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Mukia Arn. (Cucurbitaceae) in Asia, in particular in Thailand

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ABSTRACT: The genus *Mukia* Arn. has been taxonomically revised. *Mukia maderaspatana* (L.) M. Roem. var. *gracilis* Kurz has been raised to specific rank, *Mukia gracilis* (Kurz) W.J. de Wilde & Duyfjes. The only species of the Indian endemic genus *Dicoelospermum* C.B. Clarke has been combined as *Mukia ritchiei* (C.B. Clarke) W.J. de Wilde & Duyfjes. The correct name for the eastern Malesian *Mukia celebica* appeared to be *Mukia rumphiana* (Scheff.) W.J. de Wilde & Duyfjes, of which one new subspecies is also described, *Mukia rumphiana* (Scheff.) W.J. de Wilde & Duyfjes subsp. *tomentosa* W.J. de Wilde & Duyfjes. A key to the species and descriptions of the Thai and Malesian species are presented.

INTRODUCTION

On inspection of the material of Asian Cucurbitaceae for the treatments of the family for the Flora of Thailand and Flora Malesiana it became clear that additions needed to be made to the comprehensive treatment of the genus *Mukia* by Jeffrey (1969). Firstly, certain Thai specimens which strongly deviate within the very variable *M. maderaspatana* are better accommodated in a separate species, *Mukia gracilis.* Secondly, the rare and incompletely known monotypic genus *Dicoelospermum*, from India, should be regarded as belonging to the genus *Mukia*. Because of its obscurity a drawing is included in this paper, but the species is not fully described. *Melothria rumphiana* Scheff., published with a detailed description, but with a very deteriorated type-specimen, antedates the name *Mukia celebica*, which is renamed *Mukia rumphiana*. The number of Asian species of *Mukia* has now increased to six. *Mukia* is an Old World genus including one Africa species, *M. maderaspatana* (very variable in Africa; also in Asia and Australia). Further study of the insufficiently known Australian *Mukia* (at present two species but with an additional several taxa as indicated by Telford, 1982) will yield more species. Telford (pers. comm.) has informed us that in Australia: "Besides the *M. maderaspatana* species complex, 3 species, *Mukia* sp. A and *Mukia* sp. B sens. Flora of Australia (1982) and one recent discovery, will be named as new in a paper almost completed. *Mukia micrantha*, *Mukia* sp. C, *Mukia* sp. D and *Mukia* sp. E will be placed in a new genus".

MUKIA

Arn., Madras J. Lit. Sci. 12: 50. 1840; C.B. Clarke in Hook. f., Fl. Brit. Ind. 2: 623. 1879; C. Jeffrey, Kew Bull. 15: 343. 1962; in Hooker's Ic. Pl. 37, 3: 2, tab. 3661-3664. 1969; Keraudren in Aubrâv . & J.-F. Leroy, Fl. Cambodge, Laos & Viêt-Nam 15: 57. 1975. *Melothria* L. sect.

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Mukia (Arn.) Cogn. in A.DC & C.DC., Monogr. Phan. 3: 622. 1881. Type species: *Mukia scabrella* (L.) Arn. (= *Mukia maderaspatana* (L.) M. Roem.).—*Dicoelospermum* C.B. Clarke ('*Dicaelospermum',* correction T. Post & Kuntze, 1903) in Hook. f., Fl. Brit. Ind. 2: 630. 1879; Cogn. in A.DC. & C.DC., Monogr. Phan. 3: 734. 1881; in Engl., Pflanzenr. 66 (family no. 4.275.1): 252. 1916; Chakrav., Rec. Bot. Surv. India 17: 176. 1959; C. Jeffrey, Kew Bull. 34: 796. 1980. Type species: *Dicoelospermum ritchiei* C.B. Clarke.

Small climbers, shoots herbaceous, (sub)annual or with a (thick) perennial root; monoecious; whole plant scabrid-hairy. *Probract* absent. *Tendrils* simple. *Leaves*: blade simple, green on drying; apices of (lobes of) developing leaves distinct, broad, glabrous, often brown on drying; petiole long or short (leaves subsessile). *Flowers* small; petals yellow, (almost) free, imbricate in bud; disc free from the receptacle-tube. *Male inflorescences*: a fascicle (in Asia) at the node, with few to 10(–20) short-pedicelled flowers; *bracts* absent. *Male flowers*: pedicel 2–10 mm long, slender; receptacle-tube urceolate-campanulate; sepals minute, long-triangular or linear, somewhat recurved; petals elliptic or (ob)ovate, free or very short-connate at base; stamens 3, inserted slightly above halfway up the receptacle-tube, filaments short, much shorter than the anthers, glabrous, anthers one 1-thecous and two 2-thecous, included, thecae lateral, straight, connective narrow, ± hairy, at apex hardly or shortly produced; disc depressed globose. *Female flowers*: 1–6, fascicled, usually separate from male flowers; pedicel short; ovary globose to oblong, slightly constricted at apex; perianth as in male; style thick; stigma with 3 sessile, elongate lobes, and each lobe shallowly 2-lobed again, lobes carnose, papillose, included; staminodes usually present; disc annular. *Fruits* 1–6, clustered, subsessile or short-pedicelled, (sub)globose or ellipsoid, 0.5–3 cm long, hairy, glabrescent or glabrous, red when ripe, inside juicy; pericarp membranous or cartilaginous, smooth. *Seeds* few or many, globose or compressed, whitish or pale grey-brown, ornamented or not, margin distinct, wing absent.

A genus of about 9 species, including 3 unpublished Australian species, distributed in the tropics of the Old World: Africa (1 species); in SE Asia from Pakistan east to China and south-east through Indo-China and Malesia to New Guinea, and in Australia.

Key to the species

1. Leaf blade ovate-oblong, longer than broad. Fruit globose, 5–8 mm diameter. Seeds ca 5 per fruit, 5–6 mm long. Burma, Thailand **1. M. gracilis**
1. Leaf blade about as long as broad (sometimes longer than broad in Africa, E New Guinea, Australia, but than fruit longer and more-seeded)
   2. Seeds globose, 1–3 per fruit. Western India **5. M. ritchiei**
   2. Seeds distinctly flattened (flat or tumid), 8–20 per fruit
      3. Fruit ellipsoid, 2–4 cm long. E Malesia: Moluccas & Vogelkop Peninsula **6. M. rumphiana**
      3. Fruit globose or ellipsoid, up to 1.5 cm long
         4. Fruit ellipsoid; pericarp thin, collapsing about the seeds, translucent. Seed faces flat. [Hairs of petiole spreading or curved downward]. China, south to Java, Borneo, Philippines **2. M. javanica**
         4. Fruit globose; pericarp thicker, wrinkling or not, not translucent. Seed faces convex
            5. Hairs of petiole spreading or curved upward (always?). Seed faces smooth or low-warted, the margin separated by a groove. S India, Sri Lanka **3. M. leiosperma**
            5. Hairs of petiole spreading or curved upward. Seed faces warted and pitted or nearly smooth and then without a distinct margin. Widespread: Africa, Asia, China, east to Australia **4. M. maderaspatana**

