

Flora of Singapore precursors, 25: Taxonomic notes on new discoveries from Bukit Timah Nature Reserve, including two native genera newly recorded

M.A. Niissalo & L.M. Choo

Singapore Botanic Gardens, National Parks Board,
1 Cluny Road, 259569 Singapore
matti_asser_niissalo@nparks.gov.sg

ABSTRACT. As part of a project to sample tissue from all native vascular plants in Bukit Timah Nature Reserve, we collected material from four species that have not been previously recorded in Singapore. Of these, *Nervilia singaporensis* Niissalo has already been described as a new species, native to Singapore. Two species, *Lepidogyne longifolia* (Blume) Blume (Orchidaceae) and *Ptyssiglottis kunthiana* (Wall. ex Nees) B.Hansen (Acanthaceae), which are reported here, belong to genera that have not previously been recorded in Singapore. Based on their collection history in the region and their habitat in Bukit Timah Nature Reserve, we consider them native to Singapore. The fourth new record, *Plectocomiopsis* cf. *corneri* Furtado (Arecaceae), also reported here, is a new species record for Singapore, but based on the collection history of the species and its only known locality in Singapore, we consider it introduced. The nomenclature and history of these species are discussed and we designate lectotypes for several names that are relevant to these species: *Neottia longifolia* Blume, *Lepidogyne sceptrum* Schltr., *Polytrema aequale* Ridl., *Polytrema aequale* Ridl. var. *minor* Ridl. and *Polytrema vulgare* C.B.Clarke. We also designate a neotype for *Lepidogyne minor* Schltr.

Keywords. Acanthaceae, Arecaceae, lectotypification, new generic records, new species records, Orchidaceae

Introduction

Recent intensification of field collection effort for plants in Singapore has led to numerous new national records. The new records have included native plants (De Kok, 2015; Leong-Škorničková & Boyce, 2015; Niissalo et al., 2016; Niissalo & Leong-Škorničková, 2017; J. Chen et al., 2018; Chong et al., 2018; Ho et al., 2018; Khoo et al., 2018; Lim et al., 2018a; L.M.J. Chen et al., 2019a; Van Welzen et al., 2020); introduced plants (Niissalo et al., 2016; L.M.J. Chen et al., 2018a, 2018b, 2019a, 2019b, 2020; Choo et al., 2020); species new to science (Niissalo et al., 2014; Leong-Škorničková & Boyce, 2015; Seah & Wong, 2018a, 2018b; Wong, 2018; Wong & Lua, 2018; Wong & Mahyuni, 2018; Niissalo et al., 2020); and rediscoveries of species that had been considered nationally extinct (Leong et al., 2017, 2018; Chong et al., 2018; Ho et al., 2018; Lim et al., 2018a, 2018b; Rodda & Lai, 2018; Choo & Ngo, 2020). However, there have recently been only a few discoveries of native plant genera that

were not previously recorded in Singapore, namely *Plectocomiopsis* Becc. (Tan et al., 2011), *Phrynium* Willd. (Niissalo et al., 2016), *Securidaca* L. (Tan et al., 2016), *Albertisia* Becc., *Arcangelisia* Becc., *Chaetocarpus* Thwaites, *Dendrokingstonia* Rauschert, *Sphaeropteris* Bernh. (Lim et al., 2018a) and *Acer* L. (Chan et al., 2020). During our effort to collect all native vascular plants from Bukit Timah Nature Reserve (BTNR), we collected plants belonging to the genera *Lepidogyne* Blume (Orchidaceae) and *Ptyssiglottis* T.Anderson (Acanthaceae), neither of which have previously been recorded in Singapore. We also report the first record of *Plectocomiopsis* cf. *corneri* Furtado (Arecaceae) in Singapore, but we suspect that the species is not native to Singapore.

Each of these three species is restricted to a single locality. The population of *Lepidogyne longifolia* (Blume) Blume was first discovered on 16 October 2019, *Ptyssiglottis kunthiana* (Wall. ex Nees) B.Hansen on 9 October 2020 and *Plectocomiopsis* cf. *corneri* on 4 December 2020. Due to the small population, no complete voucher could be made of *Lepidogyne longifolia*, and the only voucher collected consists of a single leaf. *Ptyssiglottis kunthiana* was collected in bud on two occasions, and flowered later *ex situ*. No flowers were seen on *Plectocomiopsis* cf. *corneri*, and the voucher consists of an entire leaf, including the portion of the sheath covering the internode.

The native status of the three species was determined by assessment of historic collections in the region and their current occurrence in BTNR. Several plant species have been introduced to Bukit Timah from collections made by E.J.H. Corner in Peninsular Malaysia (Leong-Škorničková & Boyce, 2015; Niissalo et al., 2016). Most of these plants were planted near Taban Stream, though at least one species was planted in Jungle Fall. For this reason, the native status of new records from Bukit Timah needs to be assessed critically.

Lepidogyne longifolia occurs in a single poorly accessible and rarely visited natural wetland. *Ptyssiglottis kunthiana* grows in humid shade among large natural boulders in an equally rarely visited locality in primary forest. No herbarium collections of these species by Corner are known, and the localities of these species are relatively far from both Taban Loop and Jungle Fall where suspected introductions by Corner and associates have usually been found. Both species are known to be native in nearby localities in Johor as well as Sumatra, and it is not surprising that they are also found in Singapore. The closest known localities for the two species are just c. 35 km away from BTNR for *Lepidogyne longifolia* and c. 45 km away for *Ptyssiglottis kunthiana*, with a morphologically identical population known from a distance of c. 100 km away. It therefore seems likely that these species are native, but were missed in previous surveys due to their relative inaccessibility and restricted distribution in Singapore.

The situation for *Plectocomiopsis* cf. *corneri*, however, is quite different. The only known individual occurs on Taban Stream, next to several species that are known to have been planted from Corner's materials, and the species is also known to have been collected from Peninsular Malaysia by Corner based on herbarium specimens. Therefore, while this species may occur in Johor (Dransfield, 1979, but contradicted by Dransfield, 1982), we consider it more likely that this species has been introduced to BTNR.

The brief descriptions given below are for the material collected in Singapore. Fuller descriptions will be given in the *Flora of Singapore* accounts of these families. The global conservation assessment is based on the guidelines by IUCN Standards and Petitions Committee (2019). The local conservation assessment follows Davison et al. (2008).

Taxonomic notes on the new records

1. *Lepidogyne longifolia* (Blume) Blume, Fl. Javae, n.s., 1: 78, pl. 25 (1858); Blume, Coll. Orchid. 94, t. 25 (1859). – *Neottia longifolia* Blume, Bijdr. Fl. Ned. Ind. 8: 406 (1825); Lindl., Gen. Sp. Orchid. Pl. 476 (1840). – *Spiranthes longifolia* (Blume) Hassk., Cat. Hort. Bog. Alt. 47 (1844). – TYPE: [Indonesia], West Java, ‘Tangerang’ [Tangerang is a later addition, and likely incorrect, see notes below; locality is given as “Java, montis Salak” in the protologue], *Blume 66i* (lectotype L [L0061481], designated here; isolectotype L [L0061480]). (Fig. 1).

