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Additions to the Flora of Singapore: New and overlooked records of casual and naturalised plant species (7)

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ABSTRACT. Five non-indigenous species, viz. *Hamelia patens* Jacq. (Rubiaceae), *Laportea aestuans* (L.) Chew (Urticaceae), *Leuenbergeria bleo* (Kunth) Lodé (Cactaceae), *Tradescantia spathacea* Sw. (Commelinaceae) and *Triphasia trifolia* (Burm.f.) P.Wilson (Rutaceae), are reported here as new records of naturalised species or species of casual occurrence in Singapore. *Hamelia*, *Leuenbergeria*, *Tradescantia* and *Triphasia* are also new generic records for the naturalised flora of Singapore.

Keywords. Cultural usage, escapees from cultivation, ethnobotany, folk medicine, routes of introduction

Introduction

This paper is part of an ongoing series that documents introduced plant species that have become variously established in Singapore. Thus far, 32 new records of casually occurring or naturalised plants have been added to the *Flora of Singapore* via this series (Chen et al., 2018a, 2018b, 2020, 2021; Choo et al., 2020; Middleton et al., 2022) and associated publications (Chen et al., 2019a, 2019b; Choo et al., 2022; Ho et al., 2021). In this report five species and four genera not recorded in the Flora of Singapore checklist (Lindsay et al., 2022) are reported here as new casual or naturalised records for Singapore, and the routes of their introduction are briefly discussed. A short description is provided for each species based on the voucher specimens collected locally which are deposited in the Singapore Botanic Gardens Herbarium (SING).

Materials and methods

The new records in this paper were identified by comparing against their descriptions in the references cited (such as the respective *Floras*). Relevant specimens were consulted in the process, and the type specimens were examined via the various online platforms hosting their digital images. Specimens of the new records reported in this paper were mostly collected as part of an ongoing study of naturalised species undertaken by the authors since 2018, and all vouchers have been lodged in SING.

Cactaceae

Leuenbergeria bleo (Kunth) Lodé, Cact.-Avent. Int. 97: 26 (2012). – *Cactus bleo* Knuth in Humb. et al., Nov. Gen. Sp. 6: 69 (1823). – TYPE: Colombia, Río Magdalena, near Badillas, May 1801, *Bonpland & Humboldt 1546* (lectotype P [P00476534], designated by Leuenberger, Mem. New York Bot. Gard. 41: 99 (1986)). (Fig. 1)

Shrub to c. 4 m tall; trunk and twigs spiny. ***Areoles*** white hairy, bearing 5–7 spines. ***Spines*** subulate with thickened base, to c. 1.4 cm long, reddish-brown to brownish-black. ***Leaves*** fleshy, elliptic to oblong, (3.5–)5.5–16 × (1.1–)2–5.8 cm, apex acuminate, base cuneate, margins entire, greenish-red when young; petioles 0.5–3 cm long. ***Flowers*** to c. 6 cm across; pedicels unarmed, 0.6–1.1 cm long; receptacle turbinate, 0.5–1.1 cm wide at the rim; tepals obovate to broadly obovate, 2.6–3.5 × 1.8–2.3 cm, apex rounded to emarginate, bright orange-red; stamens numerous (> 100), c. 10 mm long, filaments bright orange-red in the upper two thirds, white at base, anthers c. 1 mm long, cream; stigma lobes 5–9, cream. ***Fruit*** a turbinate, flat-topped berry, c. 4 cm diam., green, ripening bright yellow-orange. ***Seeds*** few, to c. 7.5 mm long, black.

Distribution. Native to Panama and north-western Colombia; introduced to the Caribbean Islands, India and Vietnam where it has subsequently escaped (POWO, 2025a). Frequently cultivated in Singapore (Boo et al., 2003, 2006; Chen et al., 2015, as *Pereskia bleo*) and Malaysia by the local Chinese population for use in folk medicine, where it is consumed as a general health tonic and for the prevention of various ailments ranging from cancer to gastritis (Zareisedehizadeh et al., 2022, as *Pereskia bleo*). In Singapore, the species is currently known in the wild from a patch of wasteland in Bukit Batok and from Dairy Farm Nature Park (H.K. Lua, pers. comm.) where it persists as a remnant from former cultivation. Though the plant sets fruit year-round, there are no seedlings found in the vicinity to our current knowledge. It is thus treated here as Casual until further signs of its spread can be established.