1. Mukia gracilis (Kurz) W.J. de Wilde & Duyfjes, **stat. nov.**— *M. maderaspatana* (L.) M. Roem. var. *gracilis* Kurz, J. Asiat. Soc. Bengal 46: 104. 1877.— *M. scabrella* (L.) Arn. var. *gracilis* (Kurz) C.B. Clarke in Hook. f., Fl. Brit. Ind. 2: 623. 1879.— *Melothria maderaspatana* (L.) Cogn. var. *gracilis* (Kurz) Cogn. in A. & C. DC., Monogr. Phan. 3: 624. 1881; in Engl., Pflanzenr. 66 (family no. 4.275.1): 128. 1916; Craib, Fl. Siam. Enum. 1: 764. 1931. Type: Burma, Pagamew, *Wallich* Cat. 6714 (isotype **K-W**, microphoto in **L**).— *M. maderaspatana* auct. non (L.) Cogn.: Craib, Fl. Siam. Enum. 1: 764. 1931, p.p., for *Garrett* 469.— *Mukia maderaspatana* auct. non (L.) M. Roem.: C. Jeffrey in Hooker's Ic. Pl. 37, 3: 5. 1969, p.p., for the synonym var. *gracilis*, and tab. 3662: 1–8. Fig. 1, 4A.

Climber 2(–3) m tall; stem 1–3 mm diam.; sparsely or densely grey- or brown-hairy, hairs stiff or soft, erect or somewhat curved upward, 1–5 mm long. *Leaves*: blade ovate-oblong, longer than broad, 5–12 by 2–6(–8) cm, entire or conspicuously hastate, base deeply cordate, the basal lobes downward directed or ± patent and hastate, apex long acute-acuminate, margin entire or shallowly and irregularly sinuate with teeth to 1(–2) mm long, upper and lower surface sparsely or densely ± appressedly soft-hairy, hairs 1–5 mm long, denser on the veins below, cystoliths small or absent; petiole 3–6(–7) cm long, hairy as on the stem. *Male flowers*: in sessile clusters of 5–10, occasionally mixed with few female flowers; pedicel 2–6 mm long; receptacle-tube long-campanulate, 2–2.5 by 1–1.5 mm; sepals ca 1 mm long, pedicel, receptacle-tube and sepals (sparsely) stiff-hairy, hairs 1–1.5 mm long; petals nearly free or up to 1 mm connate at base, (obovate-)elliptic, 2(–3) mm long, glabrous except for few stiff hairs on midvein at outside, apex (broadly) rounded or (sub)emarginate; anthers ca 1 mm long. *Female flowers*: 1–5 in sessile clusters; pedicel ca 1 mm long; ovary subglobose, 2–3 mm diam., at apex with short neck, sparsely hairy; style hairy in apical part (*Garrett* 469). *Fruits* solitary or 2 or 3 in sessile cluster, 0.5–0.8 cm diam., sparsely brown-hairy; pericarp thin, filmy or not; fruiting pedicel 1(–2) mm long. *Seeds* ca 5, ellipsoid-obovate, only little compressed, 5–6 by 3–4 by ca 2.5 mm, margin ± rounded with faint ridge in the middle, and with a deep groove separating the faces; faces somewhat convex, shallowly pitted.

Thailand.— NORTHERN: Chiang Mai (Doi Inthanon, Doi Suthep-Pui, Doi Luang); Lamphun (Doi Khun Tan); Lampang (en route from Pang La to Huai Tak); NORTHEASTERN: Loei (Samhaek); SOUTHWESTERN: Kanchanaburi (Huai Ban Kao).

Distribution.— Myanma (type).

Ecology.— Mixed deciduous forest, evergreen seasonal forest and scrub, bamboo thickets, stream-sides; on limestone and phylletic bedrock; at 350–2,000 m altitude. Flowering & fruiting: Aug.–Nov.

2. Mukia javanica (Miq.) C. Jeffrey in Hooker's Ic. Pl. 37, 3: 3, tab. 3661: 1-10. 1969; Keraudren in Aubrâv. & J.-F. Leroy, Fl. Cambodge, Laos & Viêt-Nam 15: 58, f. 10: 6-8. 1975; A.M. Lu & Zhi Y. Zhang in A.M. Lu & S.K. Chen, Fl. Reip. Pop. Sin. 73(1): 177, f. 46: 7-8. 1986; S.K. Chen in C.Y. Wu et al., Fl. Yunnan. 6: 321, f. 83: 8-10. 1995.— *Karivia javanica* Miq., Fl. Ned. Ind. 1: 661. 1856.— *Melothria javanica* (Miq.) Cogn. in A.DC. & C.DC., Monogr. Phan. 3: 625. 1881; in Engl., Pflanzenr. 66 (family no. 4.275.1): 129. 1916; Gagnep. in Lecomte, Fl. Indo-Chine 2: 1060. 1921; Backer in Backer & Bakh. f., Fl. Java 1: 297. 1964. Type: Indonesia, Java,