Lepidogyne minor Schltr., Repert. Spec. Nov. Regni Veg. Beih. 1: 56 (1914). – TYPE: [Published illustration] Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 21(1): t. 23, fig. 76 (1923) (neotype designated here; see notes below).

Lepidogyne sceptrum Schltr., Repert. Spec. Nov. Regni Veg. Beih. 1: 55 (1914). – TYPE: [Papua New Guinea], Finisterre Gebirges [Finisterre Mts], 1200–1300 m, 20 January 1909, *Schlechter 19166* (lectotype L [L0063947], designated here; isolectotypes AMES [AMES00100755], GH [GH00100754], K [K000942741, K000942742], NSW [NSW826860]).

An upright herb, with a stem that can become prostrate as the plant ages and then resembling a rhizome, or stem completely aerial, supported by roots, with older parts of the rhizome decaying as it ages. **Rhizome or stem** c. 1 cm thick, with thick (c. 0.7 cm) stilt-like roots, growing down at c. 45° angle. **Leaves** long and narrow, c. 40 × 3.7 cm, light green, with a prominent, thickened midrib at the base, eventually forking to three prominent veins. **Inflorescence** not seen in Singapore (but in other parts of the range a long, 30–100 cm spike with numerous small, brick-red flowers supported by long, narrow bracts).

Distribution. The species is known from Peninsular Malaysia, Sumatra, Pulau Lingga, Borneo, Java, Flores, Philippines and New Guinea (Ridley, 1908; Seidenfaden & Wood, 1992; De Vogel et al., 2020; specimens at K, L and SING). In Peninsular Malaysia, the species is considered rare: Ridley (1908) mentions that the species is only known from two localities, Kukup in Johor and Bukit Penara on Penang Island. The known distribution has changed little since, with one collection from Taiping Hills [Bukit Larut] in Perak (*Mhd Haniff 13210*, 22 Mar 1924, SING [SING0140070]), one from Tiger Hill in Penang Island (*Sinclair SFN 39110*, 18 Nov 1950, SING [SING0140073]), and a mention in Seidenfaden & Wood (1992) that it occurs in Pahang. We do not know



Fig. 1. *Lepidogyne longifolia* (Blume) Blume. **A.** Plant in habitat. **B.** Plant from above. From Niissalo SING2019-1033. (Photos: M. Niissalo).

the details of two Malaysian spirit collections at Kew (32055.000 and 44828.000). The species has recently been recorded from Penang Hill (Go et al., 2011), which is the only recent record from Peninsular Malaysia that we know of.

Habitat. In Singapore, the species is found in the understorey, in shade, in fully saturated soil in a freshwater swamp, alongside swamp forest species such as *Benstonea atrocarpa* (Griff.) Callm. & Buerki and *Dracaena granulata* Hook.f. A similar habitat was described for the species in Johor by Ridley (1908).

Provisional IUCN conservation assessment. The species is widespread, and although it is relatively rarely collected, there are a considerable number of collections, particularly from New Guinea. Therefore, the species is best considered Least Concern (LC). However, little is known about the abundance of the species or the extent of suitable habitat. In Singapore, the only population is very small (likely only three individuals) and limited to a tiny range, and nationally, the species should be considered Critically Endangered (CR/D).

Specimen examined. SINGAPORE: Bukit Timah Nature Reserve, 16 Oct 2019, Niissalo et al. SING2019-1033 (SING [SING0299479]).

Notes. *Lepidogyne longifolia* was identified by comparing it to herbarium material available online and in SING. *Lepidogyne longifolia* belongs to a vegetatively distinctive monotypic genus. The genus was also confirmed using ribosomal DNA from the 18S to 26S (partial sequences), including the full length of 5.8S, ITS1 and ITS2 with the primers ITS4 and ITS5 (White et al., 1990), Genbank accession: MW672102.

The large genus *Goodyera* R.Br., in its traditional sense, is paraphyletic if *Lepidogyne* and a number of other small genera are maintained separate from it (S.-P. Chen et al., 2019). In a recent paper, Pace (2020) addressed this issue by segregating a number of small genera from *Goodyera*. Even if an alternative approach was taken, and *Lepidogyne* is included in a more widely circumscribed *Goodyera*, this would still be a new national genus record, as *Goodyera* has also never been recorded in Singapore.

The status of the two heterotypic synonyms, both from New Guinea, has not been discussed in the literature in any detail, but they are considered synonyms by De Vogel et al. (2020).

The lectotype of *Neottia longifolia* designated here bears both of Blume's names (*Neottia longifolia* and *Lepidogyne longifolia*) in his handwriting and is undoubtedly part of the original material. The isolectotype, which is sterile, bears only the basionym. No locality data is mentioned on the original data of the lectotype: a label that has been applied later refers to a different species ('*Neottia alsinifolia* R.', a name used by Reinwardt on his collection of *Myrmechis gracilis*; this name has not been published except as a synonym of the latter by Blume) and has clearly been added to the specimen in error, likely due to the similarity of the names *Neottia alsinifolia* and *Neottia longifolia*. The two species cannot be confused with each other. The locality written on this erroneous label ('Tangerang') is therefore most likely also in error, and the locality given in the protologue is more likely to be correct. Blume only ever mentioned one locality for *Lepidogyne longifolia*.

No original material of *Lepidogyne minor* could be traced. The cited collection *Schlechter 19930* from what is now Papua New Guinea, 'Bergwälder bei Jaduna' [forests near Jaduna], c. 500 m, June 1909, was presumably destroyed in B. The neotype designated here is possibly an illustration of *Schlechter 19930* as no other material is known.

2. *Ptyssiglottis kunthiana* (Wall. ex Nees) B.Hansen, *Nordic. J. Bot.* 9(2): 214 (1989). – *Ruellia kunthiana* Wall., *Numer. List [Wallich]* n. 2419 (1830), nom. nud. – *Asystasia kunthiana* Wall. ex Nees, *Pl. Asiat. Rar.* 3: 89 (1832); Nees in DC., *Prodr.* 11: 163 (1847). – *Ruellia homonyma* Steud., *Nomencl. Bot.*, ed. 2, 2: 481 (1841), nom. illeg. – TYPE: [Peninsular Malaysia], Penang, 1822, *Wallich s.n.* [EIC 2419] (lectotype K [K001115889], designated by Hansen, *Nordic J. Bot.* 9(2): 214 (1989)). (Fig. 2–4).

Polytrema crenulatum C.B.Clarke, *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 74(3): 693 (1908); Ridley, *Fl. Malay Penins.* 2(2): 606 (1923). – TYPE: [Peninsular Malaysia], Perak, *Scortechini s.n.* (syntypes CAL n.v. [CAL0000020360, CAL0000020361]).

Polytrema vulgare C.B. Clarke, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 74(3): 693 (1908); Ridley, Fl. Malay Penins. 2(2): 606 (1923). – TYPE: [Peninsular Malaysia], Perak, Gunung Tunggul, March 1896, *Ridley 7164* (lectotype K [K000884332], designated here; isolectotypes CAL n.v. [CAL0000020365], K [K000884336], SING [SING0263861]).