Ecology. In its native habitat, *Leuenbergeria bleo* occurs along the banks of streams and rivers, and in secondary forests from sea level to 1300 m above sea level (Leuenberger, 1986). The fruits are mainly dispersed by water, although animals may also be involved (N. Taylor, pers. comm.).

Additional specimens examined. SINGAPORE: **Bedok:** Bedok Reservoir Forest plot 2, 2011–2012, *Kee & Yee BR2_32*, (SING [SING0350043]). **Bukit Batok:** Bukit Batok West Avenue 5, 12 Jun. 2022, *Ho 22-117* (SING [SING0401751]). **Nanyang Avenue:** Nanyang Technological University campus, NTU herb garden, 29 May 2015, cultivated specimen, *Koh SING2015-145* (SING [SING0213659]).

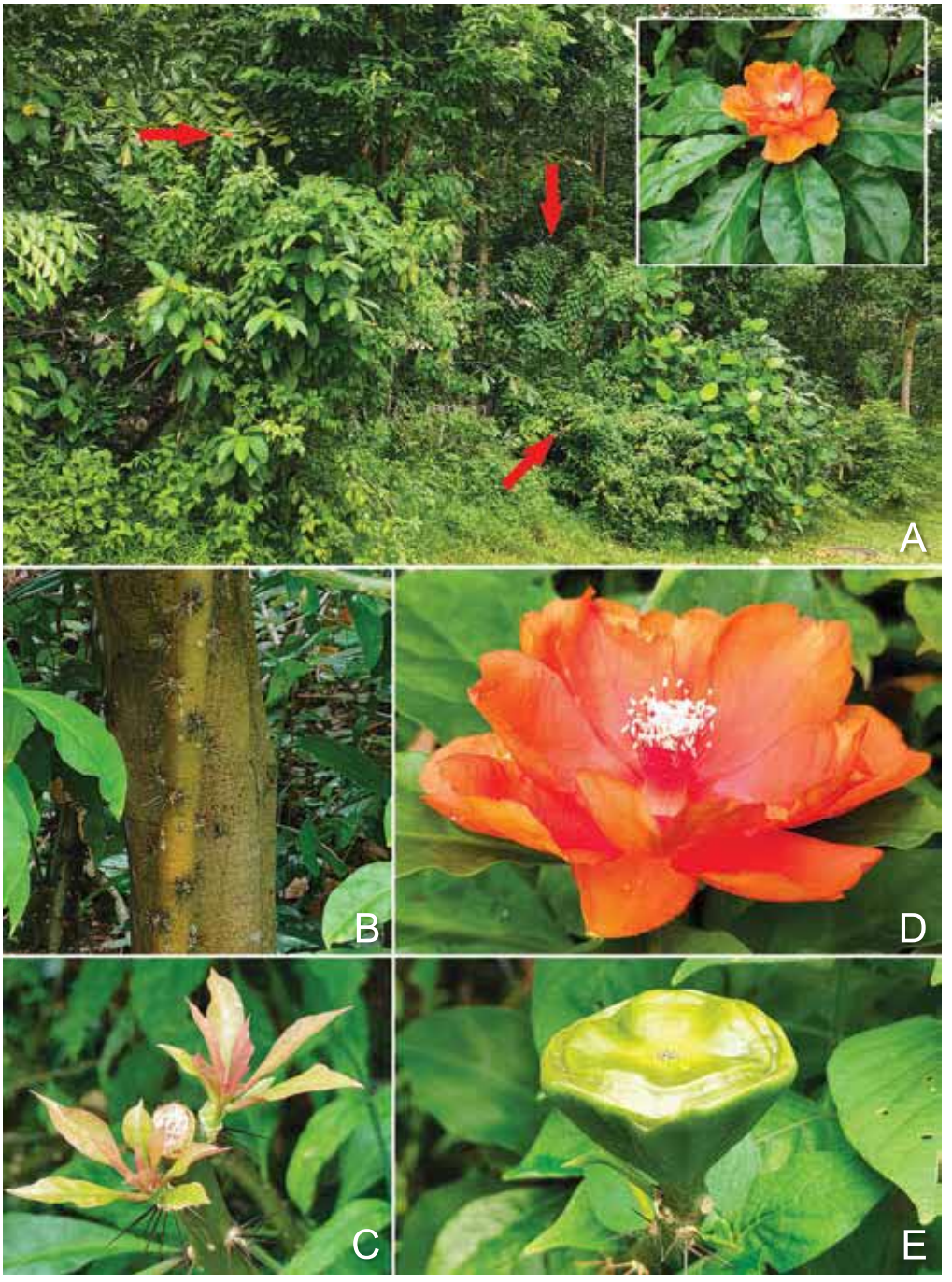

Fig. 1. *Leuenbergeria bleo* (Kunth) Lodé. **A.** Plants (red arrows) growing at the edge of a patch of secondary vegetation along Bukit Batok West Avenue 5 (inset: flowering branch). **B.** Stem showing the armature. **C.** Young leaves. **D.** Close-up of flower. **E.** Unripe fruit. All from *Ho 22-117*. (Photos: B.C. Ho)