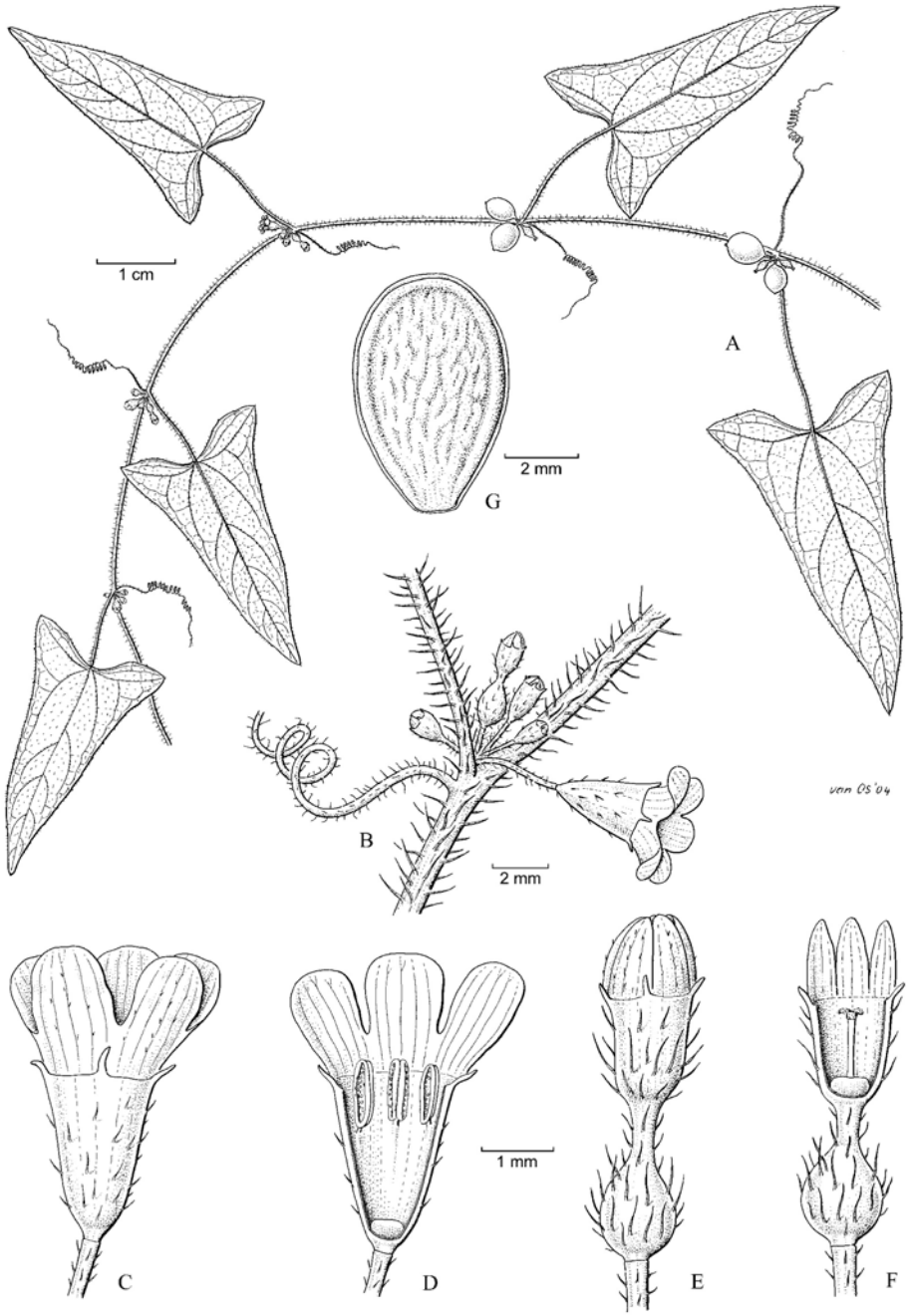

Figure 1. *Mukia gracilis* (Kurz) W.J. de Wilde & Duyfjes. A. Twig with fruits and inflorescences, each with male and female flowers; B. node with mixed inflorescence; C, D. male flowers, from outside and opened respectively; E, F. female flowers, from outside and opened respectively; G. seed. (A-G: *Van Beusekom, Geesink, Phengklai & Wongwan* 3567). Drawn by Jan van Os.

Horsfield s.n. (holotype **U**; isotypes **BM**, **K**).— *M. assamica* Chakrav., J. Bombay Nat. Hist. Soc. 50: 897. 1952; Rec. Bot. Surv. India 17: 145. 1959. Type: India, Assam, *Keenan* s.n. (holotype **K**).— *M. assamica* Chakrav. var. *scabra* Chakrav., J. Bombay Nat. Hist. Soc. 50: 898. 1952; Rec. Bot. Surv. India 17: 145. 1959. Type: India, Assam, *King's Collector* 1890 (holotype **CAL**, not seen).— *M. leiosperma* auct. non (Wight & Arn.) Cogn.: Chakrav. Rec. Bot. Surv. India 17: 141. 1959, p.p. Fig. 4E.

Climber or creeper to 3 m long; stem scabrous hairy. *Leaves*: blade broadly ovate(-hastate), subcircular in outline, 2–10 cm diam., 5-angular or variously (3–)5-lobed up to halfway deep, base cordate, apex subobtuse or acute(-acuminate), margin to 2 mm dentate, upper and lower surface subglabrous or variously (scabrid-)hairy, denser on the veins below, cystoliths not apparent; petiole 2–5(–10) cm long, scabrid-hairy, hairs curved downward. *Male flowers*: 3–6, rarely with few female flowers mixed; pedicel 1–2(–4) mm long; receptacle-tube 1.5–3 by 1.5–2 mm, scabrid hairy; sepals 0.5–1.5 mm long; petals ovate, 1.5–2.5 mm long, apex subacute, glabrous except for few hairs on outer surface; filaments less then 0.5 mm long, anthers 1.5(–2) mm long; disc 1–1.5 mm diam. *Female flowers*: (1–)2–4; pedicel ca 1 mm long; ovary ellipsoid(-oblong), 4–5 mm long, (sub)glabrous or finely hairy, hardly constricted at apex; perianth as in male; style glabrous; disc ca 1 mm high. *Fruits* 1–3, fascicled, ellipsoid, 1–1.5 cm long, juicy, with filmy pericarp showing the seeds when dry, glabrous; fruiting pedicel 1–2 mm long. *Seeds* 8–18, obovate, strongly compressed, ca 5 by 3.5–4 by 1–1.5 mm, (pale brown or) whitish, faces flat, ± depressed, irregularly low-warted, with a broad 2-grooved margin.

Thailand.— NORTHERN: Chiang Mai (Doi Inthanon, Mae Sa Arboretum, Doi Chiang Dao); Chiang Rai (Doi Tung); Phrae (Mae Yom); Phitsanulok (Thung Salaeng Luang); NORTHEASTERN: Khon Kaen (Phu Khieo); SOUTHWESTERN: Kanchanaburi (Khaobuing); SOUTHEASTERN: Chon Buri (Khao Khieo).

Distribution.— Northern India, east to China, through Malesia (Java, type, east to Borneo and The Philippines); not known from Sulawesi, Lesser Sunda Islands, and New Guinea.

Ecology.— Roadsides, (disturbed) forest and scrub edges; up to 1,500 m altitude. Flowering & fruiting throughout the year.

Vernacular.— Ma ra dong (มะระดง) (Kanchanaburi).

3. Mukia leiosperma (Wight & Arn.) Wight, Ann. Mag. Nat. Hist. ser. 1, 8: 268. 1842; Thwaites, Enum. Pl. Zeyl. 2: 125. 1859; C.B. Clarke in Hook. f., Fl. Brit. Ind. 2: 623. 1879; Trimen, Handb. Fl. Ceylon 2: 255. 1894; C. Jeffrey in Hooker's Ic. Pl. 37, 3: 9, tab. 3663: 1-9. 1969; Matthew, Fl. Tamilnadu Carnatic 1: 649. 1983; Ill. Palni Hills, South India: pl. 342. 1996; Philcox, Fl. Ceylon 11: 37. 1997.— *Bryonia leiosperma* Wight & Arn., Prodr. Fl. Indiae Orient. 1: 345. 1834.— *Melothria leiosperma* (Wight & Arn.) Cogn. in A.DC. & C.DC., Monogr. Phan. 3: 622. 1881; in Engl., Pflanzenr. 66 (family no. 4.275.1): 125. 1916; Fyson, Fl. South Indian hill stations 1: 244, t. 191. 1932; Chakrav., Rec. Bot. Surv. India 17: 140. 1959, p.p. Lectotype (C. Jeffrey, 1969): India, Madras, Palni Hills, *Wight* 1112 (lectotype **K**; isolectotype **BR**, not seen).

