

Research paper

Begonia hirtella Link (Begoniaceae: sect. *Ephemer*a), a newly naturalized species of Taiwan

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【**Abstract**】 We report a newly naturalized *Begonia hirtella* Link of Taiwan in this article. This species was a famous ornamental plant that had been introduced to many countries and naturalized in India, Hawaii and United States. In Taiwan, *B. hirtella* was found in the wild at low altitudes of central and northern parts of the island, on the roadsides or in the greenhouses. This species would becoming a high potential invasive species due to its well regeneration ability in the wild, and the possibility of hybriding with native species. The morphological comparison of *B. hirtella* with *B. cucullata* was also provided in this article for identification.

【**Key words**】 *Begonia*; sect. *Ephemer*a; naturalized plant; Taiwan.

研究報告

巴西秋海棠 (秋海棠科短生組)，臺灣新歸化種

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【**摘要**】本研究報導臺灣的一新歸化種－巴西秋海棠。本種經常作為觀賞植物栽培，由於其種子細小，因此容易逸出，加上良好的適應能力，使其於印度、夏威夷及北美洲都有歸化紀錄。本種能夠產生大量的子代，在野外的更新良好，目前已於臺灣北部及中部發現歸化族群，多生長於路旁或為溫室內的雜草。此外，筆者更發現本種與臺灣原生的秋海棠共域生長，未來有可能形成兩者的天然雜交後代。因此本種於野外的生長狀況，實有必要加以監控並移除。文中並比較本種與另一同組且已作為園藝作物引進的近似種四季秋海棠的形態差異，提供鑑定之需求。

【**關鍵詞**】秋海棠屬、短生組、歸化植物、臺灣。

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Introduction

The genus *Begonia* L. is one of the largest genera among the flowering plants of the world (Frodin 2004), the number of accepted species is over 1850, and more than 300 of them were described in recent ten years (Moonlight et al. 2018). Therefore, *Begonia* is the fastest growing genus among the flowering plants (Moonlight et al. 2018). It is not surprisingly, *Begonia* had wide morphological variation from herbs to vines, and distributed world-widely from tropical to tempered regions (Doorenbos et al. 1998; de Wilde 2011).

In Taiwan, a total of 12 taxa had been recorded in the second edition of Flora of Taiwan (Chen 1993). After then, the subsequent studies revealed the highly diversity of *Begonia* of Taiwan. Peng et al. (2005) described five new species, viz. *B. bouffordii* C. I Peng, *B. chuyunshanensis* C. I Peng & Y. K. Chen, *B. pinglinensis* C. I Peng, *B. tengchiana* C. I Peng & Y. K. Chen, and *B. wutaiana* C. I Peng & Y. K. Chen. The distribution of these new species is often restricted in a narrow area. Besides, some natural hybrids could be found in the overlapping habitats of two species. Two natural hybrids had been described are *B. ×chungii* C. I Peng & S. M. Ku (Peng & Ku 2009) and *B. ×taipeiensis* C. I Peng (Peng & Su 2000), which the parents are *B. longifolia* Blume and *B. palmata* D. Don and *B. formosana* Hayata and *B. longifolia* Blume respectively. Recently, *B. grandis* Dryand. subsp. *grandis* was found from southern Taiwan (Nakamura et al. 2015), and the number of Taiwanese *Begonias* was come to 20.

Recently, an unknown species was found in central and northern Taiwan. The morphology and literature review revealed this was *B. hirtella* Link, a species often cultivated for garden decoration. According to Moonlight et al. (2018), this species was treated in sect. *Ephemera* Moonlight, which

was comprising 14 species distributed in southern America. Most species were treated in sect. *Doratometra* (Klotzsch) A. DC. or sect. *Begonia*, they all had annual habit, erect stems, persistent stipules, bracts and bracteoles, and cymes with few flowers. Detailed description, photos, and distribution map are provided in this article for identification of this newly naturalized species.

