

## *Scaphium affine* (Mast.) Pierre (Sterculiaceae) new for Thailand

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ABSTRACT. A third species of *Scaphium* in Thailand, *Scaphium affine* (Mast.) Pierre, discovered in E, SE & PEN Thailand, is described and illustrated.

The genus *Scaphium* (Sterculiaceae) consists of 8 species distributed in SE Asia from Burma, through Thailand, Cambodia, Malaysia, Singapore, Sumatra, and Bangka to Borneo. For the Flora of Thailand the family Sterculiaceae was recently published (Phengklai, 2001) where *Scaphium* is represented by 2 species: *S. linearicarpum* (Mast.) Pierre, with a cordate leaf base, and *S. scaphigerum* (Wall. ex G. Don) G. Planch., with the leaf base mostly obtuse, never cordate.

During fieldwork in SE Thailand specimens belonging to this genus were collected and all determined by Phengklai (l.c.) to *S. scaphigerum*, which clearly represented two distinct species, *Scaphium affine* (Mast.) Pierre and *S. scaphigerum*. These two species are distinct in a number of characters including the morphology of the seeds as described by Pierre (1889) and morphology of seedling development observed from seeds grown in the nursery of the Khao Hin Son Botanic Garden, SE Thailand (Table 1).

According to the revision of the genus by Kostermans (1953), *S. affine* was considered a synonym of *S. macropodum* (Miq.) Beumée ex K. Heyne overlooking the salient differentiating characters of the embryo, clearly depicted by Pierre (l.c., fig. 200). *S. macropodum* characterized by more tubular flowers is clearly differentiated from *S. affine* and *S. scaphigerum*, both possessing shorter, campanulate perianth. The differences between *S. scaphigerum* and *S. affine* are summarized in Table 1, and the differences in the seedlings, especially in the cotyledons is shown in figure 3.

For standardization with the Flora account *Scaphium* is recognized here as belonging to the Sterculiaceae. However, it should be noted that phylogenetic studies have suggested that it be placed in the subfamily Sterculioideae of an expanded Malvaceae (Alverson et al., 1999; Bayer et al., 1999; Wilkie et al., 2006).

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Table 1. A comparison of the morphological characters of *Scaphium scaphigerum* (Wall. ex G. Don) G. Planch. and *S. affine* (Mast.) Pierre.

Characteristic	<i>S. affine</i>	<i>S. scaphigerum</i>
Crown	conical to rounded	rounded
outer bark	shallowly fissured	smooth
Twig	stout, ca 10 mm diam.	less stout, ca 5 mm diam.
leaf (mature tree)	ovate to ovate-oblong	elliptic to ovate
leaf (sapling)	3–5-lobed	entire
leaf base	subcordate or obtuse to truncate	cuneate or obtuse to truncate
lateral veins of leaf blade	3–7 pairs	5–7 pairs
stipule	rusty hairy	glabrous to glabrescent
perianth	greenish white	reddish with yellow at apex
fruiting stalk	1–1.3 cm long	1.5–3.2 (–3.5) cm long
follicle length	up to 20 cm	up to 28 cm
follicle indumentum	glabrous, hairy near base	pubescent, hairy near base and on veins
seed	ellipsoid	subglobose to globose
seed size	3–3.5 by 1.4–2 cm	1.8–2.6 by 1.7–2.4 cm
seed (without mucilage)	ellipsoid	globose
seed size (without mucilage)	1.8–2.5 by 1.2–1.5 cm	1.5–1.8 by 1.5–1.8 cm
cotyledons	thin (albumen thick)	thick (albumen thin)
cotyledons of seedlings 5–7 days after germination:		
petiole	1–1.2 cm long	sessile
shape	elliptic, large, thin	orbicular, small, thick
size	4.1–5.5 by 4–6.5 by 0.3–0.4 cm	1.8–2 by 1.6–1.8 by 0.8–1 cm

## AMENDED KEY TO THE SPECIES OF SCAPHIUM IN THAILAND

1. Leaves heart-shaped, base deeply cordate. Seed pubescent **1. *S. linearicarpum***  
 1. Leaves elliptic to ovate-oblong, base subcordate or cuneate to truncate. Seed glabrous  
   2. Flower 18–23 mm diam., red with yellow at apex. Seed subglobose to globose **3. *S. scaphigerum***  
   2. Flower 5–7 mm diam., greenish white. Seed ellipsoid **2. *S. affine***

