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PLANT PORTRAIT

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1150. *Phytocrene bracteata* Wall.

Icacinaceae

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Summary

Phytocrene bracteata Wall., a woody liana from the lowland forests of mainland South-East Asia from Thailand to Borneo and the Philippines, is described and illustrated. The species is remarkable for the heteromorphic leaves, the bracteate 'foxtail' staminate inflorescences, and the small, spherical pistillate inflorescences which enlarge considerably during fruiting, forming dense heads of bristly hairy compound fruits the size of a small football.

The Icacinaceae is a pantropical family of trees, shrubs and lianas with 24 genera and at least 155 species worldwide (POWO, 2025). Until recently the family including a mixture of unrelated genera grouped together on the presence of a single ovary with two apical ovules, and many Flora accounts used this arrangement, despite being considered unsatisfactory, e.g. *Flora Malesiana* (Sleumer, 1971), and the Floras of Thailand (Sleumer, 1970), and China (Peng & Howard, 2008). With the advent of new molecular techniques, family placement, and generic limits have been more clearly defined (Byng et al., 2014; Stull et al., 2015), with several genera previously included in this family now placed in the Cardiopteridaceae (Cardiopteridales), Metteniusaceae (Metteniusales) and Stemonuraceae (Cardiopteridales; see Stull et al., 2015; Utteridge & Schori, 2011).

In Singapore, there are only two genera of the Icacinaceae, both climbers: *Iodes* Blume with three species, and *Phytocrene* Wall. with two species (Lindsay et al., 2022: 381; Utteridge & Turner 2024). Whilst the family in the contemporary sense is difficult to characterize across its distributional range, the exstipulate simple leaves having conspicuous venation and usually bent petioles, the small green, yellow or brown flowers, and the drupaceous fruits, often with a sculpted endocarp (see the comprehensive survey by Del Rio et al., 2020), are good spot characters when attempting to identify them. The Icacinaceae includes many species of woody lianas that can reach the canopy in tropical rainforests. These are a group of plants often overlooked by botanists and requiring specialist attention because of the

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difficulty in collecting them (Neo et al., 2024); for example, a new genus of Icacinaceae has been described relatively recently from primary rainforest in Borneo (Utteridge et al., 2005).

Phytocrene Wall. is a genus of 11 species, all woody lianas from the Old World (POWO, 2025), found from Assam and Myanmar, through mainland South-East Asia and the Indo-Australian archipelago (except for the more climatically seasonal Lesser Sunda Islands) to New Guinea; currently, no species are recorded from Australia or islands to the east of New Guinea (Sleumer, 1969; Utteridge & Schori, 2011). Members of *Phytocrene* are recognisable by the simple, spirally arranged leaves, often heteromorphic (see below), the small unisexual flowers (with the plants being dioecious), with the staminate inflorescences usually with numerous, densely packed flowers, subtended by hairy bracts with a foxtail-like appearance, and with the fruits aggregated into large spherical heads (Figure 1). The generic name was first published by Wallich (1828), who noted that the plant's "trunk is as thick as a man's thigh, and when divided affords a large quantity of a limpid, tasteless, and very wholesome water," which and was probably the inspiration for the generic epithet (Greek: *phyto* = plant, and *crene* = fountain).

In Singapore, there are two species of *Phytocrene*: the more widespread *Phytocrene bracteata* Wall. featured here (plate 1150), and *P. oblonga* Wall. which was not known in Singapore until a field survey in the Central Catchment Forest Reserves in 2011.



FIGURE 1 Mature fruit of *Phytocrene bracteata* growing on The Plant House at Singapore Botanic Gardens. Photograph Timothy Utteridge.



PLATE 1150 *Phytocrene bracteata* NAM SIANG TEO

Phytocrene bracteata is known from many collections across Singapore, and is cultivated at the Singapore Botanic Gardens, particularly with a large and vigorous living pistillate ('female') specimen growing over the Plant House pergolas; this specimen flowers and fruits continuously. An interesting feature of the species are the different leaf morphologies, with at least three different sizes and shapes reported: 1) young leaves on juvenile/sterile plants which are chartaceous, ovate to 3-lobed with entire to serrulate margins (Figure 2); 2) mature leaves on juvenile/sterile plants which are coriaceous, large (to 30 cm long) and deeply 5-lobed; and 3) mature leaves on adult/fertile plants which are coriaceous, broadly ovate and unlobed to slightly lobed (Figure 3). The young leaves of the pistillate specimen on the Plant House are allometrically scaled-down versions of the mature, ovate and unlobed leaves, even in the sun or shade, i.e. the age and reproductive stage of the plant may influence leaf size and shape as much as, or in addition to, environmental factors.

