



## *Biancaea scabrida*, a new species of the *Caesalpinia* group (Fabaceae) from Peninsular Malaysia

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### Abstract

The new species *Biancaea scabrida*, currently only known from Peninsular Malaysia, is described and illustrated. The new species most resembles *B. parviflora* and *B. oppositifolia* in its inflorescence, but can be distinguished from both species by its sepals which have short stiff scabrid hairs, and its pistil which has stiff and hispid hairs. It also has alternately arranged leaves and inflorescence branches, a lack of a persistent suborbicular stipule, few pinnae per rachis (2–6 pairs) and relatively fewer leaflets per pinna ((3–)5–9 pairs). A provisional IUCN conservation assessment and a taxonomic key to *Biancaea* is also provided here.

**Keywords:** *Caesalpinia*, Caesalpinioideae, Kelantan, limestone hill, Perak, taxonomy

### Introduction

The genus *Biancaea* Todaro (1860: 21), consisting of six currently accepted species, was recently reinstated by Molinari-Novoa *et al.* (2016) following the significant publication on the new generic delimitation of the *Caesalpinia sensu lato* clade based on phylogenetic evidence (Gagnon *et al.*, 2013). Among the newly delimited genera of the *Caesalpinia* group, the genus *Biancaea* can be distinguished from the similar genus *Mezoneuron* Desfontaines (1818: 245). Unlike the winged pods of *Mezoneuron*, the pods of *Biancaea* are laterally compressed, wingless, coriaceous and dehiscent, with an obliquely placed apex which forms a sharp beak on the adaxial end of the apex, and is much narrower at the base compared to the apex.

The genus *Biancaea* is native to Yemen, India, Sri Lanka, Myanmar, Thailand, Cambodia, Vietnam, south China, Japan, the Philippines, Peninsular Malaysia and Borneo, of which one species, *Biancaea oppositifolia* (Hattink 1974: 43) Molinari & Mayta (2016: 3) is endemic to Sabah in Borneo. It can also be found in a variety of habitats, from primary forests to forest edges, grasslands and scrub land, riverine habitats and secondary forests (Hou *et al.*, 1996, as part of *Caesalpinia*; Gagnon *et al.*, 2016). In a study of the genus in Peninsular Malaysia, in which the species *Biancaea decapetala* (Roth 1821: 212) Degener (1936: K7), *Biancaea parviflora* (Prain 1897: 239) Mayta & Molinari (2016: 3) and *Biancaea sappan* (Linnaeus 1753: 381) Todaro (1875: 3) have been recorded, several specimens identified as *B. cf. parviflora* and *B. cf. oppositifolia* were found not to match descriptions of existing *Biancaea* species. In particular, these specimens differ from the two most similar species *B. parviflora* and *B. oppositifolia* in both leaf and floral characters, which are further detailed in Table 1. Through comparing the specimens with all *Biancaea* specimens housed at SING and KEP, along with type specimens of all other *Biancaea* species available on JSTOR Plants (<https://plants.jstor.org/>), it was found that this taxon represented a new species. This new species, which is here named as *Biancaea scabrida* L.M.Choo, is currently known to be endemic to Peninsular Malaysia and restricted to limestone habitats. A provisional conservation assessment of the new species following the IUCN Red List Categories and Criteria v. 3.1 (IUCN, 2012) and Guidelines for Using the IUCN Red List Categories and Criteria (IUCN Standards and Petitions Committee, 2019) is included below. The following identification key of all seven *Biancaea* species is modified from the key in Molinari & Mayta (2016).

**TABLE 1.** Comparison of *Biancaea scabrida* with *Biancaea parviflora* and *Biancaea oppositifolia*. Distribution and habitat information is adapted from Hou *et al.* (1996).