Polytrema aequifolium C.B. Clarke ex Merr., Philipp. J. Sci., C 10: 342 (1915). – *Hallieracantha aequifolia* (C.B. Clarke ex Merr.) Merr., Philipp. J. Sci. 20: 457 (1922); Merrill, Enum. Philipp. Fl. Pl. 3: 348 (1923). – TYPE: Philippines, Palawan, Tanobag, 30 January 1906, *Bermejos BS357* (lectotype K [K000884304], designated by Hansen, Opera Bot. 116: 42 (1992); isolectotypes NY [NY00312248], US [US00136854]).

Hallieracantha brevipetiolata Merr., Philipp. J. Sci. 20: 457 (1922); Merrill, Enum. Philipp. Fl. Pl. 3: 483 (1923). – TYPE: Philippines, Mindoro, Paluan, April 1921, *Ramos BS39761* (lectotype K [K001129823], designated by Hansen, Opera Bot. 116: 42 (1992); isolectotype US [US00136857]).

Polytrema aequale Ridl., Fl. Malay Penins. 2(2): 607 (1923). – TYPE: [Peninsular Malaysia], Selangor, Batu Caves, 4 March 1914, *Ridley s.n.* (lectotype K [K000884337], designated here).

Polytrema aequale Ridl. var. *minor* Ridl., Fl. Malay Penins. 2(2): 607 (1923). – TYPE: [Peninsular Malaysia], Terengganu, Bukit Besar, [October–November 1899], *Gwynne-Vaughan 429* (lectotype K [K000884339], designated here).

Polytrema annamense Benoist [ex Lecomte, Fl. Indo-Chine 4: 723 (1935), nom. nud.], Notul. Syst. (Paris) 5: 112 (1936). – TYPE: [Vietnam], Annam, Dalat and vicinity, March–April 1932, *Squires 806* (lectotype K [K000884329], designated by Hansen, Opera Bot. 116: 42 (1992); isolectotypes A [A00067695], GH [GH00067684], MO [MO-266390], P [P02274455]).

Justicia calcicola Benoist, Notul. Syst. (Paris) 5: 122 (1936). – TYPE: [Vietnam], Tonkin, Cho-bo (rivière Noire) [‘Black river’], 16 November 1887, *Balansa 3468* (lectotype P [P00639605], designated by Hansen, Nordic. J. Bot. 9(2): 214 (1989)).

Justicia paupercula Benoist, Notul. Syst. (Paris) 5: 123 (1936). – TYPE: [Vietnam], Tonkin, Ke-so, e montibus Dong-chiem, 4 November 1884, *Bon 2801* (lectotype P [P00719958], designated by Hansen, Nordic. J. Bot. 9(2): 214 (1989)).

Polytrema javanicum Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Sect. 2. 45(2): 36 (1948). – TYPE: [Indonesia], Java, “Res. Batavia”, Depok, 8 October 1922, *Bakhuizen van der Brink Sr 5760* (lectotype L [L0002993], designated by Hansen, Opera Bot. 116: 42 (1992)).

A scrambling forest herb with a loose rhizome which leads to upright stems to 50 cm tall. **Stems** thickened above the nodes. **Leaves** opposite, usually equal; blade oblanceolate, c. 13×5 cm, base narrow and rounded-auriculate, tip acuminate, margin sparsely crenate, green, with short strigose hairs near veins on the abaxial surface, and on the basal portion of the lamina margin, where they form a marginal strip; the marginal strip extends through the petiole to the stem, and the hairy strips from opposing leaves merge and continue as a narrow strip downwards along the stem; petiole very short. **Inflorescence** very short, axillary, with c. 3 pairs of decussate bracts and a pair of flowers; anthesis in the inflorescences in the axes of the uppermost fully developed leaves, but below a new, developing pair of leaves; flowers with no detectable scent. **Calyx** deeply 5-lobed, united to c. 0.8 mm; calyx lobes narrowly lanceolate, $5\text{--}5.6 \times 0.5\text{--}0.6$ mm. **Corolla** with tube c. 1.9 cm long and c. 1.5 cm broad, adaxially glabrous except at the throat, abaxially covered in minute hairs, white, with pale yellow throat on the lower lip; upper lip 2-lobed, lower lip 3-lobed, middle lobe of lower lip with folded margins, therefore becoming convex, lateral lobes flat. **Stamens** 2, each with 2 equally presented thecae without spurs; staminodes absent; pollen grains round with several evenly spaced apertures. **Pistil** bicarpellate; style curved. **Fruit** splitting open upon drying, revealing four large jacobson's glands on each carpel wall, each holding a seed; seeds 4.

Distribution. The species is widespread, occurring in Thailand, Vietnam, Peninsular Malaysia, Sumatra, Borneo, Java and the Philippines. It is widespread in Peninsular Malaysia, where it is often found in limestone areas (Turner, 1997).

Habitat. In Singapore, the species occurs between large rocks in a humid primary forest, accompanied mostly by mosses and filmy ferns. Part of the population has been affected by a recent tree fall, but the plants are also thriving in the resulting canopy opening.

Provisional IUCN conservation assessment. Assessed here as globally Least Concern (LC). The species is widespread, and the large number of collections in herbaria (particularly at L and SING) suggests that it is fairly common. In Singapore, the only population is protected within Bukit Timah Nature Reserve, but the population is small (100–200 individuals) and with a restricted distribution (20 by 70 metres), and the species is best considered nationally Endangered (EN/D).

Specimens examined. PENINSULAR MALAYSIA: **Penang:** Muka Head, Aug 1886, *Curtis 954* (SING); Polo Boetong Reserve, Jul 1890, *Curtis s.n.* (SING); Penang Hill, Mar 1896, *Ridley s.n.* (SING). **Perak:** s.l., *Wray Jr. 3591* (K [K000884334]); Tapah, Oct 1894, *Curtis s.n.* (SING); Hermitage Hill, 1892, *Ridley s.n.* (SING); Kwala Depang, Sep 1898, *Ridley 9768* (SING [SING0194672]); Kamming, Feb 1904, *Ridley s.n.* (SING); Sungei Siput, Bukit Kapayung, Feb 1904, *Ridley s.n.* (SING); Kwala Kering, Jul 1909, *Ridley 14436* (SING); Ulu Temenggor, Jul 1909, *Ridley s.n.* (SING); Ulu Temango, Jul 1909, *Ridley 14437* (SING); Sungei Siput, limestone hill, 11 Sep 1920, *Burkill 6307* (SING); Sungei Siput, 12 Dec 1920,