Materials and methods

The studied materials were collected from natural habitats, and living ones were cultivated at the greenhouse of National Museum of Natural Science for morphology observation. The vouchers were deposited in the herbarium of National Museum of Natural Science (TNM). Following herbarium websites were examined: HAST, TAI, TAIF. The distribution of *B. hirtella* was based on the herbarium specimens and field collection, and the map was generated by QGIS ver. 3.4 (QGIS development team 2018).

Taxonomy treatment

Begonia hirtella Link in Enumeratio Plantarum

Horti Regii Berolinensis Altera 2: 396. 1822.

巴西秋海棠 (短毛秋海棠) (Figures 1, 2)

Perennial herbs. Stem erect, cane like, 20~100 cm, nodes inflated, pilose when young and glabrescent elder. Leaves simple, fleshy, alternate, 3~8 cm long, 3~4 cm wide, ovate, base oblique with a red spot, apex obtuse to acute, margin serrate and ciliate, tomentose on both surface, veins palmate-netted, stipules ovate to ovate-lanceolate, 8~10 mm long, 3~5 mm wide, ca. 5 veins, margin ciliate, petiole 1.5~5 cm long, pilose. Inflorescence axillary, cymes, monoecious, staminate flowers zygomorphic or asymmetry, tepals 3~4, with 2 large and 1~2 small, large ones near orbicular, 5~10 mm long, 5~10 mm wide,