Distribution.— S India, Sri Lanka.

Ecology.— Forest edges and scrub and in hilly country; under seasonal climate; at low and medium altitudes. Flowering & fruiting possibly throughout the year.

Note.— The status of *Mukia leiosperma* as a species is questionable. Jeffrey, l.c., regarded it a species close to *M. maderaspatana*, developed under specific local climatic conditions.

4. Mukia maderaspatana (L.) M. Roem., Syn. Monogr. 2: 47. 1846; C. Jeffrey in Hooker's Ic. Pl. 37, 3: 5. 1969, p.p., excl. tab. 3662: 1-8; Fl. Trop. East Africa, Cucurbitaceae: 115, f. 19. 1967; Matthew, Ill. Fl. Tamilnadu Carnatic 1: pl. 302. 1982.— *Cucumis maderaspatanus* L., Sp. Pl.: 1012. 1753.— *Melothria maderaspatana* (L.) Cogn. in A.DC. & C.DC., Monogr. Phan. 3: 623. 1881; in Engl., Pflanzenr. 66 (family no. 4.275.1): 126. 1916; Gagnep. in Lecomte, Fl. Indo-Chine 2: 1059. 1921; Craib, Fl. Siam. Enum: 764. 1931; Chakrav., Rec. Bot. Surv. India 17: 141. 1959; Backer in Backer & Bakh. f., Fl. Java 1: 298. 1964; Keraudren in Aubrév. & J.-F. Leroy, Fl. Cambodge, Laos & Viêt-Nam 15: 60, f. 10: 9. 1975; Telford, Fl. Australia 8: 183, f. 40: A–G. 1982; A.M. Lu & Zhi Y. Zhang in A.M. Lu & S.K. Chen, Fl. Reip. Pop. Sin. 73(1): 175, f. 46: 1–6. 1986; S.K. Chen in C.Y. Wu et al., Fl. Yunnan. 6: 319, f. 83: 1–7. 1995. Lectotype (Meeuse, Bothalia 8: 14. 1962): in Plukenet, Phytographia, t. 170, f. 2. 1692; Typotype (Meeuse, l.c.): Herb. Sloane 95: 201 (**BM-SL**, not seen).— *Bryonia cordifolia* L., Sp. Pl.: 1012. 1753.— *Coccinia cordifolia* (L.) Cogn. in A.DC. & C.DC., Monogr. Phan. 3: 529, for the type only. 1881. Lectotype (C. Jeffrey in Milne-Redhead & Polhill (ed.), Fl. Trop. E. Afr., Cucurbit.: 117. 1967): Herb. *Herman* 2: 22, No 354 (**BM**, not seen).— *Bryonia scabrella* L. in L. f., Suppl.: 424. 1781; Miq. Fl. Ned. Ind. 1: 658. 1856.— *Mukia scabrella* (L.) Arn. in Hook., J. Bot. 3: 276. 1841; C.B. Clarke in Hook. f., Fl. Brit. Ind. 2: 623. 1879.— *Mukia maderaspatana* (L.) M. Roem. var. *scabrella* (L.) Kurz, J. Asiat. Soc. Bengal 46: 104. 1877. Type: India, *without collector* (holotype **LINN** 1153/11, not seen).— *Bryonia rottleri* Spreng., Syst. 3: 15. 1826.— *Mukia rottleri* (Spreng.) M. Roem., Syn. Monogr. 2: 47. 1846. Type: India, *Rottler* s.n. (type not found).— *Bryonia althaeoides* Ser. in DC., Prodr. 3: 306. 1828.— *Mukia althaeoides* (Ser.) M. Roem., Syn. Monogr. 2: 47. 1846.— *Melothria althaeoides* (Ser.) Nakai, J. Jap. Bot. 14: 127. 1938. Type: Timor, without collector (**G-DC** holo, not seen, microphoto in **K**, **L**).— *M. celebica* Cogn. var. *villosior* Cogn., Bull. Acad. Roy. Sci. Belgique 3, sâr. 14: 357. 1887 (not seen); in Engl., Pflanzenr. 66 (family no. 4.275.1): 128. 1916. Type: Australia, Gulf of Carpenteria, Herb. *Mueller* s.n. (holotype **BR**). — *M. leiosperma* auct. non (Wight & Arn.) Wight: Cogn. in A.DC. & C.DC., Monogr. Phan. 3: 622. 1881, p.p.; in Engl., Pflanzenr. 66 (family no. 4.275.1): 125. 1916, p.p.; Chakrav., Rec. Bot. Surv. India 17: 141. 1959, p.p. Figs. 4 B, C, D.

Climber to 4 m tall; stem scabrous or stiff-hairy. *Leaves*: blade broadly ovate, subcircular or broadly hastate in outline, 2–10 cm diam., subentire or 3–5-lobed, base (shallowly or) deeply cordate, apex subobtuse or acute(-acuminate), margin variously up to 5 mm dentate, upper and lower surface hispid or scabrous-hairy, more densely so on the veins, cystoliths dense and minute and not apparent; petiole (0.1–)0.5–9 cm long, scabrous and hispid with short or long, erect or upward curved hairs (but see note). *Male flowers*: in fascicles of 2–20 (occasionally mixed with few female flowers); pedicel 2–5(–7) mm long; receptacle-tube 1.5–4 by 1–2 mm, with upward appressed hairs; sepals 1(–1.5) mm long; petals ovate, 1.5–3(–4) mm long, apex subacute, glabrous except for the mid-nerve outside;

filaments less than 0.5 mm long, anthers 1–2 mm long; disc ca 1.5 mm diam. *Female flowers*: solitary or up to 8; pedicel 1–4 mm long; ovary subglobose or broadly ovoid, 3–3.5 by 1.5–2 mm, with scattered or dense (stiff) hairs; style glabrous. *Fruits* 1–5(–8) in axillary clusters, globose, 0.5–1.5 cm diam., green and pale green striped, red when mature, darker striped or not, glabrous or with few coarse hairs; pericarp thin but not filmy, coarsely wrinkled when dry, seeds not shining through; fruiting pedicel 2–5 mm long. *Seeds* 10–20, obovate, moderately compressed, 3–4 by 2–2.5 by 1.5–2 mm, whitish or pale brown, margin narrow, ± rounded, faces not separated by a groove, faces convex, variously warted, or pitted or nearly smooth.