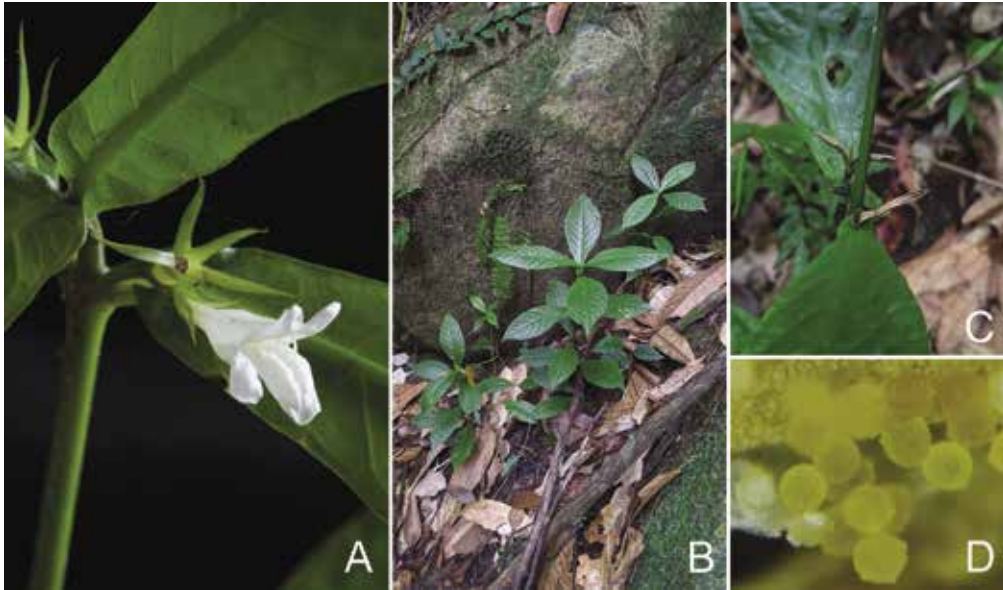


Fig. 2. *Ptyssiglottis kunthiana* (Wall. ex Nees) B.Hansen. **A.** Flowering plant. **B.** Plant in habitat. **C.** Open fruits. **D.** Pollen grains. From Niissalo & Choo SING2020-935. (Photos: M. Niissalo).

Mhd Haniff 6976 (SING); Gerik, 19 Jun 1924, *Burkill & Mhd Haniff 13619, 13639* (SING); Kuala Kangsar, Kali, 16 Jan 1925, *Mhd Haniff 14935* (SING); Sungei Seluang via Changkat Jong, Telok Anson, 16 Jul 1975, *Mhd Shah & Ahmad Shukor MS 3457* (SING). **Kelantan:** near Gua Musang, at Gua Tapah 1 limestone outcrop, on the west slope near the base, on limestone debris in shade, 100 m, 16 Aug 1971, *Chin 1591* (L [L2834466]). **Terengganu:** Dungun, Jengai F.R., 14 Mar 1998, *Anonymous s.n.* (SING). **Pahang:** Kuala Tahan, Feb 1921, *Seimund 907* (SING); Gunung Senyum, Jun 1917, *Hus s.n.* (K [K000884338]); Temerloh, Titi Bungor, 16 Mar 1923, *Henderson 10651* (SING); Raub, Gali Luan, 13 Nov 1924, *Burkill & Mhd Haniff 16212* (SING); Gunung Senyum, in gully, 31 Jul 1929, *Henderson s.n.* (SING); near Sungei Teloma, 25 Aug 1930, *Kiah & Strugnell 23949* (SING); Bentong, Bukit Chintamani, on limestone, 3 Oct 1931, *Henderson 25001* (SING); Taman Negara, plot 1 along Sungei Tahan trail c. 1.5 km from Kuala Tahan HQ, slightly disturbed rainforest, c. 90 m, 17 Apr 1975, *Van Balgooy 2434* (L [L2834465]); Taman Negara, Bukit Batu Laus, 21 Oct 1982, *Kiew RK 1232* (SING). **Selangor:** Gua Batu, Dec 1896, *Ridley s.n.* (SING). **Kuala Lumpur:** s.l., Feb 1890, *Curtis s.n.* (SING). **Negeri Sembilan:** Sungei Ujong, Bukit Sutu, 30 Oct 1885, *Alvins 1902* (SING); Bukit Tangga, 17 Dec 1920, *Ridley s.n.* (SING [SING0027218]). **Johor:** Pulau Aur, 1892, *Feilding s.n.* (SING); Bukit Penggaram, Nov 1900, *Ridley s.n.* (SING); Pulau Tinggi, south coast, Jun 1905, *Burkill s.n.* (SING); Pulau Tioman, Jaora Bay, Jun 1915, *Burkill s.n.* (SING); Kota Tinggi, 21 Jul 1929, *Teruya 835* (SING). **Undetermined:** Gulung, Aug 1880, *King's Collector 486* (K [K000884333]).

SINGAPORE: Bukit Timah Nature Reserve, 9 Oct 2020, *Niissalo SING2020-837* (SING); ibidem, 23 Oct 2020, *Niissalo & Choo SING2020-935* (SING).