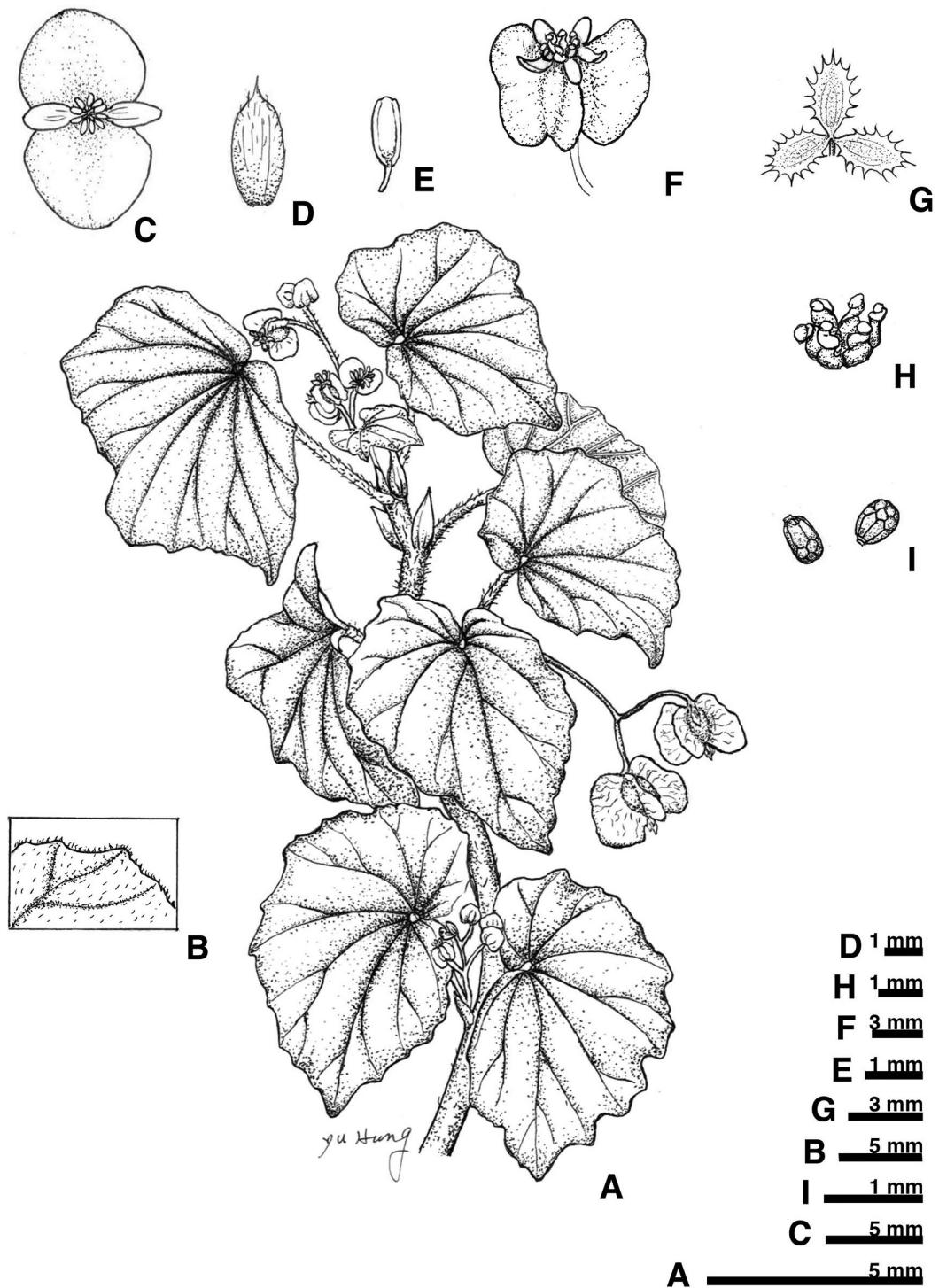


Figure 1. *Begonia hirtella* Link. A: habit; B: leaf margin; C: staminate flower; D: bracteole of staminate flower; E: stamen; F: pistillate flower; G: bracteoles of pistillate flower; H: style; I: seeds.

