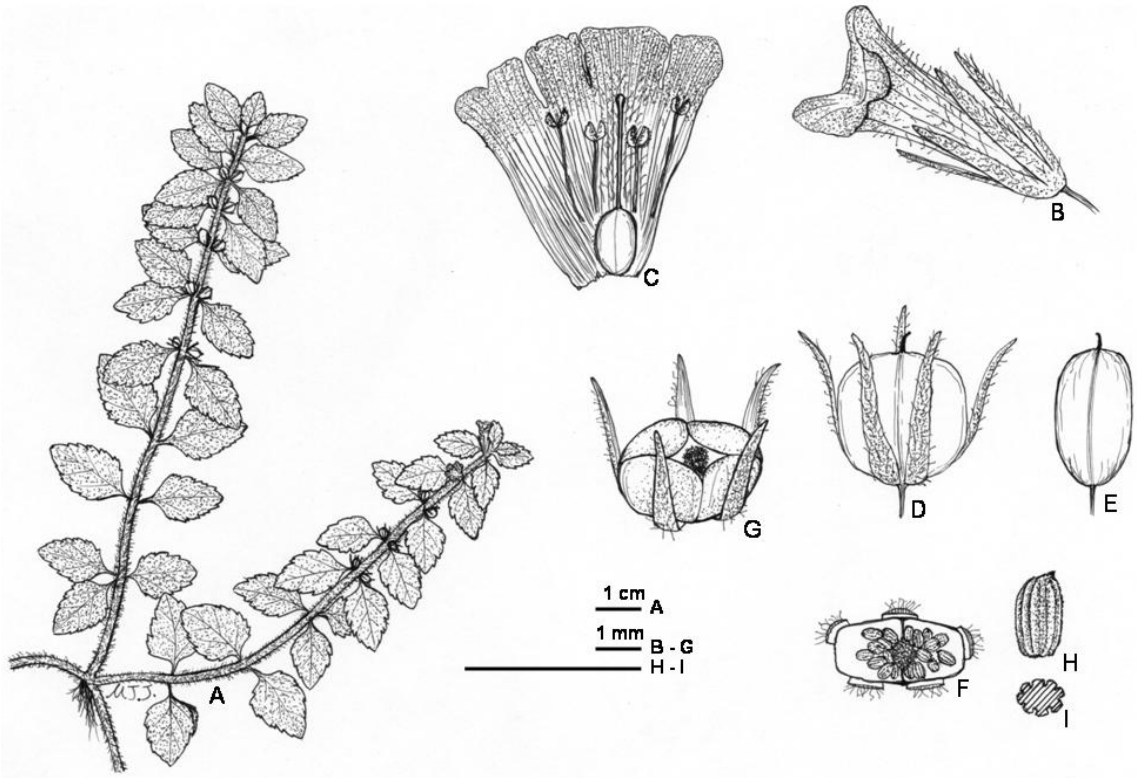


Fig. 2. *Stemodia verticillata* (Mill.) Hassl. A: Habit. B: Flower, lateral view. C: Dissected corolla, showing 2 fertile stamens, 2 staminodes, and pistil. D & E: Capsules, E: Lateral view with calyx removed. F: Cross-section of capsule, showing the axile placentation. G: Dehisced capsule with persistent calyx. H: Seed. I: Cross-section of seed.

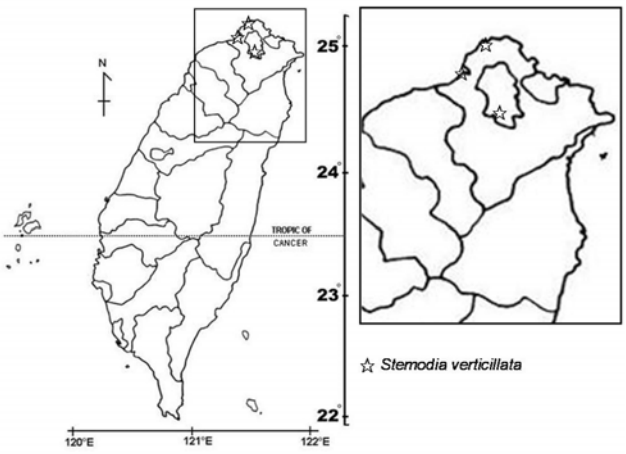


Fig. 3. Distribution map of *Stemodia verticillata* in Taiwan.

later (Fischer, 2004). Capsules of all members of *Stemodia* are loculicidal and septicidal dehisced, but those of *Limnophila* are loculicidal dehisced (Fischer, 2004).

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孿生花屬(*Stemodia* L.)：臺灣玄參科新歸化屬

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摘要：本文報導一新近發現於臺灣北部平地的玄參科新歸化屬植物：輪葉孿生花(新擬中名，*Stemodia verticillata* (Mill.) Hassl.)，本文描述此一新歸化植物，並提供線描圖、分布圖及照片以利鑑定。

關鍵詞：新歸化植物、玄參科、輪葉孿生花、臺灣。

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