

A new giant-leaved *Macaranga* (Euphorbiaceae) from dry seasonal evergreen forest in Thailand

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ABSTRACT. A new species of *Macaranga* with enormous trilobed leaves, that is common throughout central and northern Thailand is described and illustrated. In the past, this species has incorrectly been identified as *M. gigantea* (Rchb.f. & Zoll.) Müll. Arg. by field botanists and in several ecological studies. In this paper, *M. siamensis* is described, and features distinguishing it from the closely related *M. gigantea* are summarized.

INTRODUCTION

Macaranga Thouars (Euphorbiaceae) includes ca. 280 species of trees distributed between west Africa and the islands of the South Pacific (Whitmore, 1969). In Thailand 22 species have been recorded (Whitmore & Davies, in prep.). The majority of species are early successional, occurring in canopy openings in primary forest and more abundantly in degraded or secondary forests.

In 1990 the Royal Forest Department, in collaboration with Harvard University and the Center for Tropical Forest Science of the Smithsonian Tropical Research Institution, initiated a study of 50 ha of forest in seasonal dry evergreen forest at Huai Kha Khaeng Wildlife Sanctuary, Thailand. During establishment of the plot the authors realised that the species locally known as *Macaranga gigantea* (Rchb.f. & Zoll.) Müll. Arg. (Gardner *et al.* 2000) was in fact different from that species as we have recognised it further south in peninsular Thailand, Malaysia and Indonesia. On closer examination this species proved to be a new and distinctive member of this diverse genus.

Macaranga siamensis S.J. Davies, sp. nov. a speciebus aliis Macarangae in inflorescentiis, ramulis, petiolis et foliis juvenilibus in indumento dense fulvo-furfuraceo praeditis, foliis ad 70 cm longis, 50 cm latis, seminibus sphaericis differt. Typus: Thailand, Davies, Phattarahirankanok & Ngernsaengsaruay 99316 (holotypus BKF; isotypi A, K, L, SAR, others to be distributed). Figs. 1–2.