Notes. We located a sterile specimen (*Kee & Yee BR2_32* as *Pereskia bleo*) with a label indicating that it is a voucher specimen for an ecological study on "the post-cultivation tropical secondary forest" (Neo et al., 2017), although the paper did not explicitly cite any voucher. It is uncertain if this population of *Leuenbergeria bleo* from the vicinity of "Bedok Reservoir Forest" is still extant as it was collected around 2011 to 2012, but the surrounding areas have mostly been cleared for residential and other developments since.

Commelinaceae

Tradescantia spathacea Sw., Prodr. Veg. Ind. Occ. 57 (1788). – TYPE: India occidentalis, Campechia [Mexico, cultivated in Jamaica], *Swartz s.n.* (lectotype S [S-R-6172]), designated by Hunt, Fl. Mesoamer. 6: 163). (Fig. 2)

Erect rosette-forming herb to c. 40 cm tall. ***Leaves*** ± succulent, sessile; lamina oblong-lanceolate, 20–36 × 2.5–4.8 cm, dark green above, purplish-red below, apex acuminate, base ± clasping. ***Inflorescence*** axillary, umbellate, subtended by two conduplicate bracts, each fertile bract 3.5–4 cm long, purplish-red on outer surface, green within. ***Flowers*** white; sepals ± elliptic, c. 6 × 2 mm; petals ovate–broadly ovate, c. 5.5 × 3.5 mm. ***Fruit*** generally a trilocular capsule, often with only one or two fully developed locules, c. 4 × 2.5 mm. ***Seeds*** greyish-brown, one per locule, c. 3 × 2 mm, surface rugose.

Distribution. Native to Mexico and the Central American countries Belize and Guatemala (POWO, 2025b) but has naturalised in many other areas such as Hong Kong (Hong & DeFilipps, 2000), south-western USA, Japan, East Melanesia, the Polynesian islands (Hawaii, Samoa, Tonga, Niue, Cook Islands) and Australia (Weeds of Australia, 2016). The species is a common landscaping plant in Singapore (Boo et al., 2003, 2006; Chen et al., 2015) and is also grown as a medicinal plant, but has escaped from cultivation and has naturalised.

Ecology. On well-drained soils in the understorey of coastal or inland forests and disturbed areas (Rojas-Sandoval & Acevedo-Rodriguez, 2013). In Singapore, the species occurs in scrubland and has also been recorded in secondary vegetation near the coast (Fig. 2A), where it is often epiphytic on cultivated urban trees and structures (Fig. 2B).

Uses. Apart from its usage as an ornamental plant, *Tradescantia spathacea* has long been grown as a pot herb by the local Chinese community who harvest the leaves to brew a herbal tea, which is now also available commercially (L.M.J. Chen, pers. obs.).

Fig. 2. *Tradescantia spathacea* Sw. **A.** Naturalised individuals growing in a scrubland near Changi Coastal Walk (inset: close-up of open flowers). **B.** Flowering individuals and seedlings (red arrows) on an urban tree along Beach Road. **C.** Escaped seedlings (red arrow) growing in the crevice of a wooden bench at East Coast Park. A from *Jong LCMJ 2023-013*; B from *Ho et al. LCMJ 2022-137*; C from *Chen et al. LCMJ 2021-012*. (Photos: A incl. inset, Y.W. Jong; B, C, L.M.J. Chen).

