

## Flora of Singapore precursors, 3. A new species of *Canthium* (Rubiaceae: Vanguerieae) previously confused with *C. horridum*

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**ABSTRACT.** *Canthium malayense* K.M.Wong is described as a new species mainly occurring in the Malay Peninsula but also found in Sumatra and Borneo. It was previously confused with the Javanese *Canthium horridum* Blume. Differences in the morphology of the two species are discussed.

**Keywords.** Borneo, *Canthium malayense*, conservation assessment, Java, Peninsular Malaysia, Sumatra

### Introduction

Although *Canthium* s.l. remains a heterogeneous complex of taxa (Bridson, 1985, 1992; Wong, 1988, 1989; Lantz & Bremer, 2004; Razafimandimbison et al., 2009), its type alliance is a morphologically distinct group of species that share a number of interesting features. The type species, *Canthium parviflorum* Lam. (= *C. coromandelicum* (Burm.f.) Alston) from India and Sri Lanka, and its close allies have a scrambling or climbing habit or are shrubs to small trees with scrambling branches, they develop spines from supernumerary axillary buds, and the flowers are solitary, fasciculate or in small cymes (Bridson, 1985, 1992). The flowers or inflorescences occur in the axils of leaves on normal shoots (i.e., those developing elongate internodes), as well as in the axils of both normal leaves and scale-like or bract-like reduced leaves found on axillary short-shoots ('brachyblasts', with internodes condensed into a very short axis) (Wong, 1988, 1989). The minute flowers have short corolla tubes slightly constricted just below the lobes with a ring of reflexed hairs within, exerted anthers, mitriform stigmas (with a basal recess where the stigma is inserted on the style), and 2-locular ovaries. A number of non-spiny, arborescent taxa of *Canthium* s.l., which do not develop brachyblasts, have been removed or maintained as distinct genera, such as *Psydrax* Gaertn. (Bridson, 1985; Wong, 1988, 1989; Ridsdale, 1998; Chen et al., 2011; Arriola & Alejandro, 2013; Mahyuni et al., 2018; Wong & Mahyuni, 2018), *Keetia* E.Phillips (Bridson, 1986), *Pyrostria* Comm. ex A.Juss. (Bridson, 1987; Davis et al., 2007; Razafimandimbison et al., 2007, 2009; Alejandro et al., 2014; Arriola et al., 2015, 2016a), *Afrocanthium*

(Bridson) Lantz & B. Bremer (Lantz & Bremer, 2004), *Cyclophyllum* Hook.f. (Davis & Ruhsam, 2005), *Peponidium* (Baill.) Arènes (Razafimandimbison et al., 2007), *Bullockia* (Bridson) Razafim. et al. (Razafimandimbison et al., 2009) and *Kanapia* Arriola & Alejandro (Arriola et al., 2016b).

Although the spiny, brachyblast-forming *Canthium* taxa are morphologically distinctive, they have not been revised over the Southeast Asian region and only a few, older, local accounts exist, such as for Thailand (Craib, 1932) and the Malay Peninsula (Ridley, 1923; Wong, 1988, 1989; Keng, 1990). In many cases, good specimen material is lacking but in others some names have been misapplied. In the Malay Peninsula, an undescribed species has long had the name *Canthium horridum* Blume applied to it, ever since Hooker (1880) referred Malayan material to it in the *Flora of British India*.

In the following parts, herbarium acronyms are used according to Thiers (continuously updated).

### *Canthium horridum* Blume

*Canthium horridum* Blume has ascending straight spines and chartaceous leaves with acuminate apices, spreading hairs on the midrib and veins, and immersed and flat secondary veins on the upper surface. Its flowers have 0.5–1 mm long calyx lobes. The new species below that is named *Canthium malayense* has recurved spines, coriaceous leaves with acute to cuspidate apices, appressed hairs on the midrib and veins, and impressed secondary veins on the upper surface. The calyx lobes are 0.3 mm long.

The type of *Canthium horridum* is an unnumbered Blume collection from Java (lectotype L [L0000179], designated here), which is the only specimen sheet on which the vernacular name mentioned in Blume's protologue, *Tumbun Kanjut*, is written in Blume's hand. The species recorded as *Canthium* sp. 1 by Wong (1988, 1989) is in fact *Canthium horridum*. In the *Flora of Java* (Backer & Bakhuizen van den Brink, Jr, 1965), Bakhuizen erroneously considered *Canthium scandens* Blume (with recurved spines, acute corolla lobe tips) as a synonym of *C. horridum* (straight spines, apiculate corolla lobe tips).