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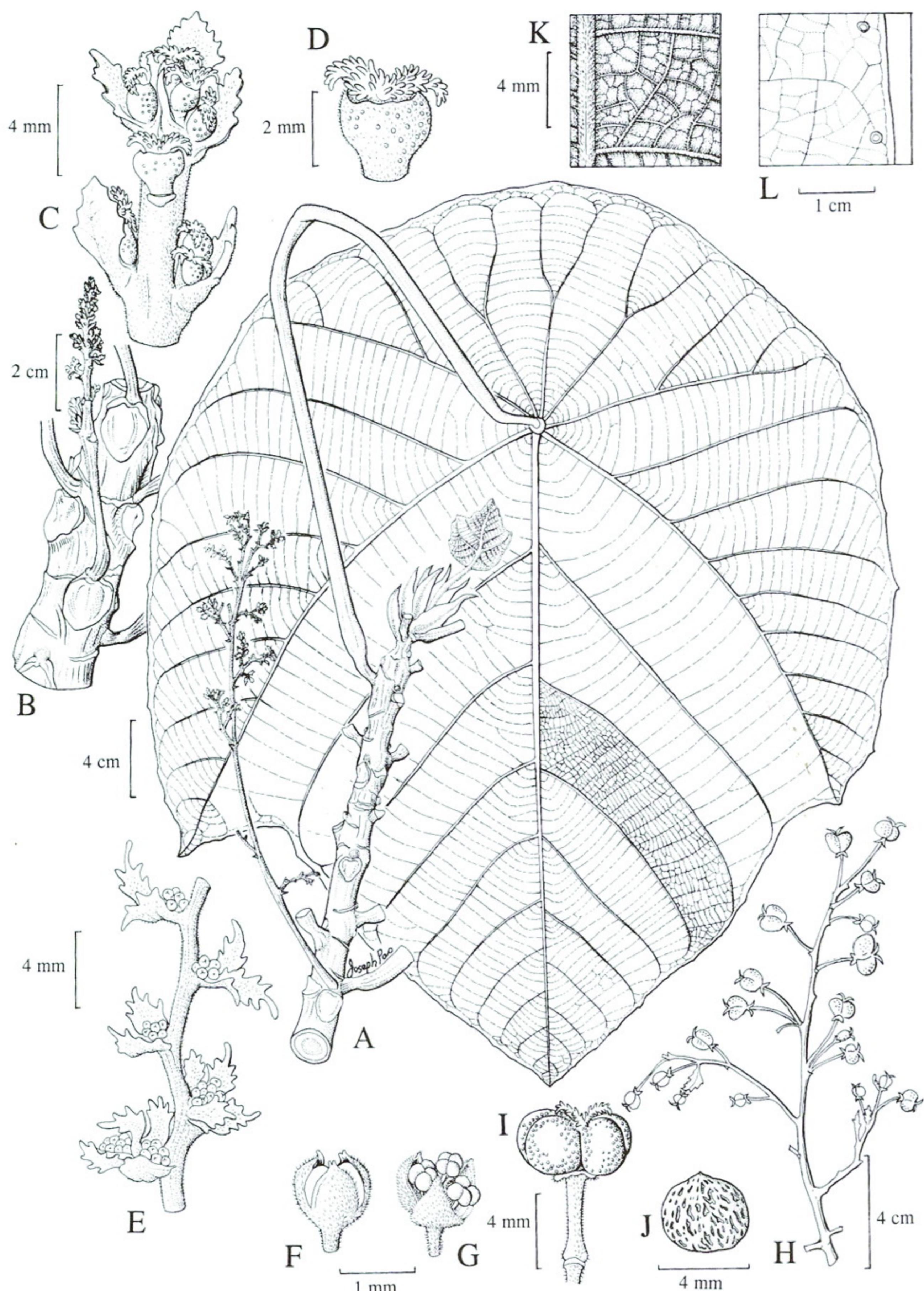


Figure 1. *Macaranga siamensis* S.J. Davies: A. habit; B. shoot with flowering pistillate inflorescence; C. detail of flowering pistillate inflorescence; D. pistillate flower; E. detail of flowering staminate inflorescence; F-G. staminate flower; H. detail of branch of pistillate infructescence; I. young fruit; J. seed; K. detail of adaxial leaf surface; L. detail of abaxial leaf surface. A, E-G, K-L from Davies et al. 99316; B-D from Davies et al. 99317; H-J from Davies 99320.

