

New records and synonymisations of *Flemingia* (Fabaceae: Phaseoleae) for Thailand, Laos and Myanmar

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ABSTRACT

This paper presents five newly recorded species of *Flemingia* present in two subgenera; *Flemingiastrum* and *Rhynchosoioides*. Four species are new for Thailand: *F. nana*, *F. semialata*, *F. vestita* and *F. wallichii*. One species, *F. nana*, is new for Myanmar, and one species, *F. wightiana*, is new for Laos. Two taxa, *F. brevipes* and *F. latifolia* var. *siamensis*, are synonymised under *F. macrophylla*. Detailed morphological descriptions and colour photographs are provided. A key to the species in *Flemingia* subgenus *Flemingiastrum* for Thailand is provided.

KEYWORDS: *Flemingia*, Indo-China, Leguminosae, synonymy, taxonomy.

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INTRODUCTION

Flemingia Roxb. ex W.T.Aiton is regarded as a relatively small papilionaceous genus belonging to subtribe Cajaninae within the tribe Phaseoleae of the family Fabaceae. It consists of about 40 species, which are distributed in tropical Asia, Australia and Africa (Lewis *et al.*, 2005; Schrire, 2005; LPWG, 2017; Gavade *et al.*, 2019). Baker (1876) subdivided *Flemingia* into five subgenera, *Chalaria* (Wight & Arn.) Baker, *Flemingiastrum* (DC.) Baker, *Lepidocoma* (Jung.) Baker, *Ostryodium* (Desv.) Baker (illegitimate name for subgen. *Flemingia*) and *Rhynchosoioides* Baker.

The genus is characterised by the following combination of characters: resinous glands throughout; digitately compound or unifoliate leaves; leaflets with 2 or 3 major veins emerging from the base with scalariform tertiary veins; absence of stipels; petioles in cross-section markedly triangular to more or less flattened, triquetrous and mostly with wings along

margins, rarely terete; racemose, paniculate or capitate inflorescences; 1 or 2 ovules per ovary; filiform style thickened in the upper part, and turgid fruits with only 1 or 2 seed(s).

Schrire (2005) suggested that the taxonomy of *Flemingia* necessitates a comprehensive revision, which was recently carried out for the Indian subcontinent and the Indo-Chinese floristic region by various authors, namely Sa & Gilbert (2010), Gavade *et al.* (2019), Do & Gao (2020) and Gavade *et al.* (2020). In Thailand, 19 taxa were recorded by Craib (1928), and one new species, *F. sirindhorniae* Mattapha, Chantar. & Suddee, was recently described (Mattapha *et al.*, 2017).

While working on the account of *Flemingia* for the Flora of Thailand we studied the nomenclatural types, voucher specimens and reviewed relevant taxonomic literature of *Flemingia*. We present three new records for Thailand in *Flemingia* subgen. *Flemingiastrum* namely, *F. nana* Roxb. ex W.T.Aiton,

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F. semialata Roxb., *F. wallichii* Wight & Arn. and one species, *F. vestita* Benth. ex Baker. in *Flemingia* subgen. *Rhynchosioides*. Furthermore, we place *F. brevipes* Craib, *F. latifolia* Benth. var. *siamensis* Craib as synonyms of *F. macrophylla* (Willd.) Merr. because characters of both taxa are identical to those of *F. macrophylla*. A key to the species of *Flemingia* subgen. *Flemingiastrum* for Thailand is provided.

TAXONOMIC TREATMENT

1. **Flemingia** subgen. **Flemingiastrum** (DC.) Baker in Hook.f., Fl. Brit. India 2: 228. 1876; Benth. in Miq., Pl. Jungh.: 245. 1852; Gavade *et al.*, Webbia 75(2): 151. 2020. Type: *Flemingia stricta* Roxb. ex W.T.Aiton.

Prostrate or erect shrubs. *Leaves* unifoliate or digitately trifoliate. *Inflorescences* a raceme or a short panicle with a few branches, solitary or in clusters of 2–5 branches; bracts caducous or subsistent.

KEY TO THE SPECIES OF SUBGEN. *FLEMINGIASTRUM*

(Numbered species are described below)

- | | |
|---|-------------------------|
| 1. Inflorescences comprising 5–20 flowers | |
| 2. Erect shrubs, ca 1.5 m tall. Staminal tube 5–6 mm long | F. kerrii |
| 2. Prostrate to erect shrubs, up to ca 0.3 m tall. Staminal tube 4–5 mm long | F. prostrata |
| 1. Inflorescences comprising 20–many flowers | |
| 3. Lower surface of leaflets densely tomentose | |
| 4. Inflorescences with ferruginous hairs | 1. F. latifolia |
| 4. Inflorescences with white or grey hairs | |
| 5. Inflorescences shorter than or equal to petioles | |
| 6. Terminal leaflet elliptic to narrowly lanceolate | F. grahamiana |
| 6. Terminal leaflet ovate, obovate to broadly lanceolate | |
| 7. Pedicels 0.5–1.5 mm long | 4. F. wallichii |
| 7. Pedicels 2–2.5 mm long | 5. F. wightiana |
| 5. Inflorescences exceeding petioles in length | |
| 8. Dwarf shrub with stout stem, up to 1 m tall; leaflets broadly obovate | 2. F. nana |
| 8. Erect shrub with slender stem, up to 2 m tall; leaflets lanceolate | 3. F. semialata |
| 3. Lower surface of leaflets glabrous to glabrescent or mostly hairy along nerves | |
| 9. Lowermost inflorescence bracts subsistent, 2–3 times longer than wide | F. stricta |
| 9. Lowermost inflorescence bracts early caducous, 1–2 times longer than wide | |
| 10. Calyx lobes as long as tube | |
| 11. Corolla as long as calyx | F. sootepensis |
| 11. Corolla much longer than calyx | F. macrophylla |
| 10. Calyx lobes much longer than tube | F. kweichowensis |

NEW RECORDS

1. **Flemingia latifolia** Benth. in Miq., Pl. Jungh. 2: 246. 1852; Do & Gao, Phytotaxa 429(1): 28. 2020; Gavade *et al.*, Webbia 75(2): 157. 2020. Type: Indonesia, the middle of the island of Java, Central Java Province, Ungaran, *Junghuhn s.n.* (lectotype **K** [K000980309!], designated by Gavade *et al.*, 2020): Fig. 1.