*Distribution.* *Canthium horridum* is distributed in Java and northern Borneo but is apparently rare in Sumatra and the Malay Peninsula.

*Additional specimens examined (Canthium horridum).* BORNEO: BRUNEI: **Belait:** Bukit Teraja, 8 Dec 1991, *Coode et al.* 6984 (BO [0030577]), BRUN, K, KEP [KEP208527], SING [SING0189302]). MALAYSIA: **Sabah:** Beluran, Nangoh, Sungai Padau Madau, 6 Dec 1983, *Rahim SAN 101787* (SAN); Keningau, Crocker Range Forest Reserve, 7 Jun 1977, *Talip & Ejan SAN 85411* (KEP, SAN, SAR); Keningau, Pisagon, 17 Jun 1989, *Sumbing SAN 127612* (SAN); Nabawan, Labou F.R., 21 May 1992, *Asik SAN 129965* (SAN); Ranau, 11 Oct 1986, *Amin & Jarius SAN 116365* (SAN); *ibid.*, 19 Nov 1986, *Amin & Jarius SAN 116576* (SAN); *ibid.*, 22 Jun 1987, *Amin et al. SAN 118148* (SAN); *ibid.*, 17 Jul 1987, *Amin & Francis SAN 118233* (SAN); *ibid.*, 17 Jul 1989, *Amin & Suin SAN 129118* (SAN); Ranau, Badukan, 29 Jul 1987, *Amin & Francis SAN 118296* (SAN); Ranau, Kampung Nalumad, 8 Oct 1998, *Daim*

1032 (K, KEP); Ranau, Kampung Pinawantai, NW, 1800 m asl, 11 May 1973, *Shea & Aban SAN 76925* (SAN); Ranau, Kampung Poring, 2 May 1996, *Sani 634* (K, KEP [KEP4874]); Ranau, Kampung Takutan, 3 Jan 1994, *Dius 598* (K, SAN); *ibid.*, 19 Mar 1995, *Lomudin 64* (K, SAN); Ranau, Kampung Takutan W, 1500 m asl, 23 May 1973, *Shea & Aban SAN 77138* (SAN); Ranau, Karipir, 16 Apr 1988, *Amin & Suin SAN 123203* (SAN); Ranau, Napong, 27 Jun 1986, *Amin & Francis SAN 115958* (SAN); Ranau, Sungai Nawanon, 17 Jun 1985, *Amin et al. SAN 109756* (SAN); Sandakan, Ulu Dusun Mile 30, 22 Aug 1977, *Lantoh SAN 87874* (SAN); Ulu Dusun Mile 32, 9 Aug 1973, *Aloysius SAN 76675* (SAN); Tambunan, 26 Jul 1925, *s. coll. CF 5259* (SING [0189303]); *ibid.*, 18 Nov 1989, *Joseph & Donggop SAN 128642* (SAN); Tawau, Agriculture Res. Mile 15, 17 Nov 1964, *Nordin SAN 47802* (SAN); Apas road Mile 16, 7 Jun 1963, *Aban SAN 35990* (SAN); Tawau Hills Park, 14 Oct 1985, *Madani & Sigin SAN 111471* (SAN); Tenom, 14 Aug 1993, *Fidilis SAN 136119* (SAN); Tenom, Kaang, 13 Mar 1987, *Sumbing & Asik SAN 120112* (SAN); Tenom, Kampung Bekuku S, c. 20 miles from Kuala Tomani, 9 Jun 1979, *Madani SAN 90833* (SAN); Tenom, Sapong, Paal, 14 Oct 1961, *Buntar SAN 27277* (K, SAN).