THE PLANT HOUSE

Found on the eastern edge of the Singapore Botanic Gardens (within the heritage or 'Tanglin Core'), The Plant House, despite the name, is an open-air structure consisting of four large



FIGURE 2 Juvenile leaves of the staminate (male) plant of *Phytocrene bracteata* growing at Nassim Visitor Centre at Singapore Botanic Gardens. Photograph Timothy Utteridge.



FIGURE 3 Mature leaves on the pistillate (female) plant of *Phytocrene bracteata* growing on The Plant House at Singapore Botanic Gardens. Photograph Timothy Utteridge.

pergolas with trellis roofs, surrounding a grass quadrangle with a central water lily pond. It was first mentioned as an 'exhibition plant house' in the *Annual Report on the Botanic Gardens, Singapore, for the year 1882* (Chia, 2022). It was initially built to display ferns and ornamental plants, but was also a venue for public flower shows and festivals, and sometimes plant sales were held to generate revenue.

Originally with a roof, the current garden structure is from the 1950s but is on the same footprint as the original building. The Plant House is used to showcase large flowering climbers, with several large woody specimens, including a mature pistillate (female) specimen of the *Phytocrene* featured here, as well as the NEW GUINEA CREEPER *Mucuna bennettii* F. Muell., which was introduced around the 1930s. Other liana species grown over the Plant House pergolas include *Beaumontia jerdoniana* Wight (Apocynaceae; NEPAL TRUMPET from the Indian Subcontinent to Myanmar); *Oxera splendida* (F.Muell.) Gâteblé & Barrabé (Lamiaceae; Wallacea to Papuasia, and the Solomon Islands); and *Phanera kockiana* (Korth.) Benth. (Leguminosae; ORANGE BAUHINIA found throughout western Malesia from Peninsular to Malaysia and Borneo, Sumatra and the Lesser Sunda Islands, but not considered native to Singapore). Under the pergolas, the ground-level beds are planted with Araceae (species and cultivars of various genera including *Alocasia*, *Anthurium, Colocasia*, *Epipremnum* etc.) and Primulaceae (*Ardisia* and *Labisia*).

A set of brick steps going down to the Plant House from the main path (Lower Ring Road) are known as the Prisoner-of-War Brick Steps. Several of the bricks are engraved with tiny, uneven arrows, and were constructed by prisoners of war incarcerated in Changi Prison during the Second World War.

CULTIVATION

Phytocrene bracteata grows best in a sunny position in well-drained soil with relatively good watering. Propagation is best by seeds if possible; care needs to be taken to remove the seeds from the fruits covered in irritating hairs. The translucent flesh needs to be scraped carefully from the hard seeds before planting them in a well-drained medium consisting of coarse sand and coir (coco-peat). Seeds germinate in 1–2 months at about 30–35°C. Vegetative cuttings can also be used for propagation, using semi-woody twigs with at least 2 or more internodes dipped in rooting hormone powder: they should be inserted in the same media used for germination. Cuttings will root in 1–2 months and can be planted out in soil mixture consisting of coir, sand and pumice in equal ratio.

As *Phytocrene bracteata* is a large woody climber, regular training of new growth on growing structures and pruning may be required to maintain tidiness of the plant. In addition, as a vigorous fast grower, it may overgrow any other climbers on the structures in time. It is best to avoid planting the female plant above high traffic areas as their mature fruits easily drop and cause a sticky mess on the floor.

NOMENCLATURE AND DESCRIPTION

Phytocrene bracteata Wall., Pl. Asiat. Rar. 3: 12 (1831). Type: MALAYSIA. Penang, 1822 (stam. fl.), *Porter s.n.* [Wall. Cat. no. 4947] (lectotype K-W [K001104281], first step designated by Sleumer Blumea 17: 238, 1969; second step designated by Utteridge & Turner (2024); isolectotypes BM [BM000839419], E, G [G00700539], GH [GH00050292 – excluding lower leaf], K [K000700059, K000700060, K000700061], K-W [K001104280], SING [SING0054230]).

Phytocrene macrocarpa Griff. in Not. Pl. Asiat. 4: 322 (1854).