Shrub, 1–2 m tall, with ferruginous hairs throughout; all parts usually with resinous glands; young twigs densely ferruginous. *Leaves* digitately 3-foliolate: petioles 6–7 cm long, grooved above, triangular in transverse section, margins narrowly winged, densely ferruginous; stipules lanceolate, caducous. *Leaflets*: petiolules 3–4 mm long; lamina ovate to broadly ovate, terminal leaflet equal to lateral

ones, 10–20 × 5–9 cm, coriaceous, base rounded to oblique, apex acute, margin entire, densely tomentose and glandular on both surfaces, strongly veined and netted beneath; secondary veins 10–15 pairs; tertiary veins scalariform; stipels absent. *Inflorescences* racemose, axillary, robust, solitary or usually in clusters of 3–5 branches, up to 7 cm long, congested when young, ca 1 cm wide before expansion, densely hairy, many-flowered; bracts broadly obovate to elliptic, overlapping and covering flowers when young, 10–11 × 6–7 mm, apex acute, margin villous, outside densely hairy, inside glabrous. *Pedicels* 1.5–2 mm long, densely hairy. *Calyx*: tube 2–2.5 mm long; 4 shortest lobes lanceolate, 6–7 × 1–2 mm, middle lobe longest, ca 12 mm long, densely hairy and glandular on outer surface, glabrescent on inner surface. *Corolla* pink; standard orbicular, 8–9 × 7–8 mm, base auriculate with



Figure 1. *Flemingia latifolia* Benth.; A. & B. Leaves, inflorescences, flowers and fruits; C. close up of flowers and fruits; D. Upper surface of leaflet showing resinous glands (Mattapha 1118, KKU); E. Lower surface of leaflet showing resinous glands and conspicuous veins (Mattapha 1118, KKU). A.–C., photos by S. Mattapha.

a basal callosity, apex acute or emarginate, margin entire, glabrous on both sides, with purple lines on the outside, claw ca 2.5 mm long; wings oblong, 5–7 × ca 2.5 mm, base auriculate, apex acute, margin entire, glabrous on both sides, claw 3–3.5 mm long; keel falcate, 8–9 × 3–3.5 mm, base minutely auriculate, apex rounded, margin entire, glabrous on both sides, claw ca 5 mm long. *Stamens*: tube 7–8 mm long; free filaments 2–2.5 mm long; anthers oblong, ca 0.7 × 0.3 mm, hairy at base. *Ovary* densely hairy and glandular, with 1 or 2 ovules; style 8–9 mm long, glabrous, hairy at base. *Fruits* turgid, oblong, 1.2–1.5 × 5–6 mm, densely hairy and glandular, dehiscent. *Seeds* globular, (1 or) 2, ca 2.5 mm long.

Myanmar.— Shan State, Pindaya Township, Paung Taw Village, alt. 1,348 m, 13 Dec. 2014, *Srisanga et al.* MI-210 (QBG).

Thailand.— NORTHERN: Nan [Chaloem Phra Kiat, Kiw Chan Village, alt. 950 m, 25 Oct. 2014, *Mattapha 1118* (BK, BKF, KKU, QBG)]; Thung Chang, alt. 1,100 m, 11 Nov. 1995, *Pooma 1249* (BKF)]; Uttaradit [Phu Soi Dao National Park, 19 Nov. 2009, *Norsaengsri 6293* (QBG)].

Laos.— Xiengkhouang Province, Phoukoud, Phoukoud Mountain, Laethong Village, alt. 1,329 m, 24 Sept. 2019, *Lanorsavanh 1242* (HNL); *ibid.*, Peak District, Keng Mountain, alt. 1,455 m, 26 Aug. 2020, *Lanorsavanh 1967* (HNL).

Distribution.— India, Myanmar (type), China, Laos.

Ecology.— Grassland, open areas, alt. 1,100–1,600 m. Flowering: October–November; fruiting: December–January.

Vernacular.— Ma hae lueat (မာမေးလွေတ်) (General).

Notes.— 1. *Flemingia latifolia* is easily distinguishable from other species by its rusty ferruginous hairs on branches, the lower surface of leaflets and inflorescences, and by its bracts overlapping and covering the flowers when young. It resembles *F. macrophylla* in its leaflet shape and the purple venation on the outside of the standard, but is different in its congested racemes before expansion (vs more loose racemes in *F. macrophylla*), the standard of *F. latifolia* is orbicular, with a basal callosity and the size is 8–9 × 7–8 mm (vs in *F. macrophylla* ovate, without basal callosities and the size is 5–7 × 3.5–4 mm).

2. According to previous studies, *F. latifolia* is confined to India, Myanmar, China, Laos, Vietnam and Indonesia (Kurz, 1876; Prain, 1897; Mukerjee, 1953; Do & Gao, 2020; Gavade *et al.*, 2020). Our study shows it to be a new record for Thailand, known from three collections. We also provide colour photographs for easy identification (Fig. 1).

2. *Flemingia nana* Roxb. ex W.T.Aiton, Hortus Kew. ed. 2, 4: 349. 1812; Do & Gao, Phytotaxa 429(1): 24. 2020; Gavade *et al.*, Webbia 75(2): 163. 2020. Type: India, *Roxburgh drawing number 1622* (lectotype **K!** [number not indicated], designated by Gavade *et al.*, 2016).