Additional specimens examined. SINGAPORE: **Changi:** Changi Coast Walk, coastal park connector near MOE outdoor learning centre, 6 Feb. 2023, *Jong LCMJ 2023-013* (SING [SING0401755]). **Commonwealth:** Commonwealth Avenue West, 21 Feb. 2019, *Ho SING2019-119* (SING [SING0401752]). **East Coast:** East Coast Park, 24 Sep. 2021, *Chen et al. LCMJ 2021-012* (SING [SING0401747]); ibidem, *Chen et al. LCMJ 2021-013* (SING [SING0401748]). **Kallang:** Beach Road, 17 Mar. 2022, *Ho et al. LCMJ 2022-037* (SING [SING0401749]). **Lower Kent Ridge Road:** National University of Singapore grounds, 14 Jun. 2022, *Chua & Nurafeqah. s.n.* (SING [SING0401764]); ibidem, 22 Jun. 2022, *Chua s.n.* (SING [SING0401765]). **Mandai:** Mandai Track 7, upper Seletar reservoir park next to roundabout, cultivated specimen, 7 Sep. 1994, *Tang & Sidek 31* (SING [SING0016511]). **Sentosa:** Serapong, ?cultivated specimen, 25 Feb. 2020, *Lua et al. SING2020-405* (SING [SING0324782]); Tanjong Rimau, ?cultivated specimen, 3 Mar. 2020, *Lua et al. SING2020-453* (SING [SING0341439]).

Rubiaceae

Hamelia patens Jacq., Enum. Syst. Pl.: 16 (1760). – TYPE: Dominican Republic, *Jacquin s.n.* (not traced, see Pacheco-Trejo & Lorence, Fl. Mesoamer. 4(2): 115 (2012)). (Fig. 3)

Erect shrub to 2 m tall, in the wild eventually becoming a small tree to 6 m tall; branches angular, puberulous when young, gradually becoming ± terete and glabrescent with age. ***Leaves*** in whorls of 3 or 4, membranous, elliptic, ± ovate or oblong-ovate, (2.3–)4.5–12 × (1.5–)2.3–4.7 cm, apex acuminate or more or less so, base cuneate to acute, upper surface glabrous or almost so, abaxial surface pubescent when young, becoming glabrescent or glabrous when the leaf fully expands, with scattered hairs mainly on midrib and veins; petioles (1.2–)1.8–4.5 cm, pilosulous to glabrescent; stipules narrowly triangular to subulate, 1.5–3.5 mm long. ***Inflorescence*** a terminal, modified dichasia of helicoid cymes. ***Flowers*** ± sessile, or, if pedicellate, to 2 mm long; corolla tubular, 1.3–1.8 cm long with 5 prominent ridges, tube red or orange throughout, or orange and red at the tips and basal half; surface glabrous or puberulent; lobes ovate-triangular, c. 1 × 2 mm. ***Fruit*** an ovoid berry, c. 10 × 4 mm, ripening to dark purplish black.

Distribution. Native to Florida, the Caribbean Islands, Central and South America, but not recorded from Surinam, Chile and Uruguay; introduced into the West Himalayas (POWO, 2025c) where it has become invasive (Anjum et al., 2022). Frequently grown in the subtropics and the tropics as an ornamental; in Singapore the species was first introduced sometime in the Singapore Botanic Gardens as early as 1921 but was listed as a garden plant in 2003 (Boo et al., 2003), and only recorded as an escapee recently (see specimen *Jong LCMJ 2024-008*). It is treated here as Casual but may eventually naturalise considering that the berries are attractive to small birds.

Fig. 3. *Hamelia patens* Jacq. **A.** Adult plant (red-flowered form) growing at the base of slope on Keppel Island (inset: close-up of flowers). **B.** Flower buds of the orange-red flowered form. **C.** Escaped young plant growing in the adjacent forest floor. **D.** Ripening fruits. B, D from *Jong LCMJ 2024-009*; C from *Jong LCMJ 2024-010*. (Photos: Y.W. Jong)

Ecology. A variable, fast-growing species typically occupying mostly newly disturbed sites. In its native habitat, the species flowers year-round and is pollinated by hummingbirds and various neotropical bee species (Peters, 2014). In Singapore, the floral visitors consist of various Hymenoptera such as the Lesser Banded Hornet (*Vespa affinis* (Linnaeus, 1764)), White-cheeked Carpenter Bee (*Xylocopa aestuans* (Linnaeus, 1758)), Black Dwarf Honey Bee (*Apis andreniformis* (Smith, 1857)) and nectar-feeding birds such as the Brown-throated Sunbird (*Anthreptes malacensis* (Scopoli, 1786)), and some of these could possibly be the pollinators (The Biodiversity of Singapore, 2023).