Character	<i>B. scabrida</i> sp. nov.	<i>B. parviflora</i>	<i>B. oppositifolia</i>
Distribution	Peninsular Malaysia (Kelantan & Perak)	Peninsular Malaysia (Negri Sembilan, Perak, Selangor), Borneo (Sabah), Philippines (Palawan)	Borneo (Sabah)
Habitat	Limestone hill/island, altitude not known.	Primary forest and clearings at low altitude	River banks and open spaces in primary forests, up to 600 m altitude.
Stipules	Not seen, either absent or caducous	Ovate or triangular, 5.5–16 × (1.5–)3–7 mm, persistent	Suborbicular, up to 35 × 45 mm, persistent
Leaves	Alternate	Alternate	Opposite
Number of pinnae on rachis	2–6 pairs	7–10(–14) pairs	4–6 pairs
Leaflet pairs per pinna	(3–)5–9 pairs	9–18 pairs	5–8 pairs
Leaflet shape	Unequally ovate to elliptic, base obtuse to obliquely truncate, apex acute to obtuse but rounded at the very tip	Oblong to obovate, base unequally or obliquely obtuse or truncate, apex rounded or slightly emarginate or retuse or slightly mucronate	Elliptic to oblong or obovate, base unequally or obliquely obtuse or truncate, apex acute to obtuse, emarginate
Leaflet size	(1.2–)1.6–5.3 × (0.4–)0.7–1.9 cm	(0.45–)1–2.8 × (0.25–)0.4–0.9 cm	2.5–4.5 × 1.2–1.9 cm
Flowering pedicels	3–4 mm	4.5–7 mm	5–10 mm
Sepal hairs	Outer surface pubescent with short stiff scabrid hairs, margins densely hairy, inner surface sparsely hairy with scabrid hairs mostly at the middle of the sepal	Both surfaces densely pubescent to tomentose with fine hairs	Both surfaces densely pubescent to tomentose with fine hairs
Pistil hairs	Densely pubescent to hispid with stiff upright hairs	Densely pubescent with long thin adpressed hairs	Densely pubescent with long thin adpressed hairs

### Key to species in the genus *Biancaea*

1a.	Leaves opposite .....	<i>B. oppositifolia</i>
1b.	Leaves alternate .....	2
2a.	Pedicels longer than 1 cm .....	3
2b.	Pedicels 0.8 cm long or less .....	4
3a.	Pedicels 3–4 cm long .....	<i>B. decapetala</i>
3b.	Pedicels less than 2 cm long .....	5
4a.	Pinnae pairs per leaf 2–6 pairs, leaflet pairs per pinna (3–)5–9 pairs .....	6
4b.	Pinnae pairs per leaf 7–10(–14) pairs, leaflet pairs per pinna 9–18 pairs .....	<i>B. parviflora</i>
5a.	Pedicels to 1.5 cm, leaflet apex rounded or obtuse .....	<i>B. millettii</i>
5b.	Pedicels 1.5–2 cm, leaflet apex emarginate or retuse .....	<i>B. sappan</i>
6a.	Leaflets opposite, ovate to elliptic, apex acute to obtuse but rounded at the very tip; sepals scabrid on the outer surface, inner surface sparsely so .....	<i>B. scabrida</i>
6b.	Leaflets alternate to subopposite, oblong-elliptic, apex rounded, sepals densely pubescent on both surface .....	<i>B. godefroyana</i>

## Taxonomy

*Biancaea scabrada* L.M.Choo, *sp. nov.* (Figs. 1–2)

**TYPE:**—Peninsular Malaysia, Kelantan, Gua Musang, 23 Feb 1972, Loh Hoy Shing FRI 19256 (holotype SING! [SING0256191] (fl); isotype KEP [KEP136564] (fl); isotype L! [L1976278] (fl)).

**Diagnosis:**—This species is the most similar to *Biancaea parviflora* and *Biancaea oppositifolia* in its small, compact flowers, borne on a long inflorescence, which are very much smaller than other species in the genus. However, it differs from both species by the sepals which have short, stiff scabrid hairs, and by the stiff and hispid hairs on the pistil, which is especially visible at the style where the hairs are sticking out, as compared to *B. parviflora* and *B. oppositifolia* where the hairs are soft and adpressed. It can be distinguished from *B. parviflora* by its larger and ovate-elliptic leaflets, fewer pinnae per rachis (2–6 pairs) and fewer leaflets per pinna ((3–)5–9 pairs). It can also be distinguished from *B. oppositifolia* by its alternately arranged leaves and inflorescence branches, and also by the lack of large, persistent and suborbicular stipules.