Woody climber reaching the canopy; stem up to 2.8 cm diam.; bark grey-brown, with scattered elongate lenticels. *Branchlets* prickly and hairy when young with very dense short stiff hairs and dense to scattered rigid, bristle-like, straight longer hairs, appressed to erect; with scattered retrorse prickly lenticels, especially when young. *Juvenile and shade leaves* highly variable in size and shape, spirally arranged, evenly spaced along the stem; petiole 7–14 cm long, hairy, variously furrowed on drying; leaf blade ovate, 3-lobed or 5-lobed, often deeply lobed to palmatifid, 11.5–28 × 5.6–29.5 cm, chartaceous to coriaceous, apex acute to acuminate, base cordate, densely hairy on all parts above and below; secondary veins 4–7 pairs in ovate leaves, up to 12 pairs in central lobe in 5-lobed leaves, brochidodromus to semicraspedodromus, basal pair ascending and giving a triplinerved appearance, tertiary veins percurrent to reticulate, adaxial venation obscure to slightly raised, abaxially secondary veins and higher orders conspicuously raised and drying sandy-brown. *Mature leaves* spirally arranged, evenly spaced along the stem; petiole 6–13.5 cm long, densely hairy with two types of hairs, short stiff hairs to 0.1 mm long and longer, stiff hairs to 1 mm long, smooth or longitudinally furrowed; leaf blade ovate to broadly ovate, usually entire to occasionally obscurely 3-lobed in outline (in Singapore material), 13–25 × 7–20.5 cm, coriaceous, apex rounded to acute, base cordate to cuneate, margins entire or slightly undulate to serrulate with 18–22 teeth along each side, lamina sparsely hairy