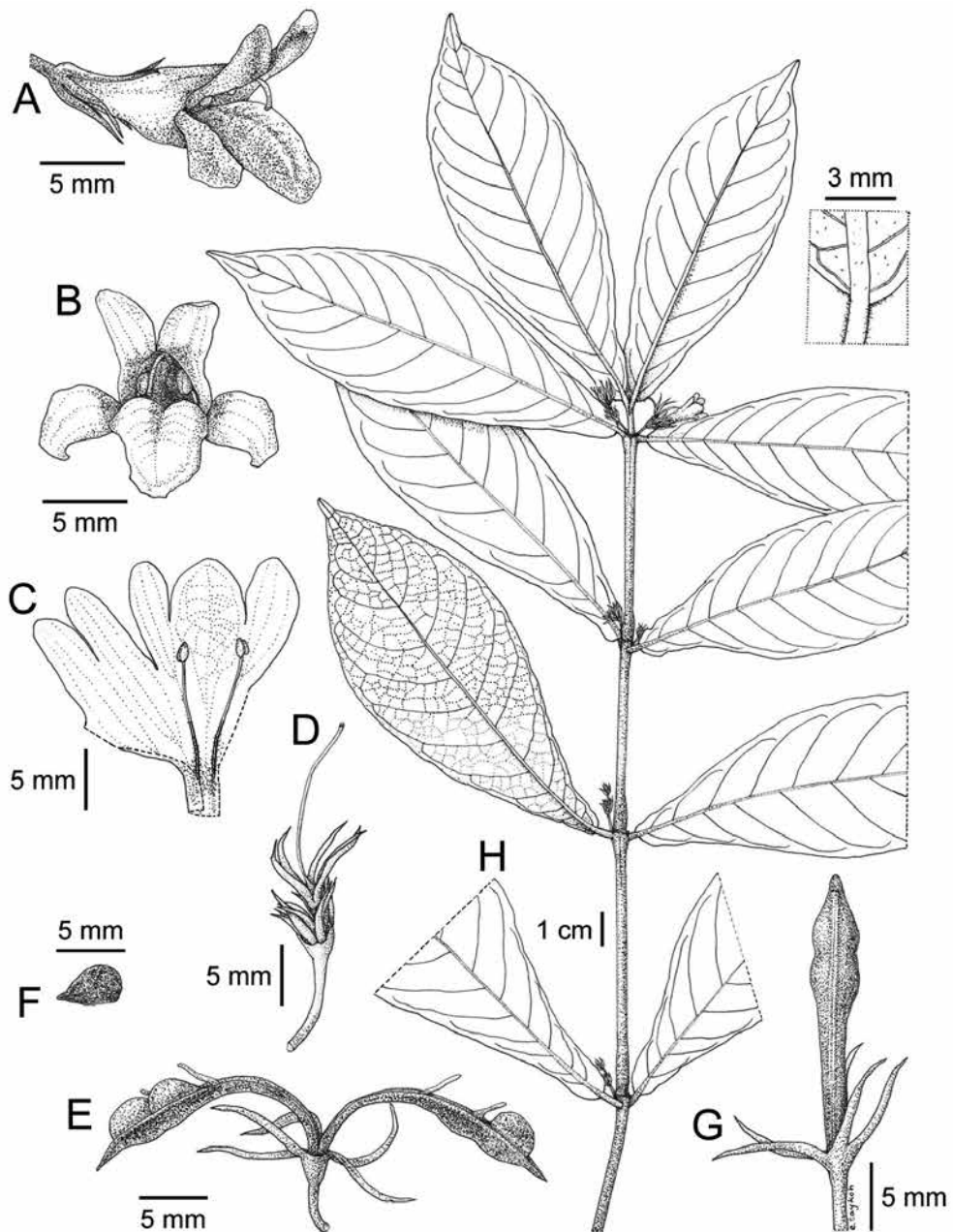


Fig. 3. *Ptyssiglottis kunthiana* (Wall. ex Nees) B.Hansen. **A.** Flower, side view. **B.** Flower, front view. **C.** Dissected corolla tube. **D.** Inflorescence, including calyx, pistil and bracts. **E.** Dehiscent fruit with seeds. **F.** Seed. **G.** Fruit before dehiscence. **H.** Habit. Inset: Indumentum showing a marginal strip of hairs at the base of the leaf. A–B, E–G from Niissalo & Choo SING2020-935; C–D, H & H inset from Niissalo SING2020-837. Drawing by Evonne Tay Koh.

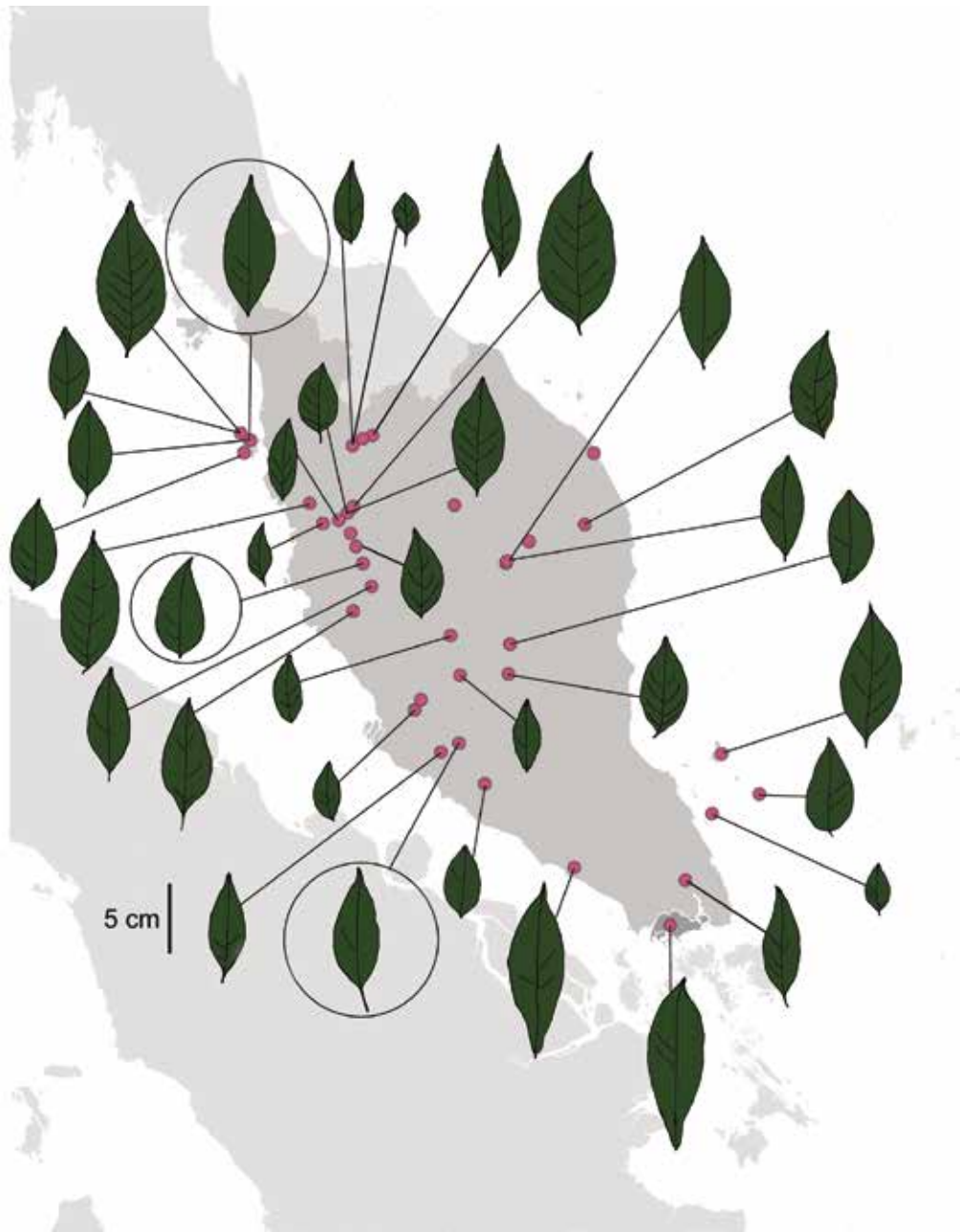


Fig. 4. Diversity in leaf shape in collections of *Ptyssiglottis kunthiana* (Wall. ex Nees) B.Hansen in Peninsular Malaysia. Type collections of relevant epithets are marked with circles.

Notes. The genus level placement of the plants was confirmed using plastome DNA from *trnL*-CAA to *trnF* (partial sequences), including the full length of their intergenic region with primers *trnFf* and *trnLc* (Taberlet et al., 1991), Genbank accession:

MW672103, though it was not possible to unambiguously distinguish *Ptyssiglottis* from some closely related genera.