Additional specimens examined. SINGAPORE: **Keppel:** Keppel Island, hillock, ?cultivated specimen, 12 Aug. 2020, *Lua et al. SING2020-775* (SING [SING0361090]); base of slope near the marina, cultivated specimen (adult), 28 Mar. 2024, *Jong LCMJ 2024-007* (SING [SING0401756, SING 0401757]); ibidem, young plant (escapee from cultivation), 28 Mar. 2024, *Jong LCMJ 2024-008* (SING [SING0401758]). **Singapore Botanic Gardens:** Lawn G, cultivated specimen, 15 Jun. 1921, *Deshmukh s.n.* (SING [SING0362493]); Near carpenter's shed, cultivated specimen, 21 Sep. 1924, *Furtado s.n.* (SING [SING0362492]); In pots, cultivated specimen, 14 Jun. 1935, *Furtado s.n.* (SING [SING0362492]); SBG Lawn F, cultivated specimen, 22 Nov. 2022, *Leong SING2022-1067* (SING [SING0388394]); Healing garden plot 9, cultivated specimen, 13 Sep. 2017, *Leong & Koh SING2017-443* (SING).

Rutaceae

Triphasia trifolia (Burm.f.) P.Wilson, Torreya 9: 33 (1909). – *Limonia trifolia* Burm.f., Fl. Indica 103 (1768). – TYPE: Java, *Burmann 166* (lectoype G [G00810963], designated by Tanaka, Meded. Rijks-Herb. 69: 8 (1939)). (Figs 4, 5)

Erect spiny shrub to c. 1.6 m tall. ***Spines*** paired, 0.4–1.2 cm long, in axils of leaves. ***Leaves*** gland-dotted, trifoliate; leaflets ovate to broadly elliptical, petioles 3–6 mm long; terminal leaflets (1.9–)2.9–4.6 × (1–)1.5–2.9 cm, apex retuse or rounded, base cuneate; lateral leaflets much smaller, sometimes ± oblique, (1.2–)1.7–2.3 × (0.8–)1–1.4 cm. ***Flowers*** fragrant, white. ***Fruits*** fleshy, rounded or ellipsoid, c. 1.2 **× 1.5 c**m, ripening bright to dark red, surface densely spotted with gland dots. ***Seeds*** 1–3, embedded in mucilaginous pulp, c. 3 × 2 mm.

Distribution. The exact geographical origins of *Triphasia trifolia* are obscure (Mabberley, 2017), as the species has long been cultivated in many areas of the world such as subtropical and tropical America (Wilson, 1909), Indonesia (Backer & Bakhuizen van den Brink, 1965), India (Nair & Nayar, 1997) and the Philippines (Pelser et al., 2011), where it has also naturalised. It is possibly native to South-East Asia (Verheij & Coronel, 1992), and there has also been speculation that the species is native to southern China (Ridley, 1922; Backer & Bakhuizen van den Brink, 1965). However, the species is not included in the treatment of the Rutaceae family in the *Flora of China* (Zhang et al., 2008). In Malaya, *Triphasia trifolia* is a cultivated species, and