**1. *Scaphium linearicarpum*** (Mast.) Pierre, Fl. Forest. Cochinch. 3: sub. tab. 193–195, in text. 1889; Ridl., Fl. Mal. Pen. 1: 275; Kosterm., J. Sci. Res. (Jakarta) 2(1): 21. 1953; Phengklai, Fl. Thailand 7(3): 621. 2001.—*Sterculia linearicarpa* Mast., Fl. Brit. Ind. 1: 360. 1874. For description and distribution see Phengklai (l.c.).

**2. *Scaphium affine*** (Mast.) Pierre, Fl. Forest. Cochinch. 13: 193. 1889. — *Sterculia affinis* Mast. in Hook.f., Fl. Brit. Ind. 1 (2): 361. 1874. Type: Malaysia, “Malacca”, *Maingay* 1856 Kew distribution 225 (lectotype K, here designated). *Scaphium lychnophorum* (Hance) Pierre, Fl. Forest. Cochinch. 13: pl. 193. 1889., as ‘*lychnophorum*’. — *Sterculia lychnophora* Hance, J. Bot. (new series) 5: 243. 1876. Type: Cambodia, mountains of Camchay, province of Kamput, *Pierre* s.n. April 1874 (Hance 19219), (lectotype K, here designated; probable isotype P (Pierre 3781, April 1874). Fig. 1.

Tree, up to 40 m high, up to 260 cm girth above buttresses; bole straight; buttresses up to 2 m; bark pale greyish-brown, shallowly fissured, inner bark pale orangish-brown; twigs stout, glabrescent, with prominently raised large leaf scars; young shoots reddish-brown, pubescent. *Stipules* subulate, rusty hairy, caducous. *Leaves* ovate to ovate-oblong, 13–22 by 7–10 cm, base subcordate or cuneate to truncate, apex acute or acuminate, subcoriaceous, glabrous; nerves 4–7(–8) pairs, 3 or 5 nerves at base, scalariform veins prominent on both surfaces; young leaves on saplings 3–5-lobed. *Petioles* 5–21 cm long, swollen at both ends. *Inflorescences* paniced, axillary and terminal, dense, (3–)14–20 cm long, erect, pubescent. *Perianth* campanulate, 5-lobed, 5–7 mm diam., pubescent, greenish-white, faintly-scented. *Stamens* 10–13, in a whorl; anthers 2-celled, yellow. *Pistil* with 2 carpels, red. *Androgynophore* 2–4 mm, erect. *Fruit* a large follicle, 18–20 by 5–6 cm, soon dehiscing, boat-shaped and membranous, glabrous or hairy near base. *Seeds* ellipsoid, 3–3.5 by 1.4–2 cm, glabrous. *Cotyledons* shortly stiped, elliptic, thin, leaflike, green, 4.1–5.5 by 4–6.5 by 0.3–0.4 cm.

Thailand.— EASTERN: Ubon Ratchathani [specimen not located]; SOUTHEASTERN: Chachoengsao [Khao Ang Ruenai WS., Lum Changwat, 21 Dec. 2005, *Phonsena* 4754 (BKF, Herbarium of Khao Hin Son Botanic Garden); 20 Feb. 2007, *Phonsena & Banchong* 5336 (BK, BKF, L, Herbarium of Suan Luang Rama IX, Herbarium of Khao Hin Son Botanic Garden: with spirit collection)]; Chon Buri [specimen not located]; Rayong [specimen not located]; Chanthaburi [Khao Khitchakut NP., 15 April 1925, *Nai Noe* 81 (BK); Khao Khitchakut NP., HQ., 5 April 2005, *Phonsena et al.* 4529 (BKF, Herbarium of Khao Hin Son Botanic Garden); 20 April 2005, *Phonsena* 4546 (BKF, Herbarium of Khao Hin Son Botanic Garden); Khao Khitchakut NP., HQ., 23 Jan. 2007, *Phonsena et al.* 5329 (BK, BKF, L, Herbarium of Suan Luang Rama IX, Herbarium of Khao Hin Son Botanic Garden: with spirit collection)]; Trat [Bo Rai, 25 Nov. 1924, *A.F.G. Kerr* 9445A (BK), 9445B (BK), 9445C (BK);