**Description:**—Thorny climber. Mature stem not known. Young stem brown to reddish brown, surface shallowly striate, minutely pubescent with small upright or tomentose hairs, armed with regularly-spaced short incurved spines. Stipules not seen. Leaves alternate; petiole (1.8–)3.5–4 cm, surface slightly furrowed, covered in short tomentose hairs; rachis 8.6–17.1 cm, tomentose as in petiole; rachis spines incurved, 2–3 × 1–2 mm, one pair at the base of each pinna and 1–3(–5) pairs between adjacent pinnae; pinnae 2–6 pairs, 4.1–9(–16) cm long. Leaflets opposite, (3–)5–9-jugate, opposite; petiolule ca. 1 mm long; leaflet lamina unequally ovate to elliptic, (1.2–)1.6–5.3 × (0.4–)0.7–1.9 cm, base obtuse to obliquely truncate, apex acute to obtuse, but rounded at the very tip; upper surface dull grey brown when dry, glabrous, but pubescent down the midrib; lower surface reddish or yellow brown when dry, glabrous, except for midrib which is very sparsely pubescent; midrib slightly raised above and raised below, secondary veins slightly raised both above and below, tertiary venation or reticulations not clearly seen above but more conspicuously raised below; glands absent. Inflorescences paniculate, axillary or supra-axillary or terminal, 18–30 × 5.4–13.3 cm, branching out in racemes. Individual racemes ca. 3–7 in each panicle, 7–23.1 cm long; flowering rachis minutely pubescent or tomentose with short upright hairs; bracts triangular, 1–2 × 1–1.5 mm long, with short tomentose hairs as in the rest of the inflorescence, early caducous and only seen in developing inflorescences or at the top of developing inflorescences where the buds are still compact; bracteoles absent. Flowers: ca. 20–50 in each individual raceme; pedicels 3–4 mm long, pubescent; buds ovoid, ca. 3 × 2 mm, pubescent with stiff short hairs; receptacle 2–3 × 1–2 mm. Sepals 5, subequal, broadly triangular to ovate, light green when fresh, 2.1–3.3 × (0.7–)1–1.8 mm, outer surface hairy with short stiff scabrid hairs, margins densely hairy, inner surface sparsely hairy with scabrid hairs mostly at the middle of the sepal. Petals 5, subequal, elliptic to obovate to narrowly ovate, bright yellow when fresh; 3–4.5 × 1.1–1.8 mm, of which claw 0.5–0.8 mm long, limb glabrous on both surfaces and pubescent at the claw, veins visible on yellow surface as brown lines; standard petal thicker than the rest, oblong to broadly oblong, 3.8–4.5 × 1.3–2 mm, of which claw 1–1.8 mm long, outer surface densely pubescent on the lower half of the petal, inner surface pubescent in the middle with villous hairs, margins at the claw densely pubescent. Stamens 10, filaments light green, 3.1–6 mm long, densely villous at the base up to more than half its length, glabrous at the top; anthers dorsifixed, narrowly lanceolate or ovate, dark brown, 0.6–0.8 × 0.2–0.4 mm. Pistil 1; ovary sessile, oblong to elliptic to lanceolate, 1.6–2.3 × 0.8–1 mm, densely pubescent to hispid with stiff upright hairs; style 3.2–3.8 mm long, pubescent but becoming sparse up the style; stigma black, slightly thickened and margin glabrous or ciliate with very short hairs, opening ca. 0.3 mm in diameter. Young pods flat and woody, shape obovate to elliptic, but obliquely truncate to acute at the tip, yellow brown when dry, 4–4.6 × 2.1–2.4 cm, base rounded, sessile (no ovary stipe), apex unequally elongated and pointed on the dorsal (adaxial side); surface smooth and glossy, puberulous with very fine short upright yellow hairs that are scarcely visible; fruiting pedicel 4–6.5 mm long, articulated where it joins the receptacle. Seed 1, a flattened elliptic disk, 1.5 × 1–1.2 × 0.1 cm, surface dark brown, with horizontal lines appearing as fine cracks encircling the seed widthwise.