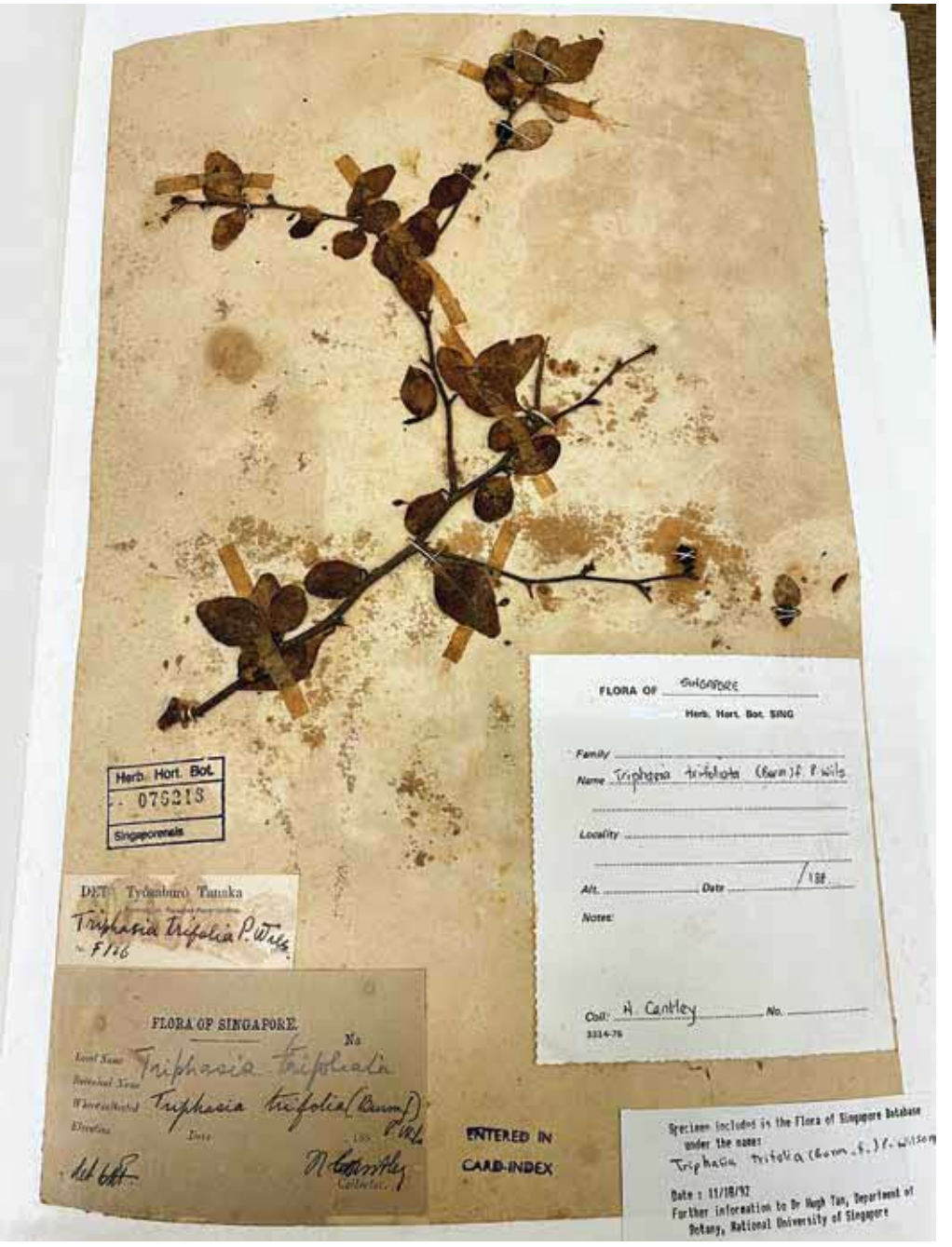

Fig. 4. Cantley's specimen of *Triphasia trifolia* (Burm.f.) P.Wilson in SING, apparently collected from Singapore in the 1880s according to the pre-printed date on the label. The species was listed in Cantley's report on the Forest Department of the Straits Settlements for 1886 as one of the economic plants grown in the experimental garden, and the above specimen could have been derived from those introduced individuals. (Photo: L.M.J. Chen)