Large tree up to 25 m tall and 30–40 cm dbh, with long spreading very stout branches. *Bark* brown to orange-brown, densely pock-marked with prominent ca. 5 mm diam. dark brown lenticels which crumble off when rubbed, also scarred with large prominent lens-shaped leaf abscission scars, exuding viscous, clear 'blood-red' latex when slashed; inner bark fibrous, pink-red, ca. 8–10 mm thick; wood white to very pale yellowish. *Twigs* very stout, 12–26 mm diam., terete, narrowing quite abruptly towards the apex, covered in dense very fine reddish golden brown woolly hairs towards the apices, the hairs rubbing off when touched, soon becoming \pm glabrous, usually slightly glaucous towards the apex, with very prominent raised cordiform leaf abscission scars, exuding copious viscous clear red latex when cut. *Stipules* massive, 2.5–5(–6) by 1.5–3 cm, much larger in saplings, lanceolate, erect, persistent, initially pale pinkish-green and coriaceous then drying becoming chartaceous and turning darker brown to black, usually at least 3–4 pairs present on the shoot apices, mostly glabrous except for a dense line of woolly golden brown hairs along the midrib on the abaxial surface. *Leaves* 30–60(–70) by 20–40(–50) cm, very broadly ovate, often slightly concave in the field, deeply peltate to 5–15 cm from the basal leaf margin, shallowly trilobed to ca. 1/3 of the leaf length or often just tricusped or even with \pm entire leaves, leaf lobes 5–10 cm wide, adaxial surface shiny dark green, densely pubescent when young, soon becoming glabrous, abaxial surface pale whitish-grey densely covered in long whitish erect crisped hairs especially on the veins, not glaucous, the distal half of the adaxial leaf surface regularly dotted with large ca. 1 mm diam. round flat nectaries ca. 1–2 mm in from the leaf margin, more closely spaced near the leaf apex; primary venation palmate with ca. 8 prominent veins, secondary–tertiary venation scalariform, secondary veins looping near the leaf margins; leaf margin \pm entire, or rarely with a few minute protruding glands; leaf apices broadly acute with prominent round nectaries on the adaxial surface; leaf base very broadly rounded; immature leaves covered in a very dense indumentum of pale golden brown woolly hairs that rub off when touched, the adaxial surface dark brown, the abaxial surface light brown, the leaves becoming more whitish as they enlarge. *Petiole* terete, stout, 20–40(–50) cm long, slightly glaucous, initially densely covered in golden brown woolly hairs soon falling and easy rubbed off. *Staminate inflorescence*: paniculate, erect, (8–)10–30 cm long, quite narrow, with short 5–10 cm long lateral branches, all axes covered in short golden densely woolly hairs, usually less densely hairy near the base of the main axes, inflorescence branches of up to 4 orders, first pair of secondary branches alternate, unbranched base of main axis ca. 1/4–1/3 of the total inflorescence length, terete or slightly flattened when dry, sometimes slightly glaucous towards the base; bracts 1.5–2 by ca. 1.5 mm, persistent except on most basal nodes, triangular, apex deltate, margin entire, covered in minute densely woolly hairs on both surfaces; flower clusters of (12–)15–25 flowers, spirally arranged and \pm evenly spaced along on the ultimate inflorescence branches; bracteoles 3–5 by 1.5–3(–4) mm, broadly ovate with a narrow base to almost oblong with straight sides, enclosing flower clusters; apex broadly acute, often with a single disk-shaped nectary on the apex of the central bracteole lobe; margin variably and irregularly dentate, with 3–4 shallow lobes to 5–7 uneven lobes, both surfaces densely covered in minute woolly golden to reddish brown hairs drying slightly greyish, veins faintly visible on abaxial surface. *Staminate flowers* 0.5–0.75 mm long, pale green to yellowish, shortly pedicellate with the pedicel persisting after the flower falls; sepals 3, free, when

in bud forming a tiny raised glabrous point at the apex, otherwise completely covered in minute dense golden woolly hairs; stamens 2–3; anthers 4-locular, dehiscence terminal. *Pistillate inflorescence*: narrowly paniculate, erect, 10–18 cm long, 6–12 cm wide, distal axes quite slender, all axes densely covered in golden reddish-brown hairs, inflorescence branches of up to 3 orders, secondary branches alternate, basal axes terete drying slightly flattened; bracts soon caducous, 2.5–3 by 3–4 mm, broadly triangular, shallowly trilobed with two short acute lateral lobes and one broader central lobe, densely golden woolly pubescent on both surfaces. *Flowers* 2–2.5 by ca. 1.5 mm, borne singly in axils of bracteoles. *Bracteoles* caducous, ca. 4–5 by 2–2.5 mm, broadly ovate to narrowly oblong, flat and appearing almost ligulate, apex acute, shallowly dentate with 4–8 short teeth, covered in dense minute golden brown woolly hairs on both surfaces, with 1–3 sub-prominent veins on abaxial surface. *Calyx* urceolate, ca. 1.5–2 mm long, apex truncate or with 3–4 slightly pointed lobes, densely covered in minute golden woolly hairs, persistent, splitting irregularly as ovary expands. *Ovary* 2-carpellate, ca. 1.5 mm long; *styles* 1–1.5 mm long, free, persistent; *stigma* shallowly papillose on adaxial surface. *Fruit* bilocular, ca. 5 by 8–10 mm, locules subglobose, often contracted towards the base when dry, without processes, pedicellate, uniformly covered in yellowish-green, sticky exudate; *pedicel* slender, 8–13 mm long, covered in dense minute golden brown woolly hairs. *Seed* ca. 3.5 mm diam., spheroidal, black or dark brown, densely covered in narrow irregular pits and grooves, with a small raised pointed scar at the columella attachment point, encased in a fleshy black aril.