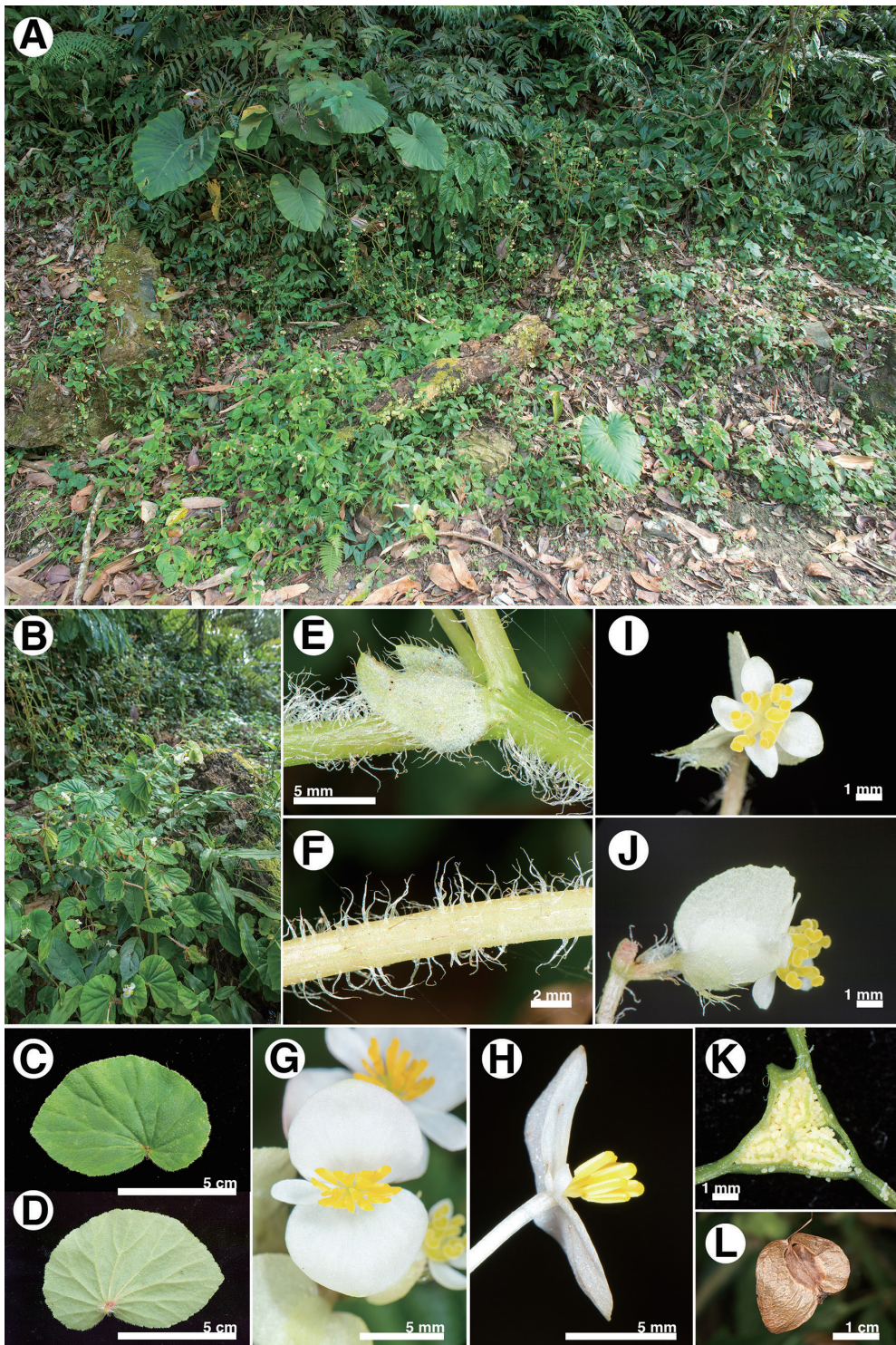


Figure 2. *Begonia hirtella* Link. A: habitat; B: habit; C: leaf adaxial surface; D: leaf abaxial surface; E: stipule; F: petiole; G, H: staminate flower (front and side view); I, J: pistillate flower (front and side view); K: placentation; L: fruit; B~L: Chao 4716.

white, glabrous, small ones obovate-lanceolate, 8~10 mm long, 3~4 mm wide, white, glabrous, stamens numerous, clavate, filaments 1~2 mm long, glabrous, anthers ca. 1~2 mm long, glabrous, lateral dehiscent, bracteole elliptic, ca. 2 mm long, ca. 1 mm wide, margin ciliate; pistillate flowers actinomorphic, tepals 5, elliptic, ca. 2 mm long, ca. 1 mm wide, white, ovary 3-loculed, central placentation, ovules numerous, style 3-fid and each bifid, stigma heliciform, bracteole elliptic, ca. 3 mm long, 1~2 mm wide, margin ciliate. Capsule 3-winged, brown, seeds numerous.

Native to South America. Naturalized in

India (Aitewade et al. 2012), Hawaii (Lorence & Flynn 1995; Oppenheimer & Bustamente 2014), and United States (Brouillet 2005). In Taiwan, this species naturalized in low altitude area, and becoming greenhouse weeds (Figure 3).

Specimens examined: **Taipei city:** Greenhouse of Taipei Botanical Garden, *T. C. Hsu 4923* (TAIF); same loc., *C. M. Wang 16991* (TNM); Kungkuang campus, National Taiwan Normal University, *M. J. Jung 5127* (TAIF); **Taichung city:** Fengyuan district, *C. M. Wang 17650* (TNM); National Museum of Natural Science, *C. M. Wang 16924* (TNM);