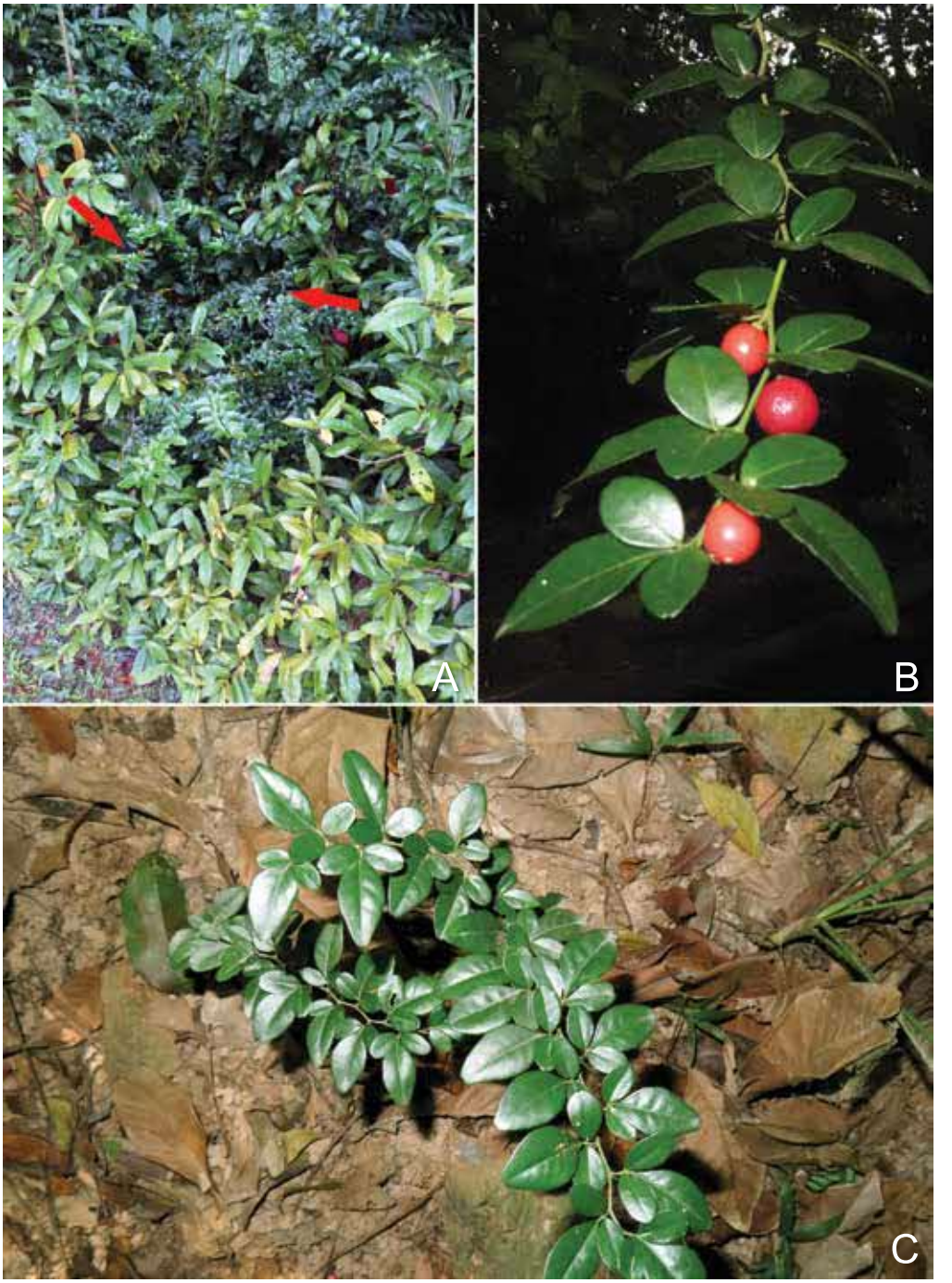

Fig. 5. *Triphasia trifolia* (Burm.f.) P.Wilson. **A.** Plant growing at the edge of secondary vegetation on Keppel Island (red arrows). **B.** Another individual, fruiting in the shade. **C.** One of several young plants that has established in the forest understorey. (Photos: Y.W. Jong)

associated with Malay villages where it is grown as a hedge (Burkill, 1966; Corner, 1988), or for its edible fruits that are used to make preserves (Ridley, 1902).

In Singapore, the species is currently known in the wild from a small population located in a remnant patch of secondary forest on Keppel Island. The island, which is currently part of a marina, is located next to areas such as Telok Blangah and Pulau Brani, both of which housed Malay villages in the past. It is also noted that all other collections of the species in SING are from cultivated material, such as those from offshore islands with Malay villages, or from the Singapore Botanic Gardens. The oldest collection of *Triphasia trifolia* that we located in SING is a Cantley specimen that came with a label with a pre-printed date suggesting that it was collected in Singapore sometime during the 1880s. Cantley's annual report to the Straits Settlements indicated that the plant had been introduced and planted in the local experimental gardens (Cantley, 1887), and the SING specimen could have been part of the introduced material. While it is uncertain which of the above routes the species came to be established in Singapore, it is certainly an introduced plant and has become naturalised.

Ecology. Often in open sunny areas with moist but moderately well-drained soil, disturbed sites or areas associated with human habitation. The species is shade tolerant and thus able to invade the understorey layer of secondary forests, often forming impenetrable thickets that smother the regeneration of native plant species, and it is invasive in many areas where it has naturalised (Rojas-Sandoval & Acevedo-Rodriguez, 2012).

Uses. Cultivated as a hedge (Keng, 1990), for edible fruits, or as folk medicine to treat ailments such as diarrhoea and skin afflictions (Burkill, 1966).