Thailand.—NORTHERN: Chiang Mai [Doi Chiang Dao, male, *Bunchuai* 918 (BKF)], Phitsanulok [Thung Salang Luang, male, *Suthesorn* 2932 (BK)]; SOUTH-WESTERN: Uthai Thani [Ban Rai, male, *Suthesorn* 3062 (BK)], Kanchanaburi [Thong Pha Phum, female, *Wongprasert* 12-2 (BKF)]; CENTRAL: Saraburi [Sahm Lahn, male, *Maxwell* 73779 (BK) & *Maxwell* 74529 (BK)], Nakhon Nayok: [Khao Yai National Park, alt. 520 m, 22 Dec. 1999, male, *Davies*, *Pattarahirankanok* & *Ngernsaengsaruay* 99316 (holotype BKF; isotypes A, K, L, SAR, others to be distributed); Khao Yai National Park, alt. 620 m, female, *Davies et al.* 99317 (A, BKF, SAR)]; SOUTH-EASTERN: Chanthaburi [Khao Soi Dao, male, *Phengklai* 6514 (BKF); Grating Falls, female, *Maxwell* 7310 (BK); Khao Srabap, female, *Kerr* 17970 (BK); just outside the entrance to Khao Srabab National Park (Namtok Phlio National Park), female, *Davies et al.* 99320 (A, BKF, SAR)].

Distribution.—*Macaranga siamensis* is widespread throughout Thailand, except in the Peninsula. Specimens have been collected from the far north, the southeast near Chanthaburi, and the southwest near Kanchanaburi. It is uncertain how far south along the Peninsula *M. siamensis* extends. No herbarium collections have been seen from further south than Kanchanaburi. However, we suspect the species probably occurs somewhat further south than this, possibly as far south as Chumphon. Although no herbarium collections have been seen from elsewhere in Indochina, trees have been seen in Laos PDR along the roadside between Vang Vieng and Luang Prabang (*Davies*, pers. obs.), suggesting that *M. siamensis* occurs more widely in Laos, possibly Cambodia, and probably Myanmar. Further field observations are required to confirm this.

Ecology.—Common in seasonal evergreen forests (sensu Ashton, 1995), 250–620 m. The species is not known from seasonal wet evergreen forest of Peninsular

Thailand south of Chumphon. However, *M. siamensis* is abundant in both seasonal dry evergreen forest such as in Huai Kha Khaeng, and in the wetter forests of Khao Yai. One collection has been recorded from forests over limestone-derived soil in Khao Soi Dao in southeast Thailand.

Within these forests *M. siamensis* is predominantly found in canopy gaps, and in moist areas along streams. As with most species in the genus, *M. siamensis* is early successional and is often found along roadsides and in degraded forests. As is also typical of other species of the genus, *M. siamensis* has small arillate, bird-dispersed seeds and rapid growth (Davies & Ashton, 1999).