Figure 1. *Scaphium affine* (Mast.) Pierre: A. Seedling; B. leafy twig; C. apex of twig; D. inflorescence; E. flower, showing *androgynophore*; F. pistil with stamens at base; G. fruit; H. seed, cross-section; I. seed, longitudinal section (A: *Phonsena* 4606; B, C, G, H, I: *Phonsena* 4546; D–F: *Phonsena et al.* 5329). Drawn by O. Kerdkaew.

Khao Saming, 30 March 1925, *Nai Noe* 35 (**BK**); 27 Nov. 1924, *A.F.G. Kerr* 9445 (**BK**); Ko Chang, Khlong Nonsi, 3 April 1957, *Smitinand* 5666 (**BKF**); Ko Chang, Khlong Phlu waterfall, 7 Aug. 2005, *Phonsena* 4606 (**BKF**, Herbarium of Khao Hin Son Botanic Garden); Ko Kut, Khlong Chao-Ao Prao, 7 April 2002, *Phengkklai* 1333 (**BKF**); PENINSULAR: Yala [Betong, 2 Aug. 1928, *A.F.G. Kerr* 7466 (**BK**)].

Distribution.—Loas, Vietnam, Cambodia.

Ecology.—In evergreen forest, at 80–700 m altitude. Flowering: January–March. Fruiting: February–June.

Vernacular.—Chong (จอง), mak chong (หมากจอง) (Ubon Ratchathani), kaen phao (แก่นผา) (Yala), phung thalai (พุงทะลาย) (Bangkok), samrong (สำรอง) (Chanthaburi, Trat).

Uses.—Wood for plywood. Seed yields copious mucilage used as beverages and medicines to treat diarrhoea, dysentery and asthmatic complaints.

**3. *Scaphium scaphigerum*** (Wall. ex G. Don) G. Planch., *Hist. Nat. Drogues Simples*, 7 ed., 3: 653. 1876; Kosterm., *J. Sci. Res. (Jakarta)* 2(1): 15. 1953; Phengkklai, *Fl. Thailand* 7(3): 623, p.p. 2001.—*Sterculia scaphigera* Wall., *Cat. no. 1130. 1828, nom. nud.*—*S. scaphigera* Wall. ex G. Don, *Gen. Hist.* 1: 517. 1831 as '*scatigera*'. 1831; Pierre, *Fl. Forest. Cochinch.* 3: tab. 201. 1889. Type: *Wallich* 1130, lectotype K-W, here designated (the sheet with fruits); isotype BM, K, SING), Fig. 2.

Tree, up to 45 m high, up to 590 cm girth above buttresses; bole straight; buttresses up to 7 m; bark grayish-brown, smooth, inner bark whitish; twigs terete, glabrous, with prominently raised large leaf scars; young shoots, reddish-brown to greenish-brown, glabrescent. *Stipules* subulate, glabrous to glabrescent, caducous. *Leaves* elliptic to ovate, 10–19 by 4–9 cm, base cuneate or obtuse to truncate, apex acuminate, subcoriaceous, glabrous; nerves 5–7 pairs, 3 or 5 nerves at base, scalariform veins prominent on both surfaces. *Petioles* 3–10 cm long, swollen at both ends. *Inflorescences* paniced, axillary and terminal, lax, 6.5–20 cm long, erect, pubescent. *Perianth* campanulate, 5-lobed, 23 by 18 mm, pubescent, reddish with yellow at apex, faintly-scented. *Stamens* 10–15, arranged in a whorl; anthers 2-celled, yellow. *Pistil* with 5 carpels, pubescent, red. *Androgynophore* 10–12 mm, upper half pilose, curved. *Fruit* a large follicle, 22–28 by 5–7.2 cm, soon dehiscent, boat-shaped and membranous, pubescent. *Seeds* subglobose to globose, 1.8–2.2 by 1.7–2 cm, glabrous. *Cotyledons* sessile, orbicular, thick, pale yellowish, 1.8–2 by 1.6–1.8 by 0.8–1 cm.