Additional specimens examined. SINGAPORE: **Keppel:** Keppel Island, base of slope near the marina, ?cultivated specimen (adult), 28 Mar. 2024, *Jong LCMJ 2024-009* (SING [SING0401759]); ibidem, seedlings, escapees from cultivation, 28 Mar. 2024, *Jong LCMJ 2024-010* (SING [SING0401760]). **Singapore Botanic Gardens:** s.l., ?cultivated specimen, 1892, *Ridley s.n.* (SING [SING0232167]); s.l., ?cultivated specimen, 2 Feb. 1958, *Abu Kassim s.n.* (SING [SING0357366]); Economic garden, cultivated specimen, May 1921, *Deshmukh s.n.* (SING [SING0365451]); Economic garden, cultivated specimen, 20 Jun. 1924, *Nur s.n.* (SING [SING0365450]); Lawn F, cultivated specimen, 8 Sep. 1971, *Lee & Samsuri SA 661* (SING [SING0365449]); Lawn H, cultivated specimen, 7 Dec. 1934, *Furtado s.n.* (SING [SING0365444]); ibidem, cultivated specimen, 1 Jul. 1929, *Mhd Nur s.n.* (SING [SING0365452]); ibidem, cultivated specimen, 8 Sep. 1971, *Lee SA 662* (SING [SING0365445]); ibidem, cultivated specimen, 8 Sep. 1971, *Lee & Samsuri SA 663* (SING [SING0365446]); Lawn O, cultivated specimen, 26 Oct. 1953, *Kiah s.n.* (SING [SING0365448]); Side gate F-25, ?cultivated specimen, 5 Sep. 1995, *Tang & Hj. Sidek 930* (SING [SING038079]).

Urticaceae

Laportea aestuans (L.) Chew, Gard. Bull. Singapore, 21(2): 200 (1965). – *Urtica aestuans* L., Sp. Pl. ed. 2, 2: 1397 (1763). – TYPE: Cultivated at Uppsala from material collected from Surinam (lectotype LINN [LINN 1111.14], designated by de Rooij, Fl. Suriname 5(1): 310 (1975)). (Fig. 6)

Herb to 1.3 m tall; stems covered with glandular hairs and stinging hairs, basal parts becoming only sparsely hairy with age. ***Leaves*** ovate to broadly ovate, 4–16.5 × 2.5–13.5 cm, apex acuminate, base rounded or ± cordate, margins dentate, armed with irritant hairs on both surfaces; petioles similarly armed as young stems, 2.6–14 cm long. ***Inflorescence*** in axillary panicles, mostly bisexual or occasionally only with male flowers; peduncles armed with stinging hairs. ***Male flowers:*** tepals 4 or 5, cymbiform, pale green, 1–1.5 mm long, connate at base, apices with long glandular hairs; stamens 4 or 5, white; pedicels c. 1.5 mm long. ***Female flowers:*** tepals 4, green, dorsal lobe c. 0.25 mm long, lateral lobes 2, c. 0.5 mm long, covering the ovary, ventral lobe minute; ovary asymmetrically ovoid, stigma unbranched; pedicel c. 0.5 mm long. ***Fruits:*** achenes obliquely ovoid and laterally compressed, cream coloured, c. 1 mm long, partially flanked by the persistent lateral lobes.

Distribution. Widely distributed across the Old and New World in tropical America, West Indies, tropical Africa, Madagascar, and Indonesia (Sumatra, Java and the Lesser Sunda Islands) (Chew, 1965). It is naturalised in Taiwan (Hsu et al., 2003) and was also accidentally introduced in Hawaii, where it was first detected growing in ornamental plant nurseries. Likely a recent introduction to Singapore as it was only first collected from a flowerbed in a nursery in 2017 (see specimen *Chen LCMJ 2017-733*). Similarly, the most recent collection was made from a population growing near a concretised drain at the edge of a patch of secondary vegetation near the now-defunct Corona Nursery. It is thus likely that the species first entered Singapore as a ‘stowaway’ through the horticultural trade and has since naturalised.

Ecology. Pantropical weed of open spaces.

Additional specimens examined. SINGAPORE: **Clementi:** Clementi Road, Secondary vegetation near now defunct Corona Nursery, 30 Aug. 2024, *Jong LCMJ 2024-011* (SING [SING0401761]); ibidem, 20 Sep. 2024, *Jong LCMJ 2024-012* (SING [SING0401762]). **Pasir Panjang:** Weed in flower bed, 6 Dec. 2017, *Chen LCMJ 2017-733* (SING [SING0286843]).

Fig. 6. *Laportea aestuans* (L.) Chew. **A.** Naturalised individuals growing at the edge of secondary vegetation along Clementi Road. **B.** Inflorescence (inset: close-up of branched inflorescence). (Photos: Y.W. Jong)

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