Ptyssiglottis kunthiana was identified by comparing the plants to herbarium material available online and in SING. *Ptyssiglottis kunthiana* is the only species of *Ptyssiglottis* that matches our material in overall vegetative morphology and flower and inflorescence details (Hansen, 1992). The plants in Singapore fit within *Ptyssiglottis kunthiana* based on the structure of the inflorescence (two nearly sessile flowers surrounded by several tightly clustered pairs of bracts) and flower details (equal arrangement of anther cells, deep lobes in both corolla lips), number of seeds, as well as overall morphology. This species is vegetatively diverse, particularly in relation to anisophylly (strongly anisophyllous to fully isophyllous). The Singapore material differs from most other collections in its combination of very short petioles and large oblanceolate and rounded to auriculate leaf bases. The leaf outline is highly similar to *Ptyssiglottis psychotriifolia* (Stapf) B.Hansen and *P. glabrisepala* (Lindau) B.Hansen, but in inflorescence details those species are clearly distinct. Only one collection of *Ptyssiglottis kunthiana*, from Bukit Penggaram, Johor, Peninsular Malaysia (Ridley s.n., 1900, SING), shares all these characteristics with the plants from Singapore. The species is vegetatively so diverse, that it is likely this rare leaf shape is not taxonomically significant. We mapped the leaf outlines of specimens from Peninsular Malaysia (Fig. 4) to show that the leaf shape seems to be randomly distributed and that in the wide variation present in the specimens, there are materials that overlap with Singapore materials in individual characteristics. The Singapore and Bukit Penggaram materials are not taxonomically distinct.

The synonymy of this species was discussed by Hansen (1989, 1992) and Turner (1997), and we follow their assessment. We think that *Ptyssiglottis isophylla* (C.B.Clarke) B.Hansen, characterised only by long petioles, should also be critically assessed because the petiole length of *P. kunthiana* is very variable and *P. isophylla* is likely part of that variation. However, we have not yet seen the type sheets of *Ptyssiglottis isophylla* (CAL0000020362, CAL0000020363) so reserve judgement on its synonymy.

Two other species of *Ptyssiglottis* have so far been sequenced and are available in GenBank (*P. pubisepala* (Lindau) B.Hansen, AF289744, and *P. psychotriifolia*, MK282397; more accessions for both exist for other genetic regions). Based on our sequence analysis and that reported in Darbyshire et al. (2019), there is no support for the monophyly of *Ptyssiglottis* in relation to some closely related genera (at least *Marcania* J.B.Imlay, *Monotheceium* Hochst., *Jadunia* Lindau and *Calycacanthus* K.Schum.). The relationships of these genera require further study; this may result in major nomenclatural changes.

In Singapore, flowering has been observed in the early morning, with all flowers closed by noon. It is possible that the flowers are open at night, as has been observed in other *Ptyssiglottis* species (Hansen, 1992). The position of the flowers at anthesis in Singapore is somewhat unusual, as the youngest pair of leaves starts to develop before the flowers open: outside of Singapore, flowers often develop relatively faster, and at anthesis are held above the plant. However, the character is variable across the range.

3. *Plectocomiopsis* cf. *corneri* Furtado, Gard. Bull. Singapore 13: 333 (1951); Dransfield, Man. Rattans Malay Penins. 65 (1979), except record for Perak; Dransfield, Kew Bull. 37(2): 250 (1982). – TYPE: Peninsular Malaysia, Terengganu, Kemaman, Sungei Nipah, 24 November 1935, *Corner SFN 30562* (lectotype SING [SING0056770], designated by Dransfield, Kew Bull. 37(2): 250 (1982); isolectotypes A [A00028446, A00028447], K [K000207868, K000207869, K000207870], L [L0042168]). (Fig. 5).

A large clumping rattan to 10 m tall. *Leaves* c. 125 cm long, with glaucous bloom, with four subopposite pairs of leaflets, cirrus c. 46 cm, knee absent, internodes c. 22 cm long, ocrea c. 1.5 cm, orange-yellow, spines very sparse, orange, including few spines on the leaf sheaths. *Leaflets* c. 37 × 5 cm, dark green except for waxy coating. *Flagellae* absent.

Distribution. We have not seen specimens apart from those of the type collection. Dransfield (1982) states that the species is only known from the type locality and in Bukit Galing, Pahang. Earlier Dransfield (1979) also mentioned a population in Johor, but it is not clear if it refers to the same species.

Habitat. Little is known about the habitat of this species; the few existing notes on habitat types could also be referring to *Plectocomiopsis mira* J.Dransf. In Singapore, the plant grows in a humid environment under a sparse canopy at the margin of primary lowland dipterocarp forest and old secondary forest.

Provisional IUCN conservation assessment. Globally Data Deficient (DD). In Singapore, not native.

Specimen examined. SINGAPORE: Bukit Timah Nature Reserve, 4 Dec 2020, Niissalo *et al.* SING2020-1196 (SING).

Notes. *Plectocomiopsis* cf. *corneri* was identified using the key in Dransfield (1979). At the time, the species was considered unmistakable among rattans due to the presence of a long, entire, golden ligule and the absence of a knee on the leaf sheath. However, *Plectocomiopsis mira* J.Dransf., described in 1982, is vegetatively identical to *P. corneri*. Our identification, in part, therefore relies on the existence of a Corner collection from Peninsular Malaysia, and the identity of the Singapore material can only be confirmed if pistillate flowering material becomes available. *Plectocomiopsis mira* is known mainly from Borneo, but is also present in Sumatra and Peninsular Malaysia. *Plectocomiopsis mira* was not known to have been collected by Corner, and therefore the collections do not coincide with known plant introductions to Bukit Timah. If the identification of the plant is changed when it flowers, its native status should also be reassessed. Unfortunately, only staminate flowers are known from *Plectocomiopsis mira* in Peninsular Malaysia, and only pistillate flowers are known

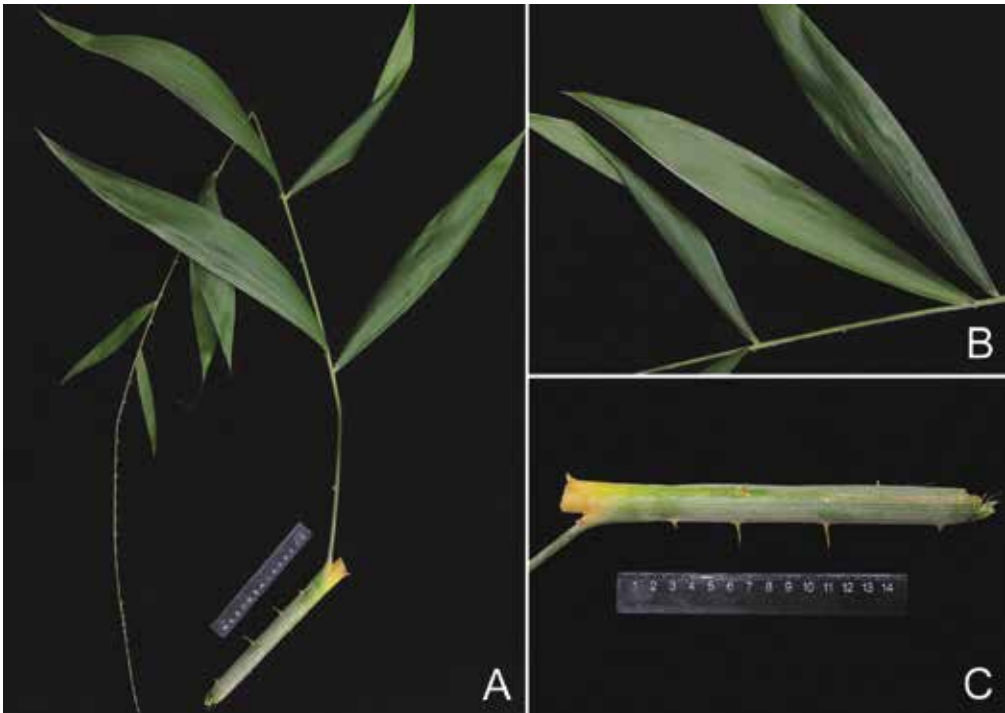


Fig. 5. *Plectocomiopsis* cf. *corneri* Furtado. **A.** Leaf with interpetiolar portion of the leaf sheath. **B.** Detail of leaflets. **C.** Detail of leaf sheath and ocrea. From Niissalo *et al.* SING2020-1196. (Photos: W.H. Lim).

from *P. corneri*, and therefore their taxonomic distinction in this region has not been confirmed.