**Distribution:**—*Biancaea scabrada* is known from two locations in Peninsular Malaysia, Gua Musang in the State of Kelantan and Tasik Temenggor in Perak.

**Habitat:**—Limestone hill.

**Etymology:**—The specific epithet is derived from the Latin word *scaber*, which means rough to the touch because of numerous minute projections. This refers to the hairs on the sepals which are short, stiff and scabrid on both surfaces.

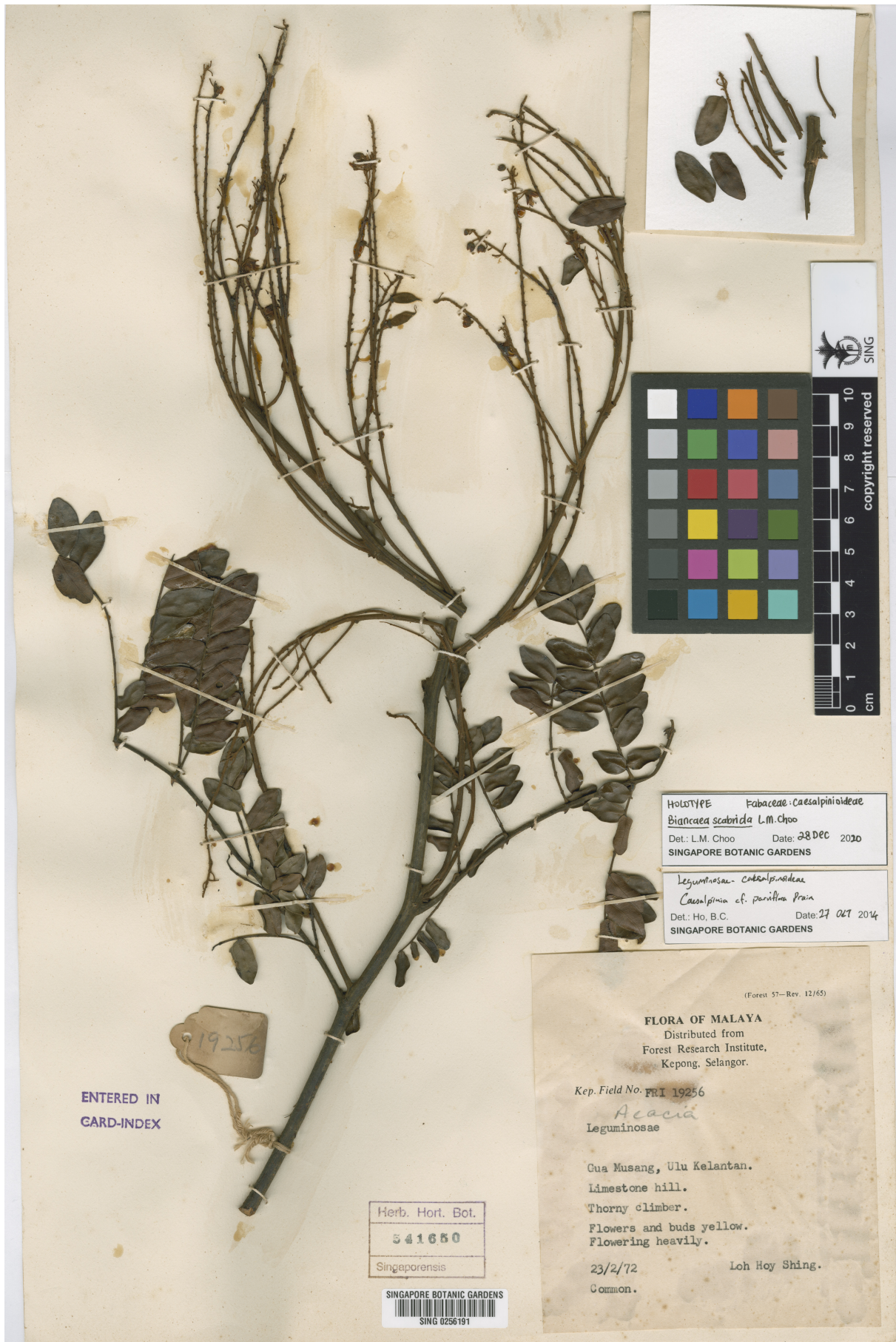
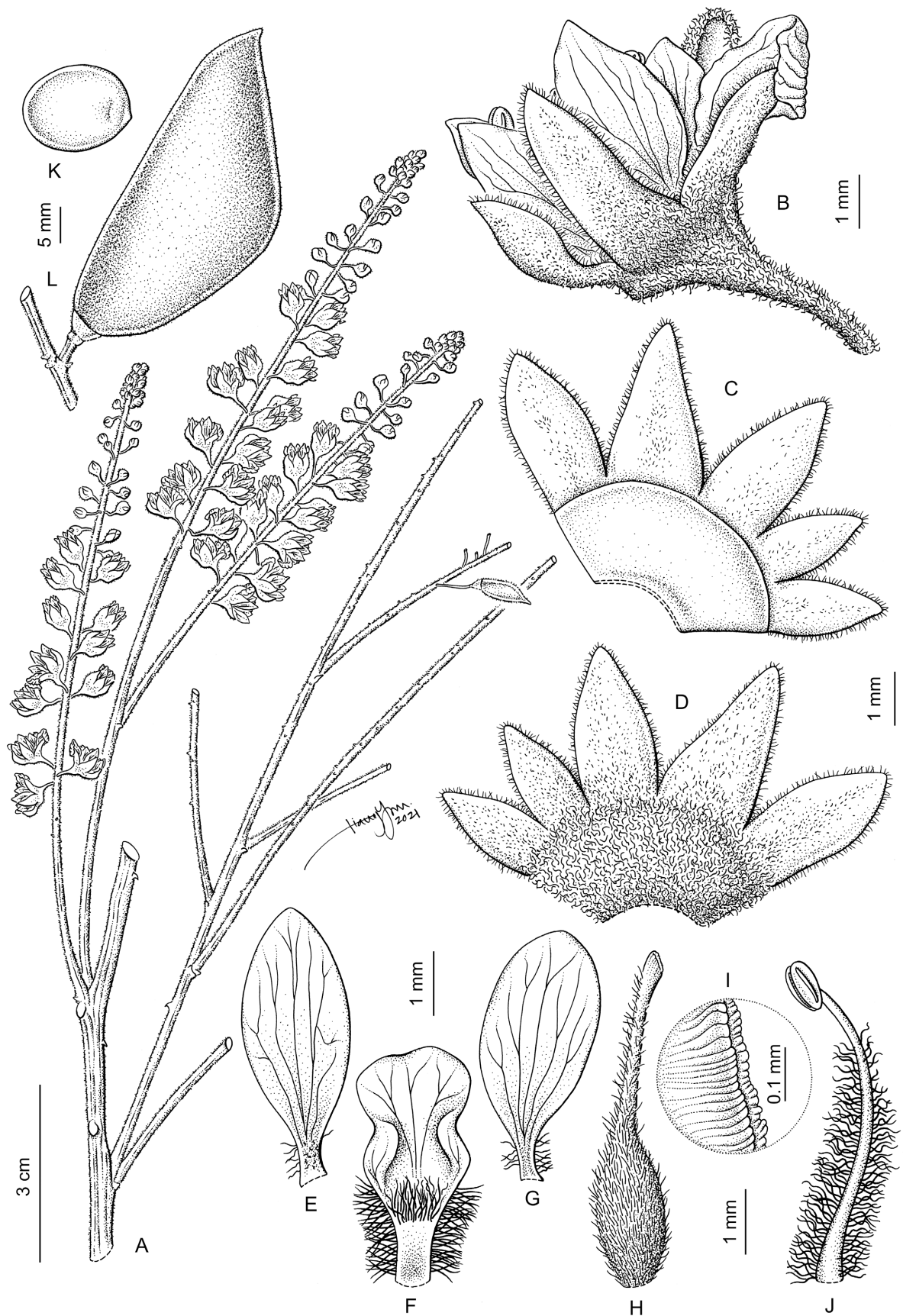