Dwarf suffruticose shrub, up to 1 m tall, with woody rootstock. *Leaves* digitately 3-foliolate: petioles variable, up to 50 cm long, grooved above, narrowly winged; stipules lanceolate, persistent. *Leaflets*: petiolules 5–7 mm long; lamina elliptic or broadly obovate, terminal leaflet equal to lateral ones, mostly broadly obovate, 10–15 × 10–13 cm, coriaceous, base rounded to cuneate, apex acute, margin entire, upper surface moderately hairy and glandular, lower surface densely tomentose and glandular, strongly veined and netted beneath; secondary veins 7–10 pairs; tertiary veins scalariform; stipels absent. *Inflorescences* racemose, axillary, in clusters of 3–5 branches, 3–7 cm long, densely hairy, many-flowered, shorter than petiole; bracts broadly obovate to elliptic, overlapping and covering flowers when young, 4–4.5 × 2–2.5 mm, apex acute, margin villous, outside densely hairy, inside glabrous. *Pedicels* 2–3 mm long, densely hairy. *Calyx*: tube 5–5.5 mm long; 4 shortest lobes lanceolate, 4–4.5 × 1–1.5 mm, middle lobe longest, ca 5 mm long, densely hairy and glandular on outer surface, glabrous on inner surface. *Corolla* pink or purple; standard orbicular, 5–5.5 × 4–4.5 mm, base auriculate without a basal callosity, apex acute or emarginate, margin entire, glabrous on both sides, with purple lines on the outside, claw ca 2.5 mm long; wings oblong, 3.5–4 × ca 1.5 mm, base auriculate, apex acute, margin entire, glabrous on both sides, claw 2.5–3 mm long; keel falcate, 4.5–5 × 2.5–3 mm, base minutely auriculate, apex rounded, margin entire, glabrous on both sides, claw 2.5–3 mm long. *Stamens*: tube 4–5 mm long; free filaments ca 7 mm long; anthers oblong, ca 0.5 mm. *Ovary* densely hairy and glandular, with 1 or 2 ovules; style 4–5 mm long, glabrous, hairy at

base. *Fruits* turgid, oblong, 8–9 × 4–5 mm, densely hairy and reddish glandular, dehiscent. *Seeds* globular, 1 or 2, ca 2 mm long.

Myanmar.— Chin State; Kanpetlet Township, ca 900 m, 2 Mar. 2011, *Ling Shein Man 087177* (QBG).

Thailand.— NORTHERN: Lampang [Ngao District, alt. 300 m, 5 Feb. 2001, *Niyomdham & Jonganulak 6418* (K)]; SOUTH-WESTERN: Kanchanaburi [Thungyai Naresuan Wildlife Sanctuary, Sangkhla Buri District, 275 m, 14 Jan. 1994, *Maxwell 94-47* (BKF)].

Distribution.— India (type), Myanmar.

Ecology.— Mixed deciduous and bamboo forests, sometimes along streams or on limestone mountains, alt. 200–900 m. Flowering and fruiting: January–March.

Notes.— 1. *Flemingia nana* is characterised by its habit of a dwarf suffruticose shrub up to 1 m tall with woody rootstock, broadly obovate terminal leaflet and distinctly long petioles up to 50 cm long.

2. Only a single collection was found in Myanmar and two collections in Thailand. Previously only recorded for India (Mukerjee, 1953; Gavade *et al.*, 2020), therefore this species represents as a new record for Myanmar and Thailand.

3. *Flemingia semialata* Roxb., [Hort. Bengal.: 56. 1814, **nom. nud.**] Fl. Ind. 3: 340. 1832; Do & Gao, Phytotaxa 429(1): 33. 2020; Gavade *et al.*, Webbia. 75(2): 175. 2020.— *F. congesta* Roxb. ex W.T.Aiton var. *semialata* (Roxb.) Baker in Hook.f., Fl. Brit. India 2: 229. 1876. Type: India, ex Herb. *Roxburgh s.n.* (*Wallich, Numerical List no. 5746a*) (lectotype **K-W** [K001121982!], designated by Gavade *et al.*, 2016; isolectotype **BR** [BR0000005172993!]).

— *Flemingia semialata* Roxb. var. *viridis* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 45(2): 261. 1876. Type: Myanmar, Prome (Pyay), *Wallich, Numerical List no. 5746D* (syntypes **G** [G00365321!, G00365325!]; **K-W** [K001121985!]).

Shrub, 50–70 cm tall; all parts usually with resinous glands; young twigs with whitish hairs. *Leaves* digitately 3-foliolate; petioles 3–4 cm long, grooved above, densely hairy; stipules lanceolate to broadly ovate, ca 2.5 × 1.5 mm, outside densely hairy, inside glabrous. *Leaflets*: petiolules 3–4 mm

long, densely silky; stipels absent; lamina lanceolate, 9–13.5 × 2.5–4.5 cm, terminal leaflet equal to lateral ones, chartaceous, base cuneate, oblique in lateral ones, apex abruptly acuminate, margin entire, upper surface densely hairy along midrib with sparse resinous glands, sparsely hairy on veins, otherwise glabrescent; lower surface densely tomentose mostly along veins with dense resinous glands; secondary veins 8–10 pairs; tertiary veins scalariform. *Inflorescence* racemose, 6–7 cm long, solitary, axillary, densely hairy, relatively laxly flowered with many flowers. *Pedicels* 1–1.5 mm long, tomentose; inflorescence bracts broadly ovate, 5–6 × 3.5–5 mm, apex acute, margin tomentose, outside tomentose, inside glabrous, persistent; floral bracts lanceolate, 3–4 × 1–1.5 mm, apex acute to acuminate, outside and inside similar to inflorescence bracts, caducous; bracteoles minute, early caducous, ca 2 mm long, margin hairy. *Calyx*: tube ca 2 mm long; lobes lanceolate, 4 smaller ones 3–4 × 0.5–0.7 mm, the longest one 5–5.5 × ca 1 mm, outside densely hairy and glandular, inside glabrous. *Corolla* white to greenish; standard orbicular, 5–5.5 × ca 4 mm, base auriculate, apex obtuse, margin entire, glabrous on both sides, claw ca 2 mm long; wings oblong, 3.5–4 × ca 2 mm, base oblique with auricles at base, apex obtuse, margin entire, glabrous on both sides, claw ca 3 mm long; keel falcate, 4–4.5 × ca 2 mm, base oblique, apex rounded, margin entire, glabrous on both sides, claw ca 1.5 mm long. *Stamens*: tube 5–6 mm long; filaments 1–2 mm long. *Ovary* glabrous, except base of style on lower suture densely hairy and glandular, 2-ovuled; style 5–6 mm long, glabrous. *Fruits* not seen.