Based on the notes of the type material, *Plectocomiopsis corneri* is dioecious and hapaxanthic. The only fertile material known of this species is of infructescences. They have three orders of branching (two in *Plectocomiopsis mira*), the last order bearing one or two flowers/fruits.

Apart from confusion with the vegetatively similar *Plectocomiopsis mira*, this species is easily identified. Like other rattans in Plectocomiinae, it is a large plant without a knee in the leaf sheath. It is easily distinguished from *Myrialepis* Becc. and *Plectocomia* Mart. & Blume by its sparse sheath spines which do not form rings, and from other *Plectocomiopsis* species by having a long, persistent, golden yellow ligule. The only other *Plectocomiopsis* species recorded in Singapore, *P. geminiflora* (Griff.) Becc., has a soon degrading papery ligule, spines on top of the leaflets (absent in *P. corneri*), and more numerous and much narrower leaflets (Tan *et al.*, 2011; only few, broad leaflets in *P. corneri*). Ligules are absent or minute in *Plectocomia* and *Myrialepis*.

ACKNOWLEDGEMENTS. The authors would like to thank Evonne Tay Koh for her illustration of *Ptyssiglottis kunthiana*, Dr Ian Turner, Singapore Botanical Liaison Officer at Kew for information on specimens housed at K, and Dr Carrie Kiel from California Botanic Gardens, Claremont Graduate University for providing references on *Ptyssiglottis*. We would also like to thank the editor Dr David Middleton and two anonymous reviewers for their constructive comments on this paper.

References

- Chan, P.J., Ting, Y.Y., Rahman, N.E., Chong, R., Lam, W.N. & Chong, K.Y. (2020). Notes on *Acer laurinum* (Sapindaceae) in freshwater swamp forest in Singapore. *Gard. Bull. Singapore* 72: 165–172.
- Chen, J., Turner, I.M., Saunders, R.M.K. & Thomas, D.C. (2018). *Artabotrys scortechinii* (Annonaceae): an augmented species description and a new record for Singapore. *Gard. Bull. Singapore* 70: 3–8.
- Chen, L.M.J., Ho, B.C., Choo, L.M. & Koh, S.L. (2018a). Additions to the flora of Singapore, new and overlooked records of naturalised plant species (1). *Gard. Bull. Singapore* 70: 91–101.
- Chen, L.M.J., Lua, H.K., Yeo, R.S.W., Choo, L.M., Ho, B.C., Chua, K.S. & Koh, S.L. (2018b). Additions to the flora of Singapore—new and overlooked records of naturalised plant species (2). *Nat. Singapore* 11: 63–75.
- Chen, L.M.J., Duyfjes, B.E.E., Ibrahim, A. & De Wilde, W.J.J.O. (2019a). Flora of Singapore precursors, 16: New records and notes on the plant diversity of Singapore. *Gard. Bull. Singapore* 71: 401–406.
- Chen, L.M.J., Lai, J.T.K., Ibrahim, A., Sim, P.P., Koh, S.L., Choo, L.M., Yeo, R.S.W., Lee, J.J.R. & Ho, B.C. (2019b). *Piriqueta racemosa* (Jacq.) Sweet (Passifloraceae), a new record of naturalisation, and a new generic record for Singapore. *Hikobia* 18: 7–10.
- Chen, L.M.J., Lua, H.K., Yeo, R.S.W., Choo, L.M., Lim, W.H., Athen, P., Chua, K.S., Koh, S.L. & Ho, B.C. (2020). Additions to the Flora of Singapore: New and overlooked records of exotic plant species (3). *Nat. Singapore* 13: 27–37.
- Chen, S.-P., Tian, H.-Z., Guan, Q.-X., Zhai, J.-W., Zhang, G.-Q., Chen, L.-J., Liu, Z.-J., Lan, S.-R. & Li, M.-H. (2019). Molecular systematics of Goodyerinae (Cranichideae, Orchidoideae, Orchidaceae) based on multiple nuclear and plastid regions. *Molec. Phylogen. Evol.* 139: 106542.
- Chong, K.Y., Lim, R.C.J., Loh, J.W., Neo, L., Seah, W.W., Tan, S.Y. & Tan, H.T.W. (2018). Rediscoveries, new records, and the floristic value of the Nee Soon freshwater swamp forest, Singapore. *Gard. Bull. Singapore* 70(Suppl. 1): 49–69.
- Choo, L.M. & Ngo, K.M. (2020). A revision of the genus *Sindora* (Fabaceae, Detarioideae) in Peninsular Malaysia and Singapore. *Gard. Bull. Singapore* 72: 233–254.
- Choo, L.M., Yeo, R.S.W., Ho, B.C., Ong, K.H. & Chen, L.M.J. (2020). Additions to the Flora of Singapore: new and overlooked records of naturalised plant species (4). *Nat. Singapore* 13: 39–45.
- Darbyshire, I., Kiel, C.A., Daniel, T.F., McDade, L.A. & Luke, W.R.Q. (2019). Two new genera of Acanthaceae from tropical Africa. *Kew Bull.* 74(3): 39.
- Davison, G.W.H., Ng, P.K.L. & Ho, H.C. (eds) (2008). *The Singapore Red Data Book: Threatened Plants and Animals of Singapore*, ed. 2. Singapore: Nature Society (Singapore).