Notes.— *Macaranga siamensis* differs from *M. gigantea*, with which it was formerly confused, in a range of morphological features (Table 1). *Macaranga siamensis* has dark orange-brown bark with very prominent lenticels which crumble off, whereas the bark of *M. gigantea* is pale grey and quite smooth. The twigs narrow more sharply towards the apex in *M. siamensis* and have very prominent raised heart-shaped scars. In *M. gigantea* the twigs remain broad to the apex and the leaf scars are not so elevated. The stipules on mature trees are larger and more broadly ovate in *M. gigantea*; in *M. siamensis* they are triangular and have a narrow line of hairs on the midrib of the abaxial surface. In *M. siamensis* the petiole is terete throughout its length, slightly glaucous, and covered in a soft caducous furfurascence, whereas the petiole in *M. gigantea* is distinctly flattened on the adaxial surface near the base, and is evenly covered in coarse short tufted hairs. The indumentum on shoots and leaves in *M. siamensis* is of golden woolly hairs, not tufted, and usually quite soft; whereas the indumentum in *M. gigantea* consists of a combination of erect spinous hairs and coarse silvery tufted hairs. Both species have extremely large leaves, by far the largest of any *Macaranga* in Thailand. In *M. gigantea* they are more consistently trilobed to ca. 1/3 of the leaf length, whereas in *M. siamensis* the leaves are sometimes subentire. The leaf margins are more coarsely dentate in *M. gigantea* than in *M. siamensis*. The upper leaf surfaces in *M. siamensis* have large flat circular glands on the lamina near the leaf margin particularly towards the leaf apex; these glands do not occur in *M. gigantea*. The juvenile leaves of *M. siamensis* are densely covered in a tawny brown soft indumentum and do not have prominent conical glands along the leaf margin; in *M. gigantea* the juvenile leaves have erect sharp hairs and prominent conical glands on the margin. The bracteoles of the staminate inflorescence are quite narrow with shallow lobes, and often have a gland on the apex in *M. siamensis*; in *M. gigantea* the bracteoles are very coarsely dentate with strongly raised nerves on the abaxial surface, and no gland at the apex. The seed of *M. siamensis* is spheroidal, coarsely pitted, and covered in a black aril, whereas the seed of *M. gigantea* is lenticellate, almost smooth and covered in bright violet aril. As far as we are aware the geographical distributions of the two species do not overlap; *M. gigantea* is restricted to seasonal and aseasonal wet evergreen forests. Further field work is required to confirm the geographical and ecological extent of *M. siamensis*.

Table 1. Summary of morphological differences between *Macaranga siamensis* and *M. gigantea*. Characters are more fully described in text.

	<i>M. siamensis</i>	<i>M. gigantea</i>
Bark colour	dark orange-brown	pale grey
Bark texture	prominent lenticels	± smooth
Twig shape	narrowing sharply at apex	broad to apex
Twig leaf scars	very prominent, heart-shaped	subprominent
Stipule shape	large, triangular	very large, broadly ovate
Stipule hairs	narrow line on lower surface	scattered tomentum
Petiole shape	terete	flattened towards base
Indumentum	tawny furfuraceous	silver-grey coarsely tufted
Leaf surface glands	along leaf apex	absent
Staminate bracteole	narrowly lobed	coarsely dentate
Seed shape	spheroidal	lenticellate
Aril colour	black	violet

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REFERENCES

Ashton, P.S. 1995. Towards a regional forest classification for the humid tropics of Asia. In: Box, E.O. (ed.), *Vegetation Science in Forestry*: 453–464. Kluwer Academic Publishers, Netherlands.

Davies, S.J. & P.S. Ashton. 1999. Phenology and fecundity in 11 sympatric pioneer species of *Macaranga* (Euphorbiaceae) in Borneo. *Amer. J. Bot.* 86: 1786–1795.

Gardner, S., Sidisunthorn, P. & Anusarnsunthorn, V. 2000. *A Field Guide to Forest Trees of Northern Thailand*. Kobfai Publishing Project, Bangkok, Thailand.

Whitmore, T.C. 1969. First thoughts on species evolution in Malayan *Macaranga* (Studies in *Macaranga* III). *Biol. J. Linn. Soc.* 1: 223–231.