JAVA: without specific locality, without date, *Blume s.n.* (L [L0000180, L0000181, L0000182, L0000183]); *Zollinger 501* (L [L0000178]). **Central Java:** Banjoemas [=Banyumas], Madjenang, 17 Jan 1915, *Backer 18500* (BO [1335919]); *ibid.*, 21 Jan 1915, *Backer 18644* (BO [1335918]); Banjoemas, Tjilatjap, Noesakambangan, 26 Dec 1895, *Koorders 22018β* (BO [1427474, 1427475]); *ibid.*, 3 Oct 1896, *Koorders 24715β* (BO [1427476]); Pekalongan, Soebah, 4 Apr 1918, *Beumèe 1969* (BO [1562180]); Rembang, Ngawen, 13 Feb 1930, *Hildebrand 35* (BO [1335909]); Semarang, NW Moeriah, 28 Sep 1912, *van Leeuwen 753* (BO [1335914, 1335915, 1335916]). **East Java:** Kediri, 1922, *Kramer 28* (BO [1322705]); Poeger, G. Sadeng, 29 Dec 1914, *Backer 18271* (BO [1643208, 1643209, 1643210, 1643211, 1643212, 1643213, 1643214]); Redjoso [=Rejoso], 25 Apr 1925, *van Leeuwen 12529* (BO [1327339, 1327340, 1327341]). **Jakarta:** Batavia [=Jakarta], locality unclear, 10 Jun 1924, *Bakhuizen v.d. Brink 3376* (BO [1327342, 1327343]); Handjwoeng, 29 Dec 1912, *Backer 6247* (BO [1335923, 1335924]). Rawa Bodjong, Kp. Tigarakan, 10 Oct 1941, *van Steenis 12574* (BO [1643207]). **West Java:** Bantam [=W Java], Tjiringin, Tjamara, G. Rompong, 27 Jun 1892, *Koorders 6551β* (BO [1327274]); Buitenzorg [=Bogor], 14 Jul 1896, *Hallier 621* (BO [1335928]); Kp. Boenar, G. Tendjoleat, 18 Nov 1941, *van Steenis 12679* (BO [1643206]); Depok, 8 Sep 1898, *S.H. Koorders 31251β* (BO [1327282]); Djasinga [=Jasinga], G. Paniis, 1913, *Backer 10403* (BO [1322705, 1326374, 1326375, 1326376, 1326377]); Preanger [=Priangan /Parahyangan], Lengkong, 12 Nov 1914, *Backer 17004* (BO [1327035, 1327036, 1327037, 1327038]); Soekaboemi, Palabooanratoe, date unclear, *Koorders 15738* (BO [1427361]); Tjibadak, 380 m, 1912, *Backer 583* (BO [1327039, 1327040]); Tjissalak, 7 Aug 1901, *Koorders 38964β* (BO [1327283]); Lengkong, 15 Nov 1914, *Backer 17100* (BO [1335920]); Poerwakarta [Purwakarta], E. Tjikoempai, 21 Aug 1921, *Harmsen 1* (BO [1335927]).

PENINSULAR MALAYSIA: **Pahang:** Tembeling, 24 Apr 1931, *Holtum s.n.* (SING [SING0189495]); *ibid.*, 25 May 1931, *Henderson SFN 24517* (SING [SING0190630]). **Perak:** Grik, 18 Jun 1924, *Burkill SFN 12436* (SING [SING0190629]). **Selangor:** Ulu Langat, 1 Jun 1958, *Gadoh anak Umbai & Hillard K.L. no. 380* (KEP [KEP161821]).

SUMATRA: **North Sumatra:** Tapanuli Selatan, Sipirok, Sumuran, Dolok Sibual-buali, 1200 m asl., 8 Mar 1983, *Zahro 83* (BO, L). **South Sumatra:** Palembang, no specific locality, 6 Oct 1928, *de Voogd 244* (BO [1643215]); Martapoera, Feb 1930, *Bal 42* (BO [1643216, 1643217]).

### The new species

***Canthium malayense* K.M.Wong, sp. nov.**

This new species superficially resembles *Canthium horridum* Blume, from which it differs by its recurved (not straight) spines and leaves that are coriaceous (not chartaceous) with acute to cuspidate (not acuminate) apices, appressed (not spreading) hairs on the midrib and impressed (not immersed or flat) secondary veins on the upper surface; also the calyx lobes are shorter, c. 0.3 mm long (not 0.5–1 mm long). – TYPE: *H.K. Lua SING 2018-320*, Singapore, Nee Soon Freshwater Swamp Forest, Mandai Track 7, 29 Mar 2018 (holotype SING [SING0238285]; isotypes A, K). (Fig. 1).

*Canthium horridum* auct. non Blume: Hook.f., Fl. Brit. India 3: 135 (1880); Ridley, Fl. Malay Penins. 2: 123 (1923); Craib, Fl. Siam. 2: 140 (1932); Wong, Arbor. Rubiaceae Malaya 45 (1988); Wong, Tree Fl. Malaya 4: 341 (1989) (in clavi); Keng, Concise Fl. Singapore, Gymn. Dicot. 152 (1990); Turner, Gard. Bull. Singapore 47: 420 (1997 [‘1995’]).

*Canthium parvifolium* auct. non Roxb.: King & Gamble, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 73(3): 59 (1904).