Thailand.—SOUTHEASTERN: Chachoengsao [Khao Ang Ruenai WS., Bo Thong, 20 Feb. 2007, *Phonsena et al.* 5335 (**BKF**)]; Chanthaburi [Khao Khitchakut NP., HQ., 5 April 2005, *Phonsena et al.* 4530 (**BK, BKF, L**); 20 April 2005, *Phonsena* 4547 (**BKF**, Herbarium of Khao Hin Son Botanic Garden, Herbarium of Suan Luang Rama IX); 15 Dec. 2005, *Phonsena* 4743 (**BK, BKF, L**, Herbarium of Khao Hin Son Botanic Garden: with spirit collection); 23 March 2006, *Phonsena & Banchong* 4849 (**BK, BKF, L**, Herbarium of Khao Hin Son Botanic Garden); Khao Khitchakut NP., HQ., 21 Dec. 2006, *Phonsena et al.* 5294 (**BK, BKF, L**, Herbarium of Khao Hin Son Botanic Garden: with spirit collection, Herbarium of Suan Luang Rama IX); Khao Phlap (Khao Sai-ngon), 27 Feb. 2001, *Phonsena* 2948 (Herbarium of

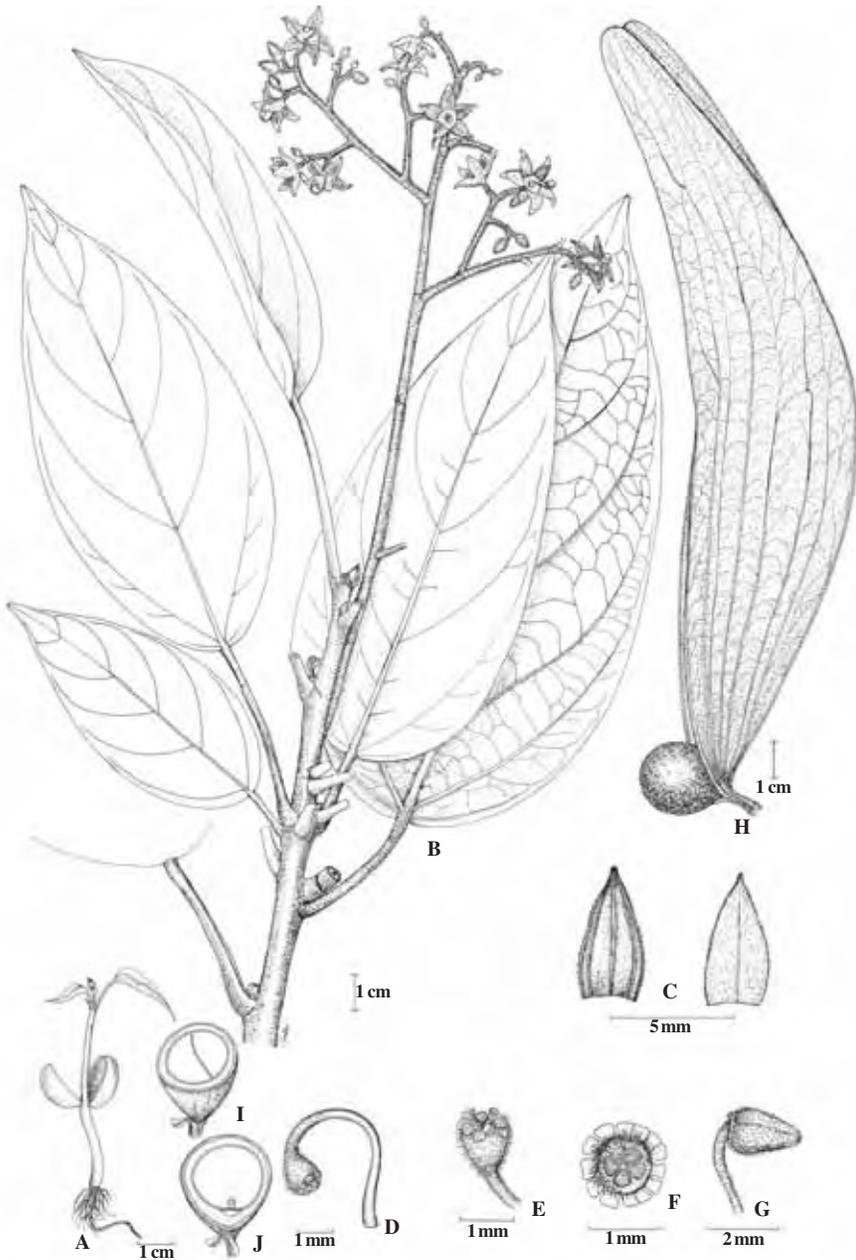


Figure 2. *Scaphium scaphigerum* (Wall. ex G.Don) G.Planch.: A. Seedling; B. twig with inflorescence; C. tepal, inner tepal (left), outer tepal (right); D. androgynophore; E. apex of androgynophore, showing anthers and stigmas; F. androgynophore, cross-section, showing 5 carpels; G. young fruits with reduced stamens at base; H. fruit; I. seed, cross-section; J. seed, longitudinal section (A: *Phonsena et al.* 4530; B–G: *Phonsena* 4743; H: *Phonsena* 4547; I–J: *Phonsena & Banchong* 5335). Drawn by O. Kerdkaew.

Khao Hin Son Botanic Garden); Khao Soi Dao WS., 23 Jan. 1998, *Phonsena* 1246 (Herbarium of Khao Hin Son Botanic Garden); Khao Soi Dao WS., Soi Dao Waterfall, 3 May 2005, *Phonsena* 4551 (**BKF**, **L**, Herbarium of Khao Hin Son Botanic Garden); 20 Dec. 2005, *Phonsena* 4753 (**BKF**, **L**); Khao Soi Dao WS., 1 km from HQ. to waterfall, 30 March 2006, *Phonsena* 4858 (**BK**, **BKF**, **L**, Herbarium of Khao Hin Son Botanic Garden: with spirit collection, Herbarium of Saun Luang Rama IX); Chon Buri [Khao Ang Ruenai WS., Ang Phak Nam Waterfall, 14 Feb. 2004, *Wilkie et al.