Thailand.— NORTHERN: Chiang Mai [Om Koi District, Au Tom Village, alt. 1,400 m, 20 Jan. 2005, *Pongamornkul 4589* (QBG)].

Distribution.— India (type), Myanmar, China, Vietnam.

Ecology.— Dry evergreen forest, alt. 1,400 m. Flowering: January–February; fruiting: expected in March.

Vernacular.— Pik ka (พื้กก)(General).

Notes.— 1. *Flemingia semialata* is characterised by its young twigs with whitish hairs scattered throughout. The upper surface of the leaflets is densely hairy along the midrib with sparse resinous glands and hairs on veins but glabrescent in between

the veins. The lower surface of the leaflets is densely tomentose, mostly along the veins with dense resinous glands. The inflorescence is racemose, relatively laxly flowered, 6–7 cm long, and is slightly longer than the petioles.

2. Baker (1876) regarded *F. semialata* as a variety of *F. congesta* Roxb. ex W.T. Aiton, but it is now understood that *F. congesta* is conspecific with *F. macrophylla* (Willd.) Merr, which is in agreement with previous studies (Mukerjee, 1953; Gavade *et al.*, 2019; Do & Gao, 2020). Instead *F. semialata* is a distinct species, distinct from *F. macrophylla*, differing in several characters, such as lanceolate leaflets (vs elliptic, lanceolate or ovate in *F. macrophylla*), inflorescences with relatively lax flowers (vs inflorescences with congested flowers in *F. macrophylla*) and a white to greenish corolla (vs pink in *F. macrophylla*).

3. In Thailand, we found an unknown specimen, housed at **QBG**, which was recently collected in Northern Thailand, close to the Myanmar border, which we identified as *F. semialata* using Baker (1876), Kurz (1876), Gavade *et al.* (2016; 2020) and Do & Gao (2020). It is a new species record for Thailand with only a single collection known so far.

4. *Flemingia wallichii* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 242. 1834; Do & Gao, Phytotaxa 429(1): 36. 2020; Gavade *et al.*, Webbia 75(2): 184. 2020.—*Maughania wallichii* (Wight & Arn.) Kuntze, Rev. Gen. Pl. 1: 199. 1891. Type: India, *Wallich, Numerical List no. 5746G*, (lectotype **K-W** [K001122002!], designated by Gavade *et al.* 2020). Fig. 2.

Shrub, 1–2 m tall; all parts usually with resinous glands; young twigs densely tomentose. *Leaves* digitately 3-foliolate; petioles 3–6 cm long, densely tomentose, grooved above, faintly winged; stipules lanceolate, 4–6 × 2–3 mm, outside densely hairy, inside glabrous, striate, caducous. *Leaflets*: petiolules 1–2 mm long, densely hairy; stipules absent; lamina ovate, obovate, lanceolate or elliptic, 5–10 × 2.5–5 cm, terminal leaflet slightly longer than lateral ones, obovate, apex acute, base symmetric, distinctly oblique in lateral ones, margin entire, upper surface densely hairy and glandular, especially along veins, lower surface sparsely hairy on blade, densely hairy and glandular along veins; secondary veins 6–8 pairs;

tertiary veins scalariform. *Inflorescence* racemose, up to 4 cm long, axillary, slender, densely tomentose, solitary or in clusters of 2–5 branches, sometimes borne on old branches or near base of stem, 15–20-flowered; bracts ovate, 3.5–5 × 1.5–2 mm, apex acute to acuminate, margin villous, outside densely silvery hairy, inside glabrous, striate, early caducous. *Pedicels* 0.5–1.5 mm long, densely silvery hairy. *Calyx*: tube 1–1.5 mm long; upper lobes 3–3.5 × ca 0.5 mm; longest lower lobe 10–11 × ca 1.5 mm, apex acuminate, margin densely plumose, both sides densely hairy and glandular. *Corolla* creamy white or with pink lines on both sides, shorter than calyx or slightly longer; standard orbicular, 4–5 × 4–4.5 mm, apex rounded to acute, base auriculate, inflexed, 0.2–0.3 mm long, without basal callosities, margin entire, glabrous on both sides, claw ca 1.5 mm long, with pink lines on both sides; wings oblong, 3–3.5 × ca 1 mm, base minutely auriculate, apex rounded, margin entire, glabrous on both sides, claw ca 2 mm long, pink at tip; keel 3–3.5 × ca 2 mm, apex acute, base minutely auriculate, margin entire, convex and bubble-like at base, glabrous on both sides, claw ca 2 mm long, creamy white. *Stamens*: tube 3–4 mm long, glabrous; filaments 1.5–2 mm long; anthers oblong, ca 0.1 mm long. *Ovary* densely hairy and glandular, ca 2 mm long, with 1 or 2 ovules; style 4–5 mm long, glabrous, thickened in upper half. *Fruits* turgid, elliptic to oblong, 8–10 × 4–5 mm, densely hairy and glandular, dehiscent, included calyx. *Seeds* 1 or 2, globular, ca 2 mm diam.

Myanmar.— Chin State, Natma Taung National Park, along the roadside between the Chin Village and the entrance to the trail to the top of Mt Victoria, alt. 1,750–2,550 m, 7 Dec. 2002, *Murata et al.* 025225 (**QBG**).