Scrambling shrub, liana or small tree to 3 m tall with straggly and spiny branches; axillary spines paired, slightly to strongly recurved. **Stipules** broad-triangular, c. 1.5 mm long, acute, not keeled. **Leaves** ovate, 1.2–4.7 × 0.8–2.5 cm, apex acute to short-cuspidate, base cuneate to rounded, coriaceous, midrib impressed on upper surface, prominent on lower, secondary veins 3–4(–5) pairs, impressed on upper surface, prominent on lower, both midrib and veins with appressed short hairs less than 0.5 mm long on both surfaces, the lamina with sparse similar appressed hairs or glabrescent on both surfaces; petioles 2–3 mm long. **Inflorescence** 1-flowered, borne in the axils of leaves on normal shoots or both leaves and bracts on brachyblasts; peduncle c. 1.5 mm long. **Flower** pedicel 0.5–1 mm long, glabrous, subtended by two small bracts; calyx broadly obconical, 1.2–1.5 mm long, subglabrous, limb c. 0.5 mm long bearing 5 deltoid lobes c. 0.3 mm long with short spinulose hairs; corolla urceolate to broad-cylindric, c. 2.2 mm long, 2 mm wide, slightly constricted just below the throat, glabrous outside, inside with a ring of deflexed hairs just below the throat, lobes lanceolate, 2–2.5 mm long, with apiculate tips especially conspicuous in bud stage, spreading in the open flower; anthers spreading, wholly exerted; style exerted for c. 2 mm from corolla throat, stigma cylindric, c. 1 mm long, 0.5 mm wide, mitriform (with a recessed base). **Fruits** subglobose, to 1.6 cm diameter.

**Notes.** The sexuality of this and other species of *Canthium* has been difficult to determine with certainty because of lack of material. For this species, functionally female plants could be ascertained because their advanced flower buds had empty anthers and clearly bilobed stigmatic heads, and fruits were formed. Whether other individuals could be functionally male or fully hermaphrodite remains to be verified.



**Fig. 1.** *Canthium malayense* K.M. Wong. From *Lua SING 2018-320*, habit. From *Lua SING 2018-320*. (Photo: P.K.F. Leong)

The very brief description of *Canthium parvifolium* Roxb. in Roxburgh (1824) gives little detail, but his species is illustrated by a drawing numbered 2195 in the Roxburgh series (Sealy, 1957), now at Kew. This clearly shows slender straight spines and elliptic leaves with obtuse leaf apices, which contrast with the recurved spines and ovate leaves with acute to cuspidate apices typical of our new species here.

*Distribution.* Mainly in the Malay Peninsula (Peninsular Thailand, Peninsular Malaysia, Singapore), apparently rare in Borneo (SW Sabah and SW Sarawak) and Sumatra (Asahan). It is a species distributed in dryland lowland (including secondary) forest sites as well as swamp forests, especially near the coast.

*Additional specimens examined.* BORNEO: MALAYSIA: **Sabah:** Kuala Penyu, between Batu Lintang and Mempakul, 23 May 1985, *Amin & Haya SAN 86444* (SAN). **Sarawak:** Kuching, 6 Apr 1893, *Haviland 3014* (SING).

PENINSULAR MALAYSIA: **Johor:** Mawai-Jemaluang road 20th mile, 14 Aug 1935, *Corner SFN 29752* (BO [1334387], KEP, SING [SING0189624]); Sungai Kayu, 18 Mar 1937, *Kiah SFN 32422* (BO [1643219], KEP, SING [SING0189629]); Sungai Lebir, 26 Apr 1976, *Stone*