* PW422 (**BKF**)]; PENINSULAR: Chumphon [Ban Ta Ngam, 15 Jan. 1927, *A.F.G. Kerr* 11457 (**BK**)]; Phatthalung [Si Banphot, Khao Pu-Khao Ya NP., HQ., 10 March 2005, *Gardner & Tippayasri* ST1643 (**BKF**)]; Ranong [Kapoe, 15 Jan. 1929, *A.F.G. Kerr* 16701 (**BK**)]; Khao Panta, 22 Jan. 1929, *A.F.G. Kerr* 16814 (**BK**); Khlong Kamphuan, 5 Feb. 1929, *A.F.G. Kerr* 17026 (**BK**).

Distribution.— Burma, Laos, Vietnam, Malay Peninsula.

Ecology.— In evergreen forest; at 80–700 m altitude. Flowering: December–February. Fruiting: January–May.

Vernacular.— Thai phao (ท้ายเผา), samphao (สำผา) (Phatthalung), samrong kalok (สำรองกะโหลก), samrong nu (สำรองหนู) (Chanthaburi).

Uses.— Wood for plywood. Seed yields copious mucilage used as beverages and medicines to treat diarrhoea, dysentery and asthmatic complaints but less popular.

Notes.— 1. *Scaphium scaphigerum* and *S. affine* can be found together in southeastern Thailand, but only one collection of *S. affine* is known from the peninsula (*A.F.G. Kerr* 7466); in the east only *S. affine* occurs.

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Figure 3. *Scaphium scaphigerum* (Wall. ex G.Don) G.Planch.: A. buttress; B. flowers; C. seeds; D. cotyledon(s) of seedling; E. inflorescences; F. leaves of sapling. *S. affine* (Mast.) Pierre: G. inflorescences; H. leaves of sapling; I. flowers; J. seeds; K. cotyledon(s) of seedling. Photographed by Y. Banchong (A, B, F, I) and P. Phonsena (C, D, E, G, H, J, K).