Thailand.— NORTHERN: Mae Hong Son; Chiang Mai (Doi Chiang Dao, Doi Inthanon); Nan; Lampang (Jae Sawn); NORTHEASTERN: Khon Kaen (Doi Phanok Khao); SOUTHWESTERN: Kanchanaburi (Tham Tarn Lot); CENTRAL: Phra Nakhon Si Ayutthaya; Bangkok; Saraburi (Phu Khae); SOUTHEASTERN: Chon Buri (Ang Phak Nam).

Distribution.— Widespread: Africa (type), SW and SE Asia, including Yemen, Pakistan, India, Sri Lanka, north-east and east to China, Ryukyu Islands, Indo-China, through Malesia to New Guinea and Australia (where very variable in indumentum, including villose).

Ecology.— Periodically dry places in a large variety of (degraded) scrub-land, savanna, and (seasonal) forest (edges); for Thailand recorded from shale bedrock; for Laos, Cambodia and Vietnam (Keraudren l.c.) recorded from basaltic rock; 1–1,300 m altitude. Flowering & fruiting throughout the year.

Vernacular.— Taeng nok (แตงนก) (Kanchanaburi); taeng phi pluk (แตงผีปลูก) (Chai Nat); taeng nu (แตงหนู) (Northern, Northeastern); taeng nu khon (แตงหนูขน) (Prachuap Khiri Khan).

Note.— Variability and deviating specimens. *Mukia maderaspatana* as here accepted is most variable in Africa, where it includes plants with elongate leaves, approaching *M. gracilis* from Thailand. The Australasian material of *M. maderaspatana* is generally quite homogenous, however, with exceptions: (1) certain very hairy specimens from Australia; (2) delicate forms from Taiwan and Ryukyu Islands with small seeds, ca 3 mm long (Taiwan: e.g. *Wang & Lin* 2198, *Huang et al.* 10680, *Jeng* 2494, and *Lin* 130; Ryukyu Islands: *Saito* 4098); and (3) specimens with comparatively large fruits, ca 1.5 cm diameter from savanna areas in eastern Papua New Guinea (e.g. *Heyligers* 1176, *Darbyshire* 696, *Henty & Katik* NGF 38646, and *Pullen* 6804).

The discriminating characters of the position and direction of curving of the hairs on the petiole, viz. upward in *M. maderaspatana* and downward in *M. javanica* work well in most material from SE Asia and West Malesia. However, one should be aware that in some specimens from East Malesia (where *M. javanica* does not occur) the position of the hairs may be at variance: sometimes retrorse (Lesser Sunda Islands) or often erect or curved in all directions (New Guinea).

The collection *Henty* NGF 49703, from savanna in Papua New Guinea, is altogether different in its delicate habit, long-pedicelled male flowers, solitary female flowers and fruits, and not up-curved petiole hairs. Its determination as *M. maderaspatana* is provisional, and should be evaluated in connection with still unnamed material from Australia. Telford (pers. comm.) comments that this specimen appears to be similar to *Mukia* sp. A, from northern Queensland, which will soon be described as a new taxon.

Finally, the fact that plants may be perennial with a thick old woody rootstock or annual and quick flowering and with fibrous roots, needs clarification.

5. Mukia ritchiei (C.B. Clarke) W.J. de Wilde & Duyfjes, **comb. nov**. *Dicoelospermum ritchiei* C.B. Clarke ('*Dicaelospermum*', correction T. Post & Kuntze, 1903) in Hook. f., Fl. Brit. Ind. 2: 630. 1879; Cogn. in A.DC. & C.DC., Monogr. Phan. 3: 735. 1881; in Engl., Pflanzenr. 66 (family no. 4.275.1): 253. 1916; Chakrav., Rec. Bot. Surv. India 17, 1: 177. 1959; C. Jeffrey, Kew Bull. 34: 796, 802. 1980. Lectotype (here chosen): Western India, *Ritchie* 316 (**K**). Fig. 2.

Distribution.— Western India.

Specimens examined.— *Meebold* 9452 (**WRSL**); *Ritchie* 316 (**K**), 318 (**E**).

Note.— The genus *Dicoelospermum*, with one species, was described from two collections with male flowers and fruits, but without female flowers. The fruit was described as containing 3 seeds which were judged as being basally attached, and hence the ovules were described in the key (Clarke, l.c.: 605) as erect, to warrant a separate tribe *Orthospermae*. The seeds were described as having "two empty cells", or seeds (Clarke, l.c.: 630) "with three parallel cells, the two lateral empty". However, we do not believe that the material then at hand allowed for judging the seeds (and hence the ovules) as truly basally attached. As regards the strange seeds, we found a comparable case in the genus *Neoachmandra* (formerly *Zehneria*, see de Wilde & Duyfjes 2004: 24, f. 3; 2006: 30) in the species *N. sphaerosperma*, which differs in aberrant seed morphology, similar to the seeds in *Dicoelospermum*, but otherwise completely agreeing with *Neoachmandra*.

The pollen of *Dicoelospermum ritchiei* (*Meebold* 9452, India) is 3-aperturate, suboblate. Equatorial diameter (E) = 38–45 µm. Ectoapertures short colpi. Endoapertures large, distincly costate pori. Exine ca 1.5 µm thick, distinctly stratified. Sexine slightly thicker than nexine. Ornamentation microreticulate, with irregular lumina.

The pollen of *D. ritchiei* resembles that of *Mukia* very much (by R.W.J.M. van der Ham, Leiden).

Molecular analysis of the same specimen, *Meebold* 9452, indicates that *Dicoelospermum* is very close to *Mukia* (pers. comm. H. Schaefer, Munich).

6. Mukia rumphiana (Scheff.) W.J. de Wilde & Duyfjes, **comb. nov.** *Melothria rumphiana* Scheff., Ann. Jard. Bot. Buitenzorg 1: 25. 1876. Lectotype (here chosen): Indonesia, Ternate, *Teijsmann* 7496 (**L**, barcode: L0589472). (For synonyms see under the subspecies).