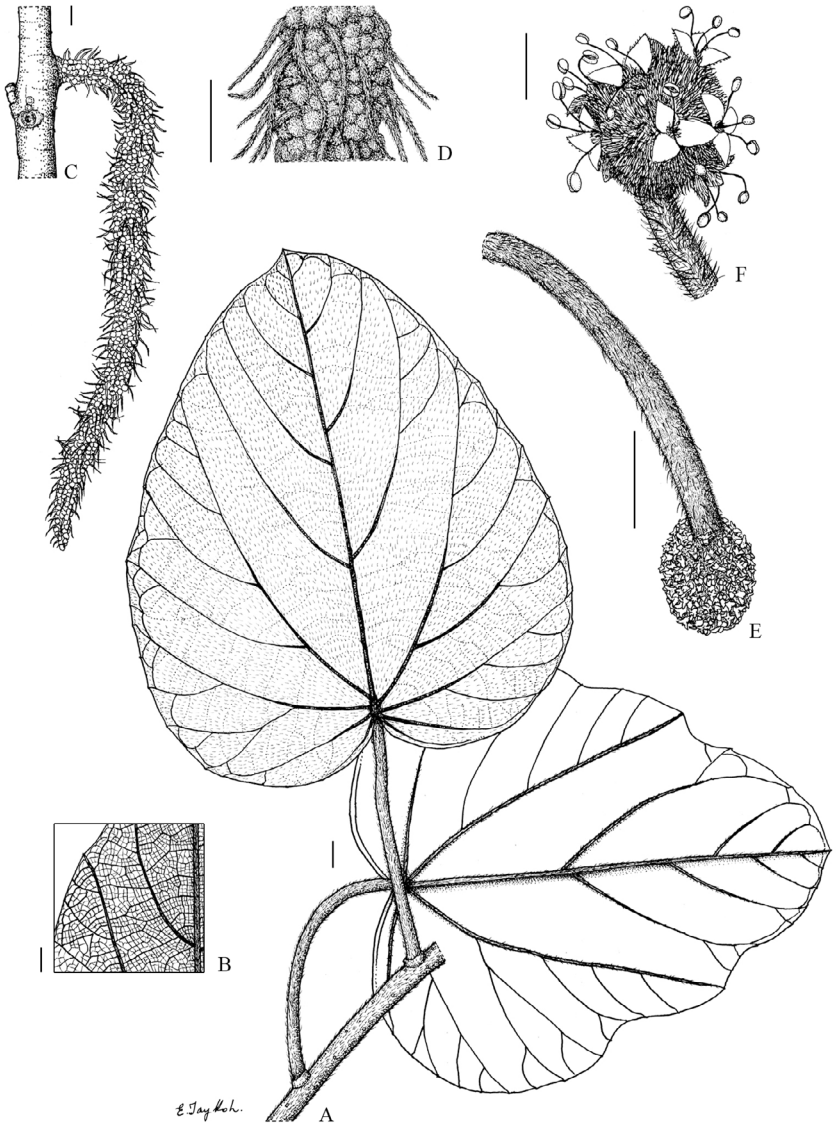


FIGURE 4 *Phytocrene bracteata* Wall. A, habit; B, leaf detail showing venation; C, staminate inflorescence; D, staminate inflorescence detail (note hairy bracts); E, pistillate inflorescence; F, pistillate inflorescence showing open flowers. Drawn by Evonne Tay-Koh. Scale bars: A–E 1 cm; F 1 mm.

above with appressed bristle-like hairs, densely hairy below with hairs arranged in tufts with the radial hairs shorter to 0.1 mm long appressed and the central hair stiff and erect to 0.22 mm long, midrib with two type of hairs as the petiole except longer, stiff hairs to 1.3 mm long; secondary veins with 3 pairs palmate from the base and 2–3 pairs distally along the midrib, brochidodromus, tertiary veins percurrent to reticulate, higher order venation orthogonally reticulate, adaxial venation conspicuous and impressed, abaxially secondary veins and higher orders conspicuously raised and densely hairy with hairs arranged in tufts with the radial hairs shorter to 0.1 mm long appressed and the central hair stiff and erect to 0.8 mm long. Plants dioecious. *Staminate inflorescences* axillary or clustered on woody tubercles on the stem, pendulous spikes, densely hairy throughout with short stiff hairs, solitary or up to 5 from each

tubercle, 10–27 cm long, ultimate branches consisting of numerous few-flowered umbellules, subtended by a subulate bract up to 1 cm long and densely hairy with longer stiff hairs to 0.8 mm long. *Staminate flowers* 4(−5)-merous; calyx lobes triangular to 1 mm long; petals almost free to the base, triangular, 0.5–1 mm long, glabrous and yellow-green; stamens 4, filaments 1–1.5 mm long; pistillode present, densely hairy. *Pistillate inflorescences* globose heads borne on peduncles arising from tubercles along the mature stems and axils of leaves in younger branches, peduncles 1–3(−4) per axil/tubercle (usually solitary in axils, with more from the tubercles), peduncle stout, pendulous, 3–5 cm long, indumentum as staminate ones. *Pistillate flowers* 4 (−5)-merous, calyx segments linear, c. 2 mm long; petals subspathulate, c. 3 mm long; ovary cylindric, apex somewhat contracted into a very short thick style, tomentose, stigmas (2–)3–4, flattish, glabrous, spreading. *Drupes* numerous (c. 60) in spherical clusters; in sicco drupes narrowly ovoid to ovoid-oblongoid, 4–8 × 1.5–2.5 cm, tapering toward the apex, apex apiculate and recurved and appearing hooked, densely strigose throughout; in vivo with a characteristic chocolate smell, as in sicco except drupes usually oblongoid, 2.5–3.5 cm diam., apex blunt, exocarp coriaceous, pericarp soft and gelatinous, pale yellow; endocarp hard and woody, depressed ovoid, densely foveolate externally, slightly tubercled inside, 3–3.8 × 1.8–2 cm. Figure 4.

Distribution. Found from the South-Western and Peninsular floristic areas of Thailand (e.g., Prachuap Khiri Khan, Surat Thani Provinces) and throughout western Malesia, i.e., Singapore, Peninsular Malaysia, Sumatra, Borneo and reaching the island of Palawan in the Philippines (Utteridge & Schori, 2011).

Habitat. The species has been recorded from lowland primary and secondary tropical forests up to an elevation of 250 m.

Flowering and fruiting. In Singapore, specimens in flower, especially staminate flower (collectors usually 'miss' the much smaller spherical pistillate inflorescences), have been collected from throughout the year. Fruiting specimens have been collected throughout the year; the specimen at Singapore Botanic Gardens is known to profusely fruit at various times, including January to February and in July and August.

Conservation status. *Phytocrene bracteata* is a widespread species in South-East Asia with a very large Extent of Occurrence, and is considered globally Least Concern (LC). In Singapore, however, the species has been assessed regionally as Vulnerable (VU/D) based on an estimate of fewer than 1000 plants in the country (Middleton et al., 2024: 485).

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