- De Kok, R.P.J. (2015). *Cryptocarya nitens* (Lauraceae), a new species record for Singapore. *Gard. Bull. Singapore* 67: 253–259.
- De Vogel, E.F., Vermeulen, J.J. & Schuiteman, A. (2020). *Orchids of New Guinea*. www.orchidsnewguinea.com. Accessed 5 Mar. 2021.
- Dransfield, J. (1979). *A Manual of the Rattans of the Malay Peninsula*. Kuala Lumpur: Forest Dept., Ministry of Primary Industries, Malaysia.
- Dransfield, J. (1982). A Reassessment of the Genera *Plectocomiopsis*, *Myrialepis* and *Bejaudia* (Palmae: Lepidocaryoideae). *Kew Bull.* 37(2): 237–254.
- Go, R., Eng, K.H., Mustafa, M., Ong Abdullah, J., Naruddin, A.A., Lee, N.S., Lee, C.S., Eum, S.M., Park, K.W. & Choi, K. (2011). An assessment of orchids' diversity in Penang Hill, Penang, Malaysia after 115 years. *Biodivers. & Conservation* 20: 2263–2272.
- Hansen, B. (1989). Notes on SE Asian Acanthaceae 1. *Nordic J. Bot.* 9: 209–215.
- Hansen, B. (1992). The genus *Ptyssiglottis* (Acanthaceae). A taxonomic monograph. *Opera Bot.* 116: 1–58.
- Ho, B.C., Lua, H.K., Leong, P.K.F., Lindsay, S., Seah, W.W., Ibrahim, B., Loo, A., Koh, S., Ibrahim, A. & Athen, P. (2018). New records and rediscoveries of vascular plants in Bukit Timah Nature Reserve, Singapore. *Gard. Bull. Singapore* 70: 33–55.
- 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. Available from <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.
- Khoo, M.S., Chua, S.C. & Lum, S.K.Y. (2018). An annotated list of new records for Singapore: results from large-scale tree surveys at the Bukit Timah Nature Reserve. *Gard. Bull. Singapore* 70: 57–65.
- Leong, P.K., Lee, C., Tay, F.E.L., Ang, P. & Yam, T.W. (2017). *Pinalia floribunda* (Lindl.) Kuntze (Orchidaceae): Rediscovery and conservation of a species thought extinct in Singapore. *Nat. Singapore* 10: 67–71.
- Leong, P.K., Lee, C., Teo, S., Tay, F.E.L., Ang, P., Lin, E.S. & Yam, T.W. (2018). *Acriopsis ridleyi* Hook. f. (Orchidaceae): Re-encounter of an orchid thought extinct since its 1889 holotype collection in Singapore. *Nat. Singapore* 11: 27–36.
- Leong-Škorničková, J. & Boyce, P.C. (2015). *Hanguana* in Singapore demystified: an overview with descriptions of three new species and a new record. *Gard. Bull. Singapore* 67: 1–28.
- Lim, R.C.J., Lindsay, S., Middleton, D.J., Ho, B.C., Leong, P.K.F., Niissalo, M.A., Van Welzen, P.C., Esser, H.-J., Ganesan, S.K., Lua, H.K., Johnson, D.M., Murray, N.A., Leong-Škorničková, J., Thomas, D.C. & Ibrahim, A. (2018a). New records and rediscoveries of plants in Singapore. *Gard. Bull. Singapore* 70: 67–90.
- Lim, R.C., Ng, X.Y., Yeo, C.K. & Ang, W.F. (2018b). Rediscovery in Singapore of *Fagraea splendens* Blume (Gentianaceae), with notes on propagation. *Nat. Singapore*: 11: 7–14.
- Niissalo, M.A. & Leong-Škorničková, J. (2017). *Hanguana podzolicola* (Hanguanaceae), a new record for Singapore. *Gard. Bull. Singapore* 69: 157–165.
- Niissalo, M.A., Wijedasa, L.S., Boyce, P.C. & Leong-Škorničková, J. (2014). *Hanguana neglecta* (Hanguanaceae): a new plant species from a heavily collected and visited reserve in Singapore. *Phytotaxa* 188(1): 14–20.
- Niissalo, M.A., Khew, G.S., Webb, E.L. & Leong-Škorničková, J. (2016). Notes on Singaporean native Zingiberales II: Revision of Marantaceae, with a new generic record, and notes on naturalised and commonly cultivated exotic species. *Phytotaxa* 289(3): 201–224.
- Niissalo, M.A., Choo, L.M., Kurzweil, H., Yam, T.W. & Khew, G.S. (2020). A new species of *Nervilia* (Orchidaceae) from Singapore. *Gard. Bull. Singapore* 72: 1–14.

- Pace, M.C. (2020). A recircumscription of *Goodyera* (Orchidaceae), including the description of *Paorchis* gen. nov., and resurrection of *Cionisaccus*, *Eucosia*, and *Salacistis*. *Brittonia* 72: 257–267.
- Ridley, H.N. (1908). New or Rare Malayan Plants. Series IV. *J. Straits Branch Roy. Asiat. Soc.* 50: 111–152.
- Rodda, M. & Lai, J. (2018). The rediscovery of *Hoya obtusifolia* (Apocynaceae, Asclepiadoideae) in Singapore. *Nat. Singapore* 11: 45–51.
- Seah, W.W. & Wong, K.M. (2018a). Flora of Singapore precursors, 1. *Gynochthodes praetermissa* (Rubiaceae: Morindeae), a new West Malesian species, with notes on related taxa. *Gard. Bull. Singapore* 70: 267–273.
- Seah, W.W. & Wong, K.M. (2018b). Flora of Singapore precursors, 7. A newly diagnosed species of *Neonauclea* (Rubiaceae: Naucleaeae) now extinct in Singapore and notes on *Neonauclea excelsa* and *N. calycina*. *Gard. Bull. Singapore* 70: 289–294.
- Seidenfäden, G. & Wood, J.J. (1992). *The Orchids of Peninsular Malaysia and Singapore*. Fredensborg: Olsen & Olsen.
- Taberlet, P., Gielly, L., Pautou, G. & Bouvet, J. (1991). Universal primers for amplification of three non-coding regions of chloroplast DNA. *Pl. Molec. Biol.* 17: 1105–1109.
- Tan, L.L., Lum, S.K.Y. & Loo, A.H.B. (2011). *Plectocomiopsis geminiflora* (Griff.) Becc. (Arecaceae)—A new record for Singapore. *Nat. Singapore* 4: 1–4.
- Tan, S.Y., Chong, K.Y., Neo, L., Koh, C.Y., Lim, R.C.J., Loh, J.W., Ng, W.Q., Seah, W.W., Yee, A.T.K. & Tan, H.T.W. (2016). Towards a field guide to the trees of the Nee Soon Swamp Forest (IV): *Xanthophyllum* (Polygalaceae). *Nat. Singapore* 9: 139–147.
- Turner, I.M. (1997 [‘1995’]). A catalogue of the vascular plants of Malaya. *Gard. Bull. Singapore* 47: 37–346.
- Van Welzen, P.C., Middleton, D.J. & Lindsay, S. (2020). Flora of Singapore precursors, 21: New records of Euphorbiaceae for Singapore. *Gard. Bull. Singapore* 72: 143–158.
- White, T.J., Bruns, T., Lee, S. & Taylor, J. (1990). Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In: Innis, M.A., Gelfand, D. H., Sninsky, J.J. & White, T.J. (eds) *PCR Protocols: A Guide to Methods and Applications*, pp. 315–322. New York: Academic Press.
- Wong, K.M. (2018). Flora of Singapore Precursors, 11. A new species of *Urophyllum* (Rubiaceae) from the Malay Peninsula. *Phytotaxa* 373(3): 236–240.
- Wong, K.M. & Lua, H.K. (2018). Flora of Singapore precursors, 3. A new species of *Canthium* (Rubiaceae: Vanguerieae) previously confused with *C. horridum*. *Gard. Bull. Singapore* 70: 275–282.
- Wong, K.M. & Mahyuni, R. (2018). Flora of Singapore Precursors, 2. A new species and two new combinations in *Psydrax* (Rubiaceae: Vanguerieae) for West Malesia. *Reinwardtia* 17(1): 77–84.