Climber 3–5 m long; roots perennial; leafy stem 2(–3) mm diam., with stiff hairs, ± upward directed. *Leaves*: blade broadly ovate in outline, 4–8 by 4–11 cm, 3–5-angular or -lobed up to ca halfway (rarely deeper), base cordate, margin sinuate-dentate, upper surface finely scabrous-punctate, lower surface grey scabrid-hairy; petiole 1–3 cm long, scabrous by stiff upward directed hairs. *Male flowers*: in fascicles of 3–15; pedicel 4–7 mm long; receptacle-tube long-campanulate, 3–4 by 1.5–2 mm; sepals 1–1.5 mm long, outside and inside densely fine-hairy; petals ovate-elliptic, 2–3 by 1.5–2 mm, apex acute(-acuminate), wholly finely-hairy at outside; filaments ca 0.5 mm long, anthers oblong, ca 2 mm long, at

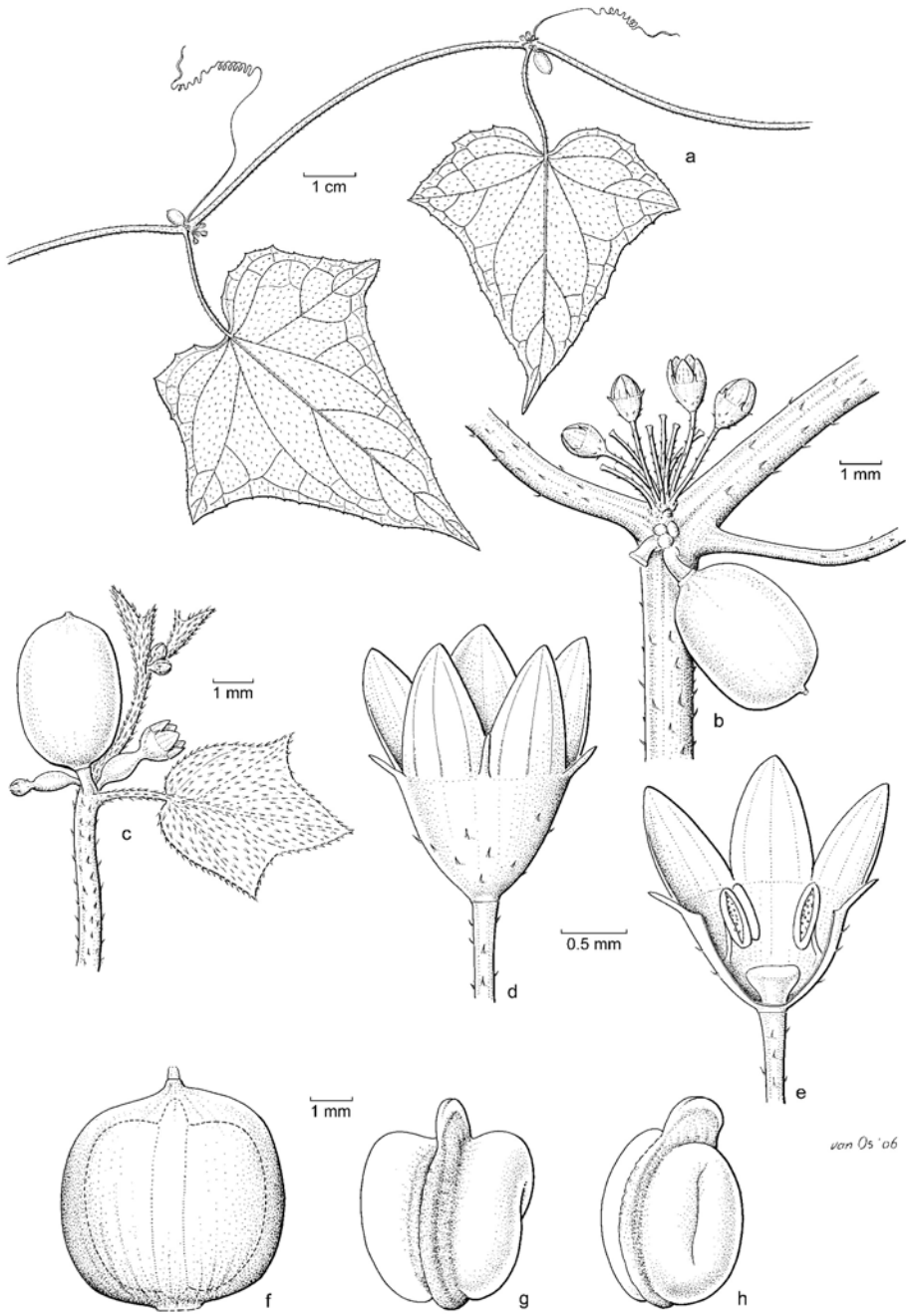

Figure 2. *Mukia ritchiei* (C.B. Clarke) W.J. de Wilde & Duyfjes. A. portion of flowering and fruiting branch; B. node with both male and female (fruiting) inflorescences, note flowers in clusters; C. node with female (and fruiting) inflorescence; D, E. male flowers, from outside and opened respectively; F. fruit with transparent filmy pericarp, showing one seed inside; G, H. seed (all from *Meebold* 9452, WRSL). Drawn by Jan van Os.

apex almost without or with one or two small exsertions; disc depressed, ca 1 mm diam. *Female flowers*: solitary; pedicel 1–2 mm long; ovary ovoid, 4–6 by 2–3 mm, (densely) soft- or coarse-hairy, the hairs patent or ± upward directed; staminodes minute; style glabrous. *Fruit* solitary, ellipsoid, 2–4 by 1.5–2.5 cm, either densely soft-hairy or sparsely hairy and later on glabrescent; pericarp thin, not or hardly translucent; fruiting pedicel 4–10 mm long. *Seeds* numerous, pyriform-ovoid, only little compressed, (4–)5–6 by 3–4 by 2 mm, margin narrow, with 2 grooves; faces flattish, shallowly verrucose-rugose.

Field note.— Fruits whitish, ultimately red.

Distribution.— East Malesia: Sulawesi, Moluccas (Ternate, type; Bacan, Soela Islands, Buru, Ambon), New Guinea (Vogelkop Peninsula).

Ecology.— Forest edges, hedges, shrubberies near the coast; on limestone; at low altitudes. Flowering & fruiting throughout the year.

KEY TO THE SUBSPECIES

1a.	Fruit sparsely long-hairy, hairs 1–2 mm long	**a.** subsp. **rumphiana**
1b.	Fruit densely short-hairy, hairs up to 0.5 mm long	**b.** subsp. **tomentosa**

a. subsp. **rumphiana**

Mukia celebica (Cogn.) F.M. Baily, Queensl. Fl. 2: 700, for the type only. 1900; C. Jeffrey in Hooker's Ic. Pl. 37, 3: 11, table 3664. 1969.— *Melothria celebica* Cogn. in A. & C. DC., Monogr. Phan. 3: 625. 1881; in Engl., Pflanzenr. 66 (family no. 4.275.1): 128. 1916. Type: Indonesia, Sulawesi, Tondano, *Forsten* 96 (holotype **L**).— *M. javanica* auct. non (Miq.) Cogn.: Merr., Interpretation Rumph. Herb. Amb.: 491. 1917.— *Cucumis murinus ruber* Rumph., Herb. Amb. 5: 463, tab. 171, f. 1 & A. 1750.

Ovary (densely) hairy, hairs 1–2 mm long. Fruits ± glossy with sparse hairs 1–2 mm long.