Thailand.— NORTHERN: Chiang Mai [Doi Sa Ket, Mae Chaem, Om Koi, alt. 500 m, 26 Feb. 1993, *Maxwell 93-203* (**BKF, CMUB-2** sheets)]; Sukhothai [Kirimas District, Ramkhamhaeng National Park, summit area of Khao Luang along the trail to Khao Phu Ga, alt. 1,200 m, 19 Jan. 1995, *Maxwell 95-43* (**CMUB**)], Phayao [Wiang Lo Wildlife Sanctuary, Km 35 between Chun and Dok Khamthai districts, 14 Jan. 2014, *Mattapha 2014/D* (**BKF**)]; NORTH-EASTERN: Loei [Chiang Khan District, Phu Khuay Ngoen temple, alt. 210 m, 4 Jan. 2018, *Mattapha 1174* (**BKF, KKU**)].

Distribution.— India, Myanmar (type).

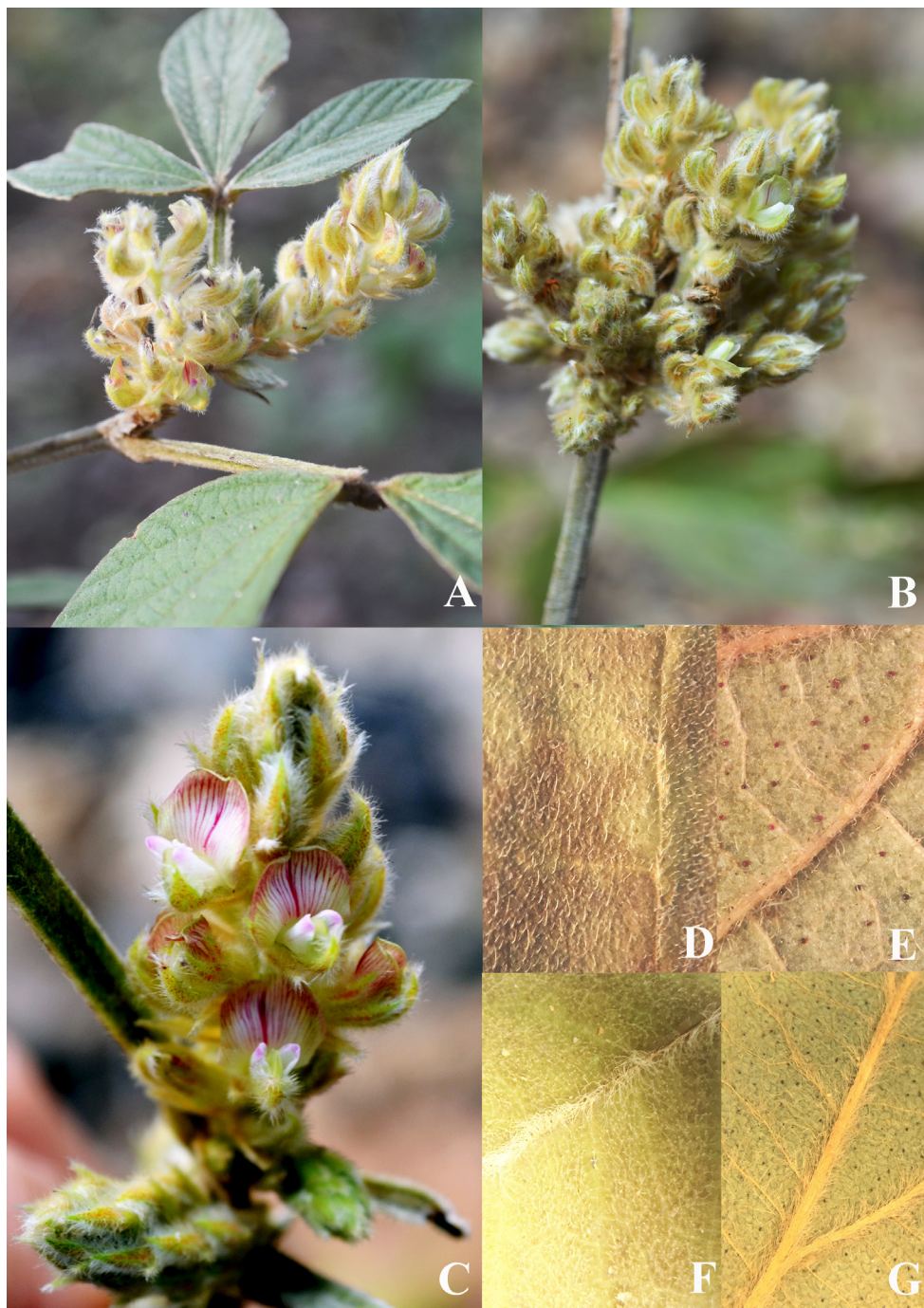


Figure 2. *Flemingia wallichii* Wight & Arn.; A. & B. Leaves and inflorescences; C. close up of flowers; D. Upper surface of leaflet showing dense hairs and resinous glands, particularly along veins (Mattapha 1174, KKU); E. Lower surface of leaflet showing sparse hairs on blade, dense hairs and resinous glandular along veins (Mattapha 1174, KKU). *Flemingia grahamiana* Wight & Arn.; F. Upper surface of leaflet showing white villous hairs (Phaosrichai 400, QBG); G. Lower surface of leaflet showing grey hairs (Phaosrichai 400 (QBG)). A. & B. & E.-G., photos by S. Mattapha.

Ecology.— Deciduous dipterocarp forest, alt. 500–1,500 m. Flowering: January–February; fruiting: March–April.

Vernacular.— Ka sam pik khon (กาสามปีกขน) (General).