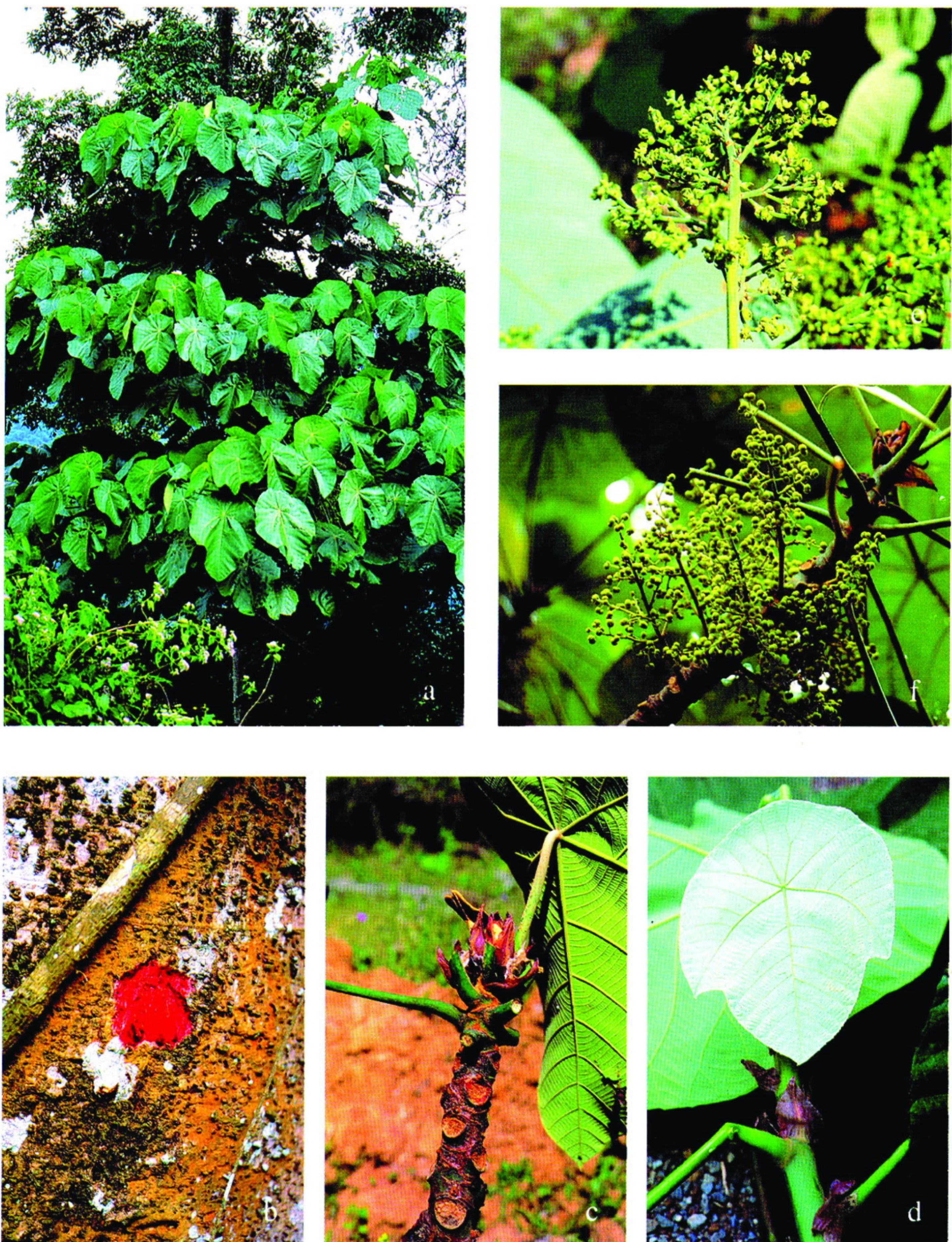


Figure 2. *Macaranga siamensis* S.J. Davies: (a) habit; (b) bark with small slash showing inner bark; (c) shoot of mature plant; (d) young shoot with stipule and young leaf; (e) staminate inflorescence; (f) fruiting tree. All from Davies *et al.* 99316.