Distribution.— Indonesia: N Sulawesi (Minahassa); northern Moluccas (Bacan, Ternate, Soela Islands, Buru, Ambon); Papua (Vogelkop Peninsula).

Ecology.— Sea level up to 600 m altitude. Flowering & fruiting throughout the year.

Specimens examined.— *Bâguin* 1588; 1623; *Burley, Tukirin et al.* 3563; *De Wiljes-Hissink* 80; *Koorders* 16592; *Nooteboom* 5342; *Polak* 758; *Ramlanto* 957; *Van Royen & Sleumer* 6880; *Yumte* 265.

b. subsp. **tomentosa** W.J. de Wilde & Duyfjes, **subsp. nov.** A subspecie typica fructibus dense velutine pubescentibus differt. Typus: Indonesia, Buru, *Van Balgooy* 4782 (holotypus **BO**; isotypi **L**, **K**, **KYO**). Figs. 3, 4F.

Ovary and fruits densely velvety grey-hairy, hairs to 0.5 mm long.

Distribution.— Indonesia: SW Sulawesi; Buru.

Ecology.— Limestone area; 500–1,000 m altitude. Flowering & fruiting: August to January.

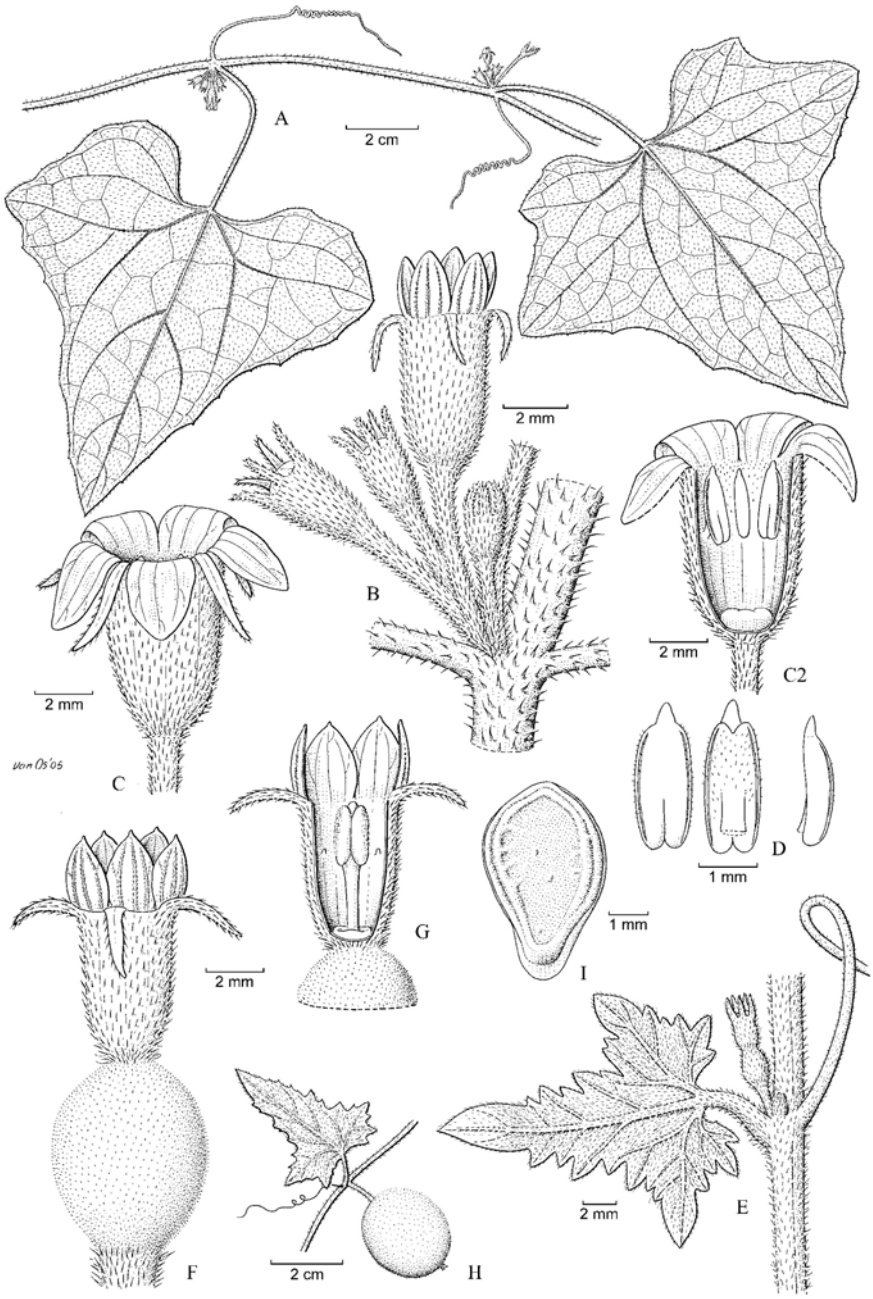

Figure 3. *Mukia rumphiana* (Scheff.) W.J. de Wilde & Duyfjes subsp. *tomentosa* W.J. de Wilde & Duyfjes. A. twig with male inflorescences; B. male inflorescence; C, C2 . male flowers, from outside and opened respectively; D. anthers; E. node with immature female flower; F, G. female flowers, from outside and opened respectively; H. node with fruit; I. seed (A—I: *De Wilde & Duyfjes* 21757). Drawn by Jan van Os.

Note.— The distribution of the subspecies *rumphiana* and *tomentosa* seem to exclude each other, but both subspecies are found on Buru.

Specimens examined.— *De Wilde & Duyfjes* 21750; 21757; *Van Balgooy* 4782 (type); *Wieringa* 1872.

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We feel much indebted and grateful to Dr. Kongkanda Chayamarit and the staff of BKF who facilitated us on our trips to see and collect *Mukia* in the wild. Herbarium collections from A, AAU, BK, BKF, BM, BO, BRI, E, K, KEP, L, P, SING, U, WAG, and WRSL were used for the present treatment of *Mukia.* We thank Pramote Triboun (Khon Kaen) for providing an informative photograph of *Mukia gracilis*. As usual Jan Frits Veldkamp (Leiden) kindly provided the translations into Latin of the diagnoses of the new taxa, Jan van Os (Leiden) prepared the beautiful drawings, Ben Kieft (Leiden) scanned the drawings and photos, Bertie Joan van Heuven and Raymond van der Ham (both Leiden) prepared and described the pollen, while Hanno Schaefer (Munich) did the molecular analysis of *Dicoelospermum ritchiei*, respectively, and Luc Willemse (Leiden) helped with the realisation of the identification list, using BRAHMS.