Notes.— 1. *Flemingia wallichii* resembles *F. grahamiana* in the flowers as the corolla is included in the calyx, but it can be distinguished by the plumose and early caducous bracts (vs less plumose and subpersistent in *F. grahamiana*), the length of the bracts as long as the flowers (vs shorter in *F. grahamiana*), the standard orbicular, 4–5 mm long (vs oblong, 8–10 mm long). Although leaves of *F. wallichii* are superficially similar to those of *F. grahamiana* because of the combination of densely tomentose hairs and prominently netted veins on the lower surface of the leaflets, the size of leaflets is larger and wider (5–10 × 2.5–5 cm in *F. wallichii* vs 3–6 × 2–3 cm in *F. grahamiana*), and the petioles are faintly winged (vs wingless in *F. grahamiana*).

2. *Flemingia wallichii* is a new record for Thailand, previously recorded for India, Myanmar, Laos and Vietnam.

5. *Flemingia wightiana* Graham ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 242. 1834; Gavade *et al.*, Webbia 75(2): 186. 2020.— *F. congesta* Roxb. ex W.T.Aiton var. *wightiana* (Graham ex Wight & Arn.) Baker in Hook.f., Fl. Brit. India 2: 229. 1876, in part. Type: India, East Peninsular region, s.d., R. Wight 815 (lectotype **E** [E00157782!], designated by Gavade *et al.* 2020); isolectotypes **K** [K001122004!], **MH** [MH00002049]. Fig. 3.

— *Flemingia ferruginea* Wall. ex Benth. in Miq., Pl. Jungh.: 245. 1852.— *Moghania ferruginea* (Wall. ex Benth.) H.L.Li, Amer. J. Bot. 31(4): 226. 1944. Type: Myanmar, Tong Dong, 1826, *Wallich, Numerical List no. 5750* (holotype **K-W** [K001122003!]).

Shrub, ca 1 m tall; all parts usually with resinous glands; young twigs densely tomentose. *Leaves* digitately 3-foliolate: petioles 2.5–4.5 cm long, densely tomentose, grooved above; stipules not seen. *Leaflets*: petiolules 2–3 mm long, densely tomentose; stipels absent; lamina broadly ovate-lanceolate, 6–11 × 3–4.5 cm, terminal leaflet equal to lateral ones, apex acute, base cuneate, margin hairy; upper surface moderately pubescent with sparse resinous glands;

lower surface densely tomentose and glandular; secondary veins 7–9 pairs; tertiary veins scalariform. *Inflorescence* racemose, 2–3 cm long, axillary, ca 1.4 cm thick, densely tomentose, solitary or in clusters of 2 or 3 branches, many-flowered; inflorescence bracts broadly ovate, 4–4.5 × 2.5–3 mm, apex acute to acuminate, margin villous, outside densely brownish hairy, inside glabrous, striate, relatively persistent; floral bracts similar to inflorescence bracts but smaller and caducous; bracteoles 1–2 mm long, hairy, early caducous. *Pedicels* 2–2.5 mm long, densely hairy. *Calyx*: tube 1.5–2 mm long; upper lobe ca 5 × 0.5 mm; lower, longest one 6–6.5 × ca 1.5 mm, apex acuminate, margin densely plumose, outside densely hairy and glandular; inside glabrous. *Corolla* white with light pink lines, included in calyx or slightly longer; standard orbicular, 5–5.5 × 4–4.5 mm, apex rounded to acute, base auriculate, without basal callosities, margin entire, glabrous, with pink lines on both sides, claw ca 2 mm long; wings falcate, 3–3.5 × ca 1.5 mm, base auriculate, apex acute, margin entire, glabrous on both sides, claw ca 2 mm long, white; keel 4–4.5 × ca 2.5 mm, apex acute, base minutely auriculate, margin entire, glabrous on both sides, claw ca 2 mm long, greenish to white. *Stamens*: tube 4–4.5 mm long, glabrous; filaments 1.5–2 mm long; anthers oblong, ca 0.1 mm long. *Ovary* densely hairy and glandular, 2-ovuled; style 5–5.5 mm long, glabrous, thickened in upper half part. *Fruits* not seen.

Laos.— Phongsaly, Yod Ou District, Mountain Ridge, Phu Ta San, alt. 1,341 m, 17 Jan. 2019, *Tanming et al. L14-079 (QBG)*.

Distribution.— India (type without geographical indication).

Ecology.— Hill evergreen forest.

Notes.— 1. This species is characterized by the combination of the following characters 1) broadly ovate-lanceolate leaflets; 2) the upper surface of the leaflets is moderately pubescent throughout with sparse resinous glands, whereas the lower surface is densely tomentose and glandular throughout; 3) the inflorescence is an axillary raceme with a length of 2–3 cm long, racemes solitary or 2 or 3 clustered per axil.

2. Craib (1928) identified *Hosseus 2868* (**K**) as *F. ferruginea*, and recorded the species for Thailand. However, this collection was wrongly identified and