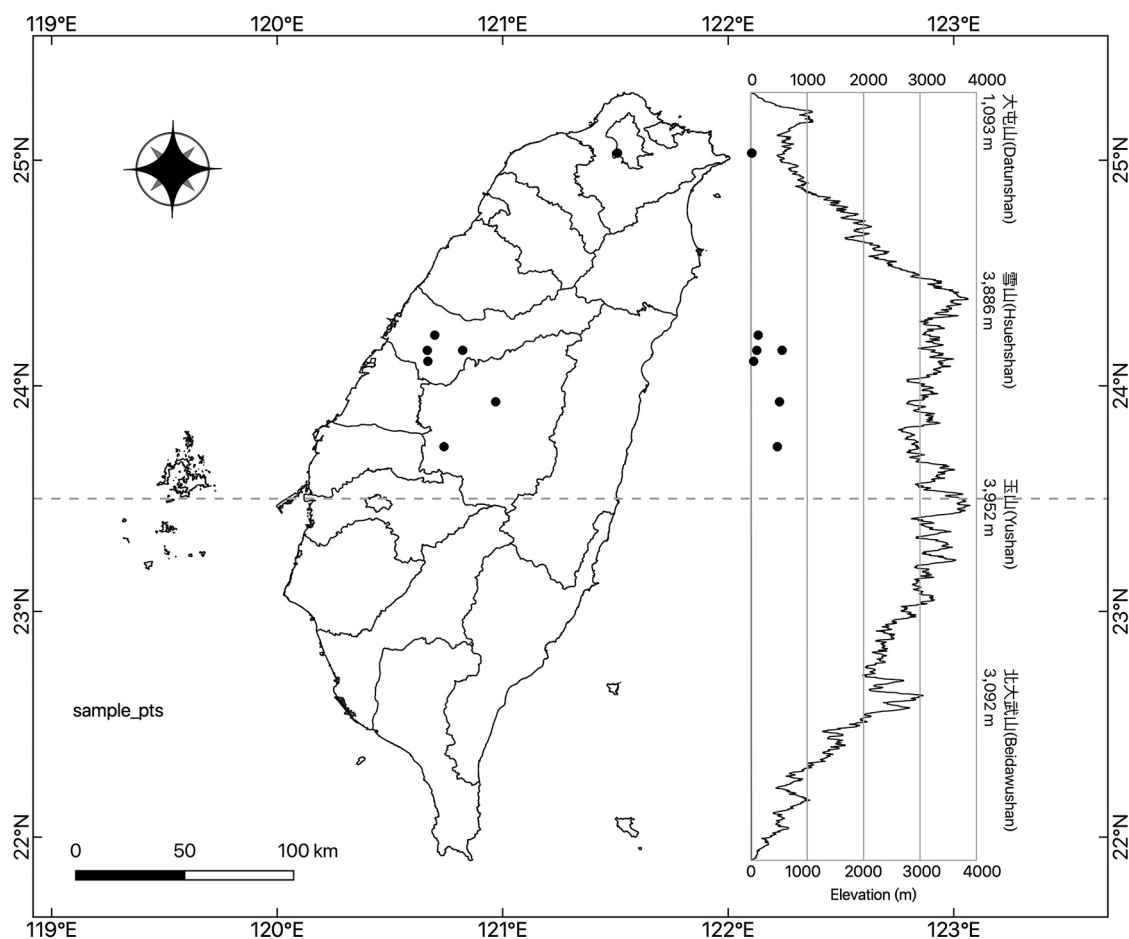


Figure 3. Distribution of *Begonia hirtella* Link.

Tali district, *J. M. Wang* 20160529 (TNM); Xinshe Dist, *C. M. Wang* 17695 (TNM); **Nantou county:** Puli town, Shuitou rd., *C. M. Wang* 17014 (TNM) ; same loc., *C. T. Chao* 4716 (TNM); Chushan town, *K. Y. Chu* 20181113 (TNM).

Discussion

In this article, we report *B. hirtella* as a newly naturalized species of Taiwan, which had been reported as naturalized species in India, Hawaii and United States. In Taiwan, this species was found in roadsides, greenhouses, or gardens in the low altitudes of central to northern parts of island. According to our observation, *B. hirtella* could produce abundant fertile seeds and seedlings in these habitats (Figure 4). Such phenomenon may imply this species could become an invasive

species with highly risk. Besides, we also found *B. longifolia* Blume and *B. laciniata* Roxb. co-occurring with *B. hirtella* in Puli, Nantou county (Figure 5). The natural hybridization within *Begonia* taxa had been found for many cases (Peng & Chen 1991; Peng & Sue 2000; Peng & Ku 2009; Peng et al. 2010). The co-occurred native and naturalized species could produce hybrid descendants, these descendants could back-cross with their parents, and causing genetic pollution. Thus, we suggest that the population of *B. hirtella* should be monitored and removed from the wild.

Begonia hirtella was similar to another species *B. cucullata* Willdenow, which was also introduced and cultivated in garden. They were classified into sect. *Ephemera* and had similar habit and floral morphology (Moonlight et al. 2018), but *B. hirtella* could be distinguished by



Figure 4. Seedlings of *Begonia hirtella* Link.



Figure 5. Habitat of *Begonia hirtella* Link with *B. longifolia* Blume.

its ovate and strongly oblique leaves covered with densely tomentose.

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