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IDENTIFICATION LIST

Mukia gracilis = 1
Mukia javanica = 2
Mukia leiosperma = 3
Mukia maderaspatana = 4
Mukia ritchiei = 5
Mukia rumphiana subsp. rumphiana = 6a
Mukia rumphiana subsp. tomentosa = 6b
Mukia sp. = 7

Amin SAN 67376: 4; - Atmodjo 312: 2.

Backer 7643: 4; - Bakhuizen van den Brink Jr. 1343: 2; 7613: 2; - Balansa 4012: 4; - van Balgooy 4782: 6b; - Barnes 985: 3; - Beddome 3280: 3; 3282: 3; - Bâguin 1074: 6a; 1588: 6a; 1623: 6a; - van Beusekom 1644: 3; 3567: 1; - Bloembergen 3750: 4; 4334: 6a; - Blume 924: 2; - Bon 4542: 4; - Bourne 1094: 3; 1626: 3; - Brass 3695: 4; 6357: 4; - Bumisra 749: 4; - Bunchuai KB 65: 4; - Bünnemeyer 3827: 2; - Burley 3563: 6a.

Ching 6463: 2; - Clason 62A: 4; - Codd 6024: 4; - Craven 7584: 7.

Darbyshire 696: 4; - Dietrich 1189: 4.

Elbert 3326: 4; - Elmer 11135: 4; - Eyma 3455: 4.

Forsten 96: 6a; - Fosberg 37640: 4; - Frodin UPNG 3735: 4; UPNG 4282: 4; - Fryar NGF 3939: 4; - Fryxell 4697: 7; - Fukuoka T 63710:1; T 63713: 1.

Gamble 14557: 3; 16191: 3; - Garrett 469: 1.

de Haas 2011: 4; - Hallier 4646: 4; - Hatusima 17420: 4; - Henry NT 34006: 4; - Henty NGF 38646: 4; NGF 49703: 4; - Herb. Hasskarl 3943: 3; - Herb. Reinwardt 1761: 2; 1766: 2; - Heyligers 1176: 4; - Hildebrandt 2038: 4; - Ho-Yih Liu 2006: 4; - Hohenacker 1505: 3; - Huang 10680: 4.

Iboet 497: 4; - Insani 10: 4; - Iwatsuki T-11077: 2; T-10327: 4.

Jeng 2494: 4; - Junghuhn 87: 4.

Keng K 2512: 4; - Kerr 3012: 1; 3024: 4; - Koch 23: 4; - Koedoes 1124: 4; - Koorders 16590b: 4; 16590: 6a; 16592: 6a; 21132b: 4; - Kostermans 693: 4; 1256: 4; 28012: 4; - Kramer 7913: 4

Larsen 34440: 1; 44534: 4; - Lin 130: 4; - Lörzing 6177: 2; 13069: 4.

Maconochie 927: 4; - Makino 1338: 4; - Maries 413: 4; - Maxwell 02-434: 1; 75-597: 2; 90-658: 4; 95-764: 4; 91-946: 2; 88-1057: 1; 93-1068: 1; 95-1106: 2; 89-1157: 4; 89-1237: 1; 93-1276: 1; 89-1418: 4; - McClure 8191: 2; - McKee 8320: 4; - Meebold 9452: 5; - Meeuse 9217: 4; - Meijer 6690: 2; - Merrill 3379: 2; BS 6299: 4; BS 10629: 4; - Millar NGF 37631: 4; - Mohan RHT 11723: 3; - Murata T 15984: 1; t 15985: 1; T 17041: 4; T 17297: 4; T 17308: 4; T 38406: 2; T 41775: 2; T 50302: 4; T 52637: 4.

Noerkas 51: 4; - Nooteboom 5342: 6a.

Ollerenshaw PO 1161: 4.

Palee 351: 4; 427: 1; - Panatkool 196: 4; - Panigrahi 13295A: 4; - Pâtelot 1193: 4; - Phengklai 2971: 2; - Phonsena 3909: 4; 4454: 4; 4472: 4; - Poilane 8801: 2; 9564: 4; 19754: 2; 26717: 4; 30416: 4; - Polak 758: 6a; - Pullen 6804: 4; - Put 1789: 2; 2664: 4.

Raap 185: 2; 499: 4; - Ramlanto 957: 6a; - Ramos BS 38482: 4; - Rao BSI 39075: 4; - Ritchie 316: 5; 318: 5; - Robson 837: 4; - Rodenburg 58: 4; - van Royen 5089: 4; 6726: 4; 6880: 6a.

Saito 4098: 4; - Sands 4728: 7; - Schmutz 123: 4; - Schweinfurth 97: 4; - Setthi 25727: 4; - Shimizu T-10728: 1; T-28372: 4; - Soejarto 11349: 4; - Specht 493: 4; 791: 4; - van Steenis 10346: 6b; - Stevens LAE 50156: 4; - Stoddart 4044: 4; 4565: 4; - Streimann NGF 27791: 4; NGF 35840: 4; - Subramanian 911: 4; - Sundaling SAN 99940: 2.

Teysmann 7496: 6a; - Thomas AQ 587041: 7; - Thorel 87: 4.

Venugopal 17742: 3; -Verheijen 2438: 4; 3670: 4; 4006: 4; 4149: 4; 4925: 4; - Versteegh 1954: 4.

Wang 2198: 4; - Weber 1121: 4; - Wiakabu LAE 70413: 4; - Wieringa 1872: 6b; - Wight 1112: 3; 1126: 3; 1127: 3; - de Wilde 19244: 2; 21750: 6b; 21757: 6b; 21760: 4; 21845: 4; 21919: 4; 21932: 4; 22011: 4; 22152: 4; 22158: 2; 22161: 2; 22273: 2; SAN 141902: 2; SAN 141920: 4; SAN 141930: 4; - de Wiljes-Hissink 80: 6a; - Wilson 2: 4; 8389: 4; - Winkler 2268: 2.

Yang 3069: 4; - Yen 177: 4; - Yumte 265: 6a.

Zippelius 107: 4; - Zollinger 160: 2.

Figure 4. A. *Mukia gracilis* (Kurz) W.J. de Wilde & Duyfjes, habit (Doi Suthep-Pui NP), photographed by Pramote Tribun; B. *Mukia maderaspatana* (L.) M. Roem., male flowers, (Ang Phak Nam, Chon Buri); C. *Mukia maderaspatana* (L.) M. Roem., fruits, (near Bangkok); D. *Mukia maderaspatana* (L.) M. Roem., fruits, different form (Doi Inthanon NP); E. *Mukia javanica* (Miq.) C. Jeffrey, fruits, (Mae Sa Nam Arboretum, Chiang Mai); F. *Mukia rumphiana* (Scheff.) W.J. de Wilde & Duyfjes subsp. *tomentosa* W.J. de Wilde & Duyfjes, fruit (SW Sulawesi). B.–F. photographed by W.J.J.O. de Wilde.