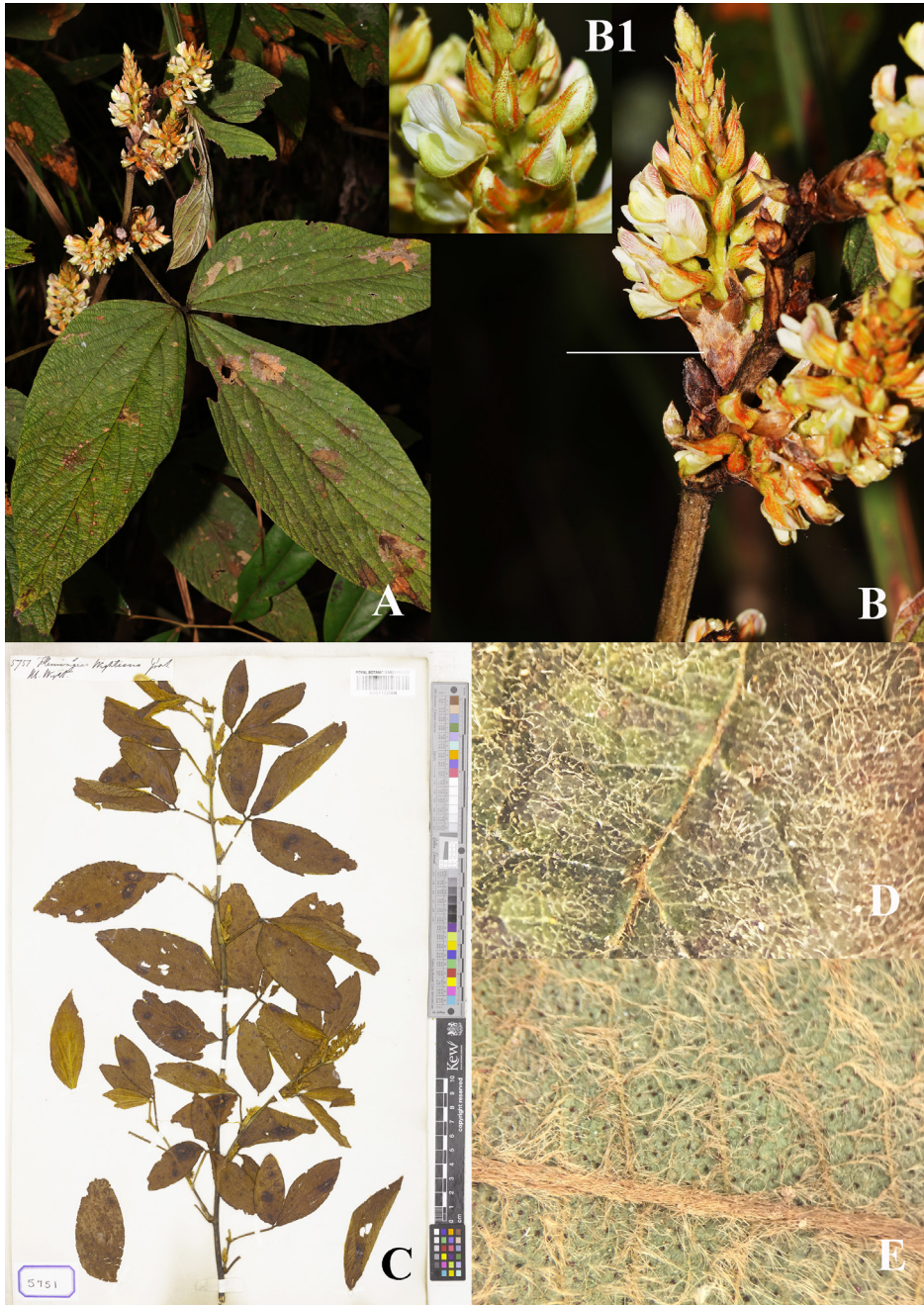


Figure 3. *Flemingia wightiana* Graham ex Wight & Arn.; A. Leaves and inflorescences; B. Inflorescences showing mature flowers, young floral buds, and fascicled bracts (arrow), B.1 close up of flowers; C. Lectotype of *Flemingia wightiana*; D. Upper surface of leaflet, showing moderately pubescent hairs throughout with sparse resinous glands (Tanming et al. L14-079, QBG); E. Lower surface of leaflet, showing densely tomentose hairs and resinous glands throughout (Tanming et al. L14-079, QBG). A. & B. photos by W. Tanming; C. The photograph was reproduced with the permission of the Board of Trustees, Royal Botanic Gardens, Kew; D. & E. Photos by S. Mattapha.

is *F. grahamiana* Wight & Arn. He also recorded *F. ferruginea* var. *eglandulosa* Gagnep. for Thailand, but this name is synonymised with *F. kerrii* by Do & Gao (2020).

3. Nguyễn (1979) followed Baker (1876) and regarded *F. wightiana* as a variety of *F. ferruginea* on the basis of three collections from Laos in P, *Vidal 2668* (P00912034), *Vidal 2213* (P02920814) and *Vidal 2329* (P02920815). We carefully diagnosed these specimens and found that the first two specimens undoubtedly belong to *F. kerrii* Craib, while the third one represents *Dendrolobium triangulare* (Retz.) Schindl. (tribe Desmodieae). This means that *F. wightiana* was not known from Laos. Lately, a specimen recently collected by the third author in the northern part of Laos, represents *F. wightiana*. We could confirm this after a critical examination of the type specimen and literature (Wight & Arnott, 1834; Prain, 1897; Mukerjee, 1953 and Gavade *et al.*, 2020) and it is here newly recorded for Laos.

2. Flemingia subgen. **Rhynchosioides** Baker in Hook.f., Fl. Brit. India 2: 230. 1876; Gavade *et al.*, Blumea 64. 257. 2019. Type. *Flemingia vestita* Benth. ex Baker.

Trailing or erect herbs with herbaceous roots. *Leaves* digitately trifoliolate. *Inflorescences* axillary or terminal capitata or racemes, sometimes with a few branches; bracts minute, caducous or persistent.

Flemingia vestita Benth. ex Baker in Hook.f., Fl. Brit. India 2: 230. 1876; Gavade *et al.*, Blumea 64: 267. 2019. Type: India, Kumaon, *Blinkworth s.n.*, s.d., (*Wallich, Numerical List no. 5545*) (lectotype **K-W** [K001121248!], designated by Gavade *et al.*, 2019; isolectotype **CAL** [CAL0000067596]).