& Mahmud 12473 (KEP, KLU, SING). **Kedah:** Bukit Enggang F.R., 2 Dec 1969, *Chan FRI 13246* (KEP, SING [SING0189637]); Langkawi, Burau, Apr 1911, *Ridley 15814* (SING [SING0190418]). **Malacca:** Alor Gajah, Nov 1890, *Ridley 2859* (SING [SING0189638]); Alor Gajah, Malacca River, 26 Jan 1908, *Burkill 3009* (SING [SING0190420]). **Negri Sembilan:** Jelebu, Pasoh Forest Reserve, 1 Mar 1996, *Gardette 1660* (K, KEP, L, SING [SING0189623]); 5 Sep 1996, *Gardette 2215* (K, KEP [KEP208526], L, SING [SING0189622]); Seremban, 25 Jun 1885, *Alvins 1987* (SING [SING0190426]); Tampin, 9 Apr 1915, *Burkill 834* (SING [SING0189643]); *ibid.*, 24 Nov 1922, *Holtum SFN 9657* (KEP, SING [SING0189630]). **Pahang:** Kuantan, Bukit Ubi, 19 Jan 1913, *Burn-Murdoch 349* (SING [SING0189644]); Pahang Track, May 1893, *Machado SFN 11591* (SING [SING0190422]); Temerloh, 6 Jun 1916, *Hashim KEP 684* (KEP [KEP208518], SING [SING0189841]). **Penang:** No locality, no date, *Cantley's coll. 2570* (SING [SING0190425]). **Perak:** Changkat Serdang, May 1886, *Wray Jr 732* (SING [SING0190424]); Grik, 18 Jun 1924, *Burkill & Haniff SFN 13739* (SING [SING0189632]); Kledang Saiong, 13 Apr 1931, *Symington KEP 25497* (KEP [KEP208517]); Larut, Jun 1884, *King's coll. 6234* (SING [SING0189640]); Larut, Blanda Mabok, Apr 1890, *Wray Jr 3977* (SING [SING0189642, SING0190421]); Padang Rengas, May 1890, *Curtis s.n.* (SING [SING0189627, SING0190423]); Pondok Tanjong Reserve, 23 Aug 1906, *Cubitt KEP 11239* (KEP, SING [SING0190411]). **Selangor:** Kepong, 8 May 1929, *Symington KEP 20112* (KEP, SING [SING0190417]); Klang Gates, 19 May 1921, *Hume KEP 7297* (SING [SING0189626]); Kuala Lumpur, 1889, *Ridley s.n.* (SING [SING0190413]); Court Hill, 24 Sep 1928, *Osman KEP 15216* (KEP, SING [SING0190419]); Sepang, 27 Nov 1941, *Denny s.n.* (SING [SING0190415]). **Trengganu:** Jerangau road 27¼ mile, 22 Sep 1955, *Sinclair & Kiah SFN 40937* (BO, SING [SING0189263]); Kemaman, Bukit Kajang, 27 Nov 1935, *Corner SFN 30598* (KEP, SING [SING0190416]).

SINGAPORE: **Chan Chu Kang:** 1892, *Ridley 3766* (SING [SING0190412]); Changi, *Ridley s.n.*, 1893 (SING [SING0019995]); **Chestnut Avenue:** *Gwee et al.*, 20 May 2008, *SING 2008-178* (SING [SING0113849]); **Grange Road:** 1894, *Ridley s.n.* (SING [SING0019994]).

THAILAND: **Nakhon Si Thammarat:** Tha Sala, Taling Chan, Sunantha Waterfall, 18 Mar 2012, *Sirimongkol et al. 351* (BKF [SN203196, SN203197], E, KYO, L, SING [SING0206188]). **Satun:** 'Setul', Mar 1910, *Ridley 15006* (SING). **Songkhla:** Chana, Khao Reng Hill, 19 Apr 2009, *Inuthai 489* (BKF [SN190690], PSU); Hat Yai, Khao Chum Sak, 22 Oct 1993, *Larsen et al. 43903* (AAU, BKF, SING [SING0189543]); Hat Yai, Ko Hong Hill, 75 m asl, 13 Oct 1984, *Maxwell 84-324* (BKF [SN050580]); Hat Yai, Ton Nga Chang Wildlife Sanctuary, 130 m asl, 22 Mar 2004, *Gardner & Sidisunthorn ST 286* (BKF [SN193350, SN194414]). **Surat Thani:** Amphoe Viphavadi, Khlong Yan Wildlife Sanctuary, 250 m asl, 31 Aug 2002, *Middleton et al. 1515* (A, BKF [SN143186]); Muang, Khao Thapet non-hunting area, Phra That Si Surat, 100 m asl, 18 Dec 2006, *Pooma et al. 6394* (BKF [SN157189]). **Trang:** 25 Oct 1993, *Larsen et al. 44012* (AAU, BKF [SN147423], PSU, SING [SING0189544]).

SUMATRA: **North Sumatra:** Asahan, Masihi, Jul 1927, *Yates 2603* (SING [SING0192611]).

*Provisional conservation assessment.* The coastal lowlands where this species has been recorded have been severely impacted by vegetation clearance and development, so regionally its distribution has become much fragmented. Based on the localities recorded, approximately 40–50% of these are likely to have been transformed or severely disturbed, so that population extinction over nearly half of its known provenance is expected to have occurred. Under these circumstances we assign a global status of Vulnerable (VU A2c) using the categories and criteria of IUCN (2012). Chong et al. (2009) recorded this taxon (sub '*Canthium horridum*') as endangered in Singapore.

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