FIGURE 1. Photo of the holotype of *Biancaea scabrida*.



**FIGURE 2.** Illustration of *Biancaea scabrada*. A: inflorescence; B: flower; C: inner surface of receptacle and sepals; D: outer surface of receptacle and sepals; E: inner surface of lateral petal; F: inner surface of standard petal; G: inner surface of basal petal; H: pistil; I: closeup of stigma; J: stamen; K: seed; L: pod. Drawn by Loh Xiang Yun from the holotype *Loh FRI 19256*, SING[SING0256191] for A, and from *Turner 94-91* [SINU] for B-L.

**Provisional IUCN conservation assessment:**—Vulnerable (VU D2). In the type locality of Gua Musang, Kelantan, and the second locality of Tasik Temenggor in Perak, the species has been described as common and with many individuals. However, Gua Musang is quite disturbed, and while Tasik Temenggor is part of a state park protected area, it can still be logged in the future (Schwabe *et al.*, 2015). Given the few known localities of the species, and the plausible threat of mining activities on limestone hills in Peninsular Malaysia, any future development activities in these two localities could cause the species to become endangered or extinct in a short amount of time (Kiew *et al.*, 2017; Rahman & Kiew, 2018).

**Additional specimens seen. Peninsular Malaysia:**—Perak, Belum Forest Reserve, Limestone Island Temenggor Lake [Tasik Temenggor], 24 Feb 1994, *Chua L. et al. FRI 40460* (KEP! [KEP187987, KEP187988, KEP187989]) (fl); *ibidem*, 21 Apr 1994, *I.M. Turner 94-91* (SING! [SING0256192], SINU! (2 sheets)) (fl, fr).

## Discussion

*Biancaea scabrida* is closely related to *Biancaea parviflora*, which is present in Peninsular Malaysia and Borneo, and *Biancaea oppositifolia*, which is endemic to Borneo (Hou, 1996) but can be easily distinguished from the two species by several morphological characters, which are expanded upon below and also listed in Table 1.

This species differs from both *Biancaea oppositifolia* and *Biancaea parviflora* by the sepals which have short, stiff scabrid hairs unlike the densely pubescent or tomentose sepals in *B. parviflora* and *B. oppositifolia*. The new species can also be distinguished by the stiff and hispid hairs on the pistil, which is especially visible at the style where the hairs are sticking out, as compared to *B. parviflora* and *B. oppositifolia* where the hairs are soft and adpressed.

It is similar to *Biancaea parviflora*, a species found in Peninsular Malaysia and Borneo, because of its alternately arranged leaves and inflorescence branches, but differs in the larger and ovate-elliptic leaflets and fewer pinnae per rachis (2–6 pairs) and fewer leaflets per pinna ((3–)5–9 pairs), as compared to the smaller oblong leaflets of *Biancaea parviflora*, which are also present in more pinnae per rachis (7–10(–14) pairs) and more leaflets per pinna (9–18 pairs).

The new species is similar to *Biancaea oppositifolia*, a Bornean species, in terms of the few pairs of pinnae on the rachis and leaflet pairs per pinna, as well as the larger and ovate-elliptic leaflets. *Biancaea oppositifolia* differs from the new species in its opposite leaves, oppositely-arranged inflorescence branches, both of which are alternately arranged in the new species; and its large, persistent suborbicular stipules (up to 35 × 45 mm) which are not seen and likely absent or caducous in the new species.

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