Trailing or erect herb; all parts usually with resinous glands; young twigs densely villous, terete. *Leaves* (1- or) digitately 3-foliolate; petioles 3–5 cm long, densely villous, grooved above; stipules lanceolate, 8–9 × ca 1 mm, outside densely villous, inside glabrous, striate, persistent. *Leaflets*: petiolules 1.5–2 mm long, densely villous; stipels absent; lamina obovate, 3–4 × 2.5–3.5 cm, terminal leaflet slightly larger than lateral ones, apex acute or cuspidate, base symmetric, distinctly oblique in lateral ones, margin entire, hairy, upper and lower surface villous; secondary veins 7–10 pairs, raised below; tertiary

veins scalariform. *Inflorescence* capitate, sometimes with a few branches, consisting of 3–6 flowers, up to 15 cm long, axillary, densely villous; bracts lanceolate, 7–8 × ca 3 mm, apex acute, margin villous, densely hairy on both sides, striate. *Pedicels* 3–4 mm long, densely hairy. *Calyx*: tube 3–4 mm long; lobes lanceolate, 6–7 × ca 2 mm, apex acuminate, margin densely hairy, both sides densely hairy and glandular. *Corolla* purple; standard obovate, 9–10 × 9–10 mm, without basal callosities, apex retuse, base auriculate, ca 1 mm long, margin entire, outside densely hairy, inside glabrous, claw 3–4 mm long; wings oblong, 7–8 × 4–5 mm, base minutely auriculate, apex rounded, margin entire, outside sparsely hairy, inside glabrous, claw ca 5 mm long; keel 7–8 × 4–5 mm, apex acute, base minutely auriculate, margin entire, glabrous on both sides, claw ca 5 mm long. *Stamens*: tube 8–9 mm long, glabrous; filaments 3–4 mm long; anthers oblong, ca 0.5 × 0.1 mm. *Ovary* densely hairy and glandular, ca 2 mm long, with 1 or 2 ovules; style 9–10 mm long, glabrous, densely hairy at apex below the stigma. *Fruits* not seen.

Thailand.— NORTHERN: Chiang Mai [Doi Chiang Dao, hill evergreen forest, alt. 1,500–1,800 m, 27 Oct. 1979, Shimizu *et al.* T-20934 (L [L1945777!])].

Distribution.— India (type).

Ecology.— Deciduous dipterocarp forest, alt. 1,500–1,800 m. Flowering: January–February; fruiting: expected in March–April.

Vernacular.— Ka sam pik Chiang Dao (กาสามปีก เชียงดาว)(General).

Notes.— 1. *Flemingia vestita* is similar to *F. trifoliata* (Jung.) C.Y.Wu and *F. sirindhorniae* Mattapha, Chantar. & Suddee in the habit of being trailing or erect herbs with herbaceous roots, with digitately trifoliolate leaves, and capitate inflorescences (Mattapha *et al.*, 2017). However, it differs from the other species within *Flemingia* subgen. *Rhynchosioides* in the capitate heads that consist of 3–6 flowers (vs numerous flowers in *F. trifoliata* and 4–7 in *F. sirindhorniae*), slender peduncles (vs thick in *F. trifoliata* and *F. sirindhorniae*), shorter petals (9–10 mm long vs 12–15 mm long in *F. trifoliata* and 16–17 mm long in *F. sirindhorniae*).

2. Previous studies (Mukerjee (1953) and Gavade *et al.* (2019) stated that *F. vestita* is endemic in India. However, it also occurs in Thailand,

therefore, we report it as a newly recorded taxon based only a single collection from Chiang Mai, Northern Thailand. The specimen matches the description of *F. vestita* very well, but there are some minor morphological differences when compared with the description in Gavade *et al.* (2019), such as inflorescences with 3–6 clustered flowers (3–4 flowers in our study), flower length 15–17 mm long (9–10 mm long in our study), and fruits (9–)12–13 × 4–5 mm and glabrous (not seen in our study). These morphological characters of this Thai collection are mostly identical to those of the type in the protologue and overlap with measurements mentioned in the literature, which is a good indicator for the correct identification as generally many species in this genus often have only slightly variable characters.

SYNONYMISATIONS

1. *Flemingia macrophylla* (Willd.) Kuntze ex Merr., Philipp. J. Sci., C 5: 130. 1910; Gavade *et al.*, Webbia. 75(2): 160. 2020.—*Crotalaria macrophylla* Willd. Sp. Pl. ed. 4, 3(2): 982. 1802. Type: India, 1797, *Klein 13260* (lectotype **B-W** [B-W13260-010!], designated by Gavade *et al.*, 2020).

— *Flemingia brevipes* Craib, Bull. Misc. Inform. (Kew) 1927(2): 68. 1927; **syn. nov.** Type: Thailand, Trat, Kao Saming, under 20 m, edge of evergreen forest, 25 Nov. 1924, *Kerr 9406* (holotype **ABD!**; isotypes **BM** [BM000958667!], **K** [K000900610!], **E** [E00313508!]).

— *Flemingia latifolia* Benth. var. *siamensis* Craib, Fl. Siam. Enum. 1: 470. 1928; **syn. nov.** Type.— Thailand, Nakhon Ratchasima, Pak Chong District, 300 m, 2 Jan. 1924, *Marcan 1591* (holotype **ABD!**; isotypes **BM** [BM000958669!], **K!** [number not indicated]).

Notes.— 1. Craib (1927) and Do & Gao (2020) accepted *F. brevipes* as distinct from *F. macrophylla*. However, the type and herbarium specimens of *F. brevipes* show that several critical characters are identical with *F. macrophylla* such as ovate-lanceolate leaflets, wingless petioles, and racemes shorter than petioles. Therefore, we consider *F. brevipes* to be conspecific with *F. macrophylla*.

2. *Flemingia latifolia* var. *siamensis* was previously included as a synonym of *F. latifolia* by Do & Gao (2020). After a study of voucher specimens

and the circumscription of *F. latifolia* from Gavade *et al.*'s revision (2020), we found the morphology of *F. latifolia* var. *siamensis* differs from those of the typical variety by absence of ferruginous hairs, smaller leaflets, racemes shorter than petioles and smaller bracts. However, those characters of *F. latifolia* var. *siamensis* are identical to those of *F. macrophylla* in having racemes shorter than the grooved petiole, ovate-lanceolate leaflets and upper surfaces of leaflets glabrous except for the veins and the lower surface pubescent with hairs and sessile glands. Therefore we decide that *F. latifolia* var. *siamensis* is a synonym of *F. macrophylla*.

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