

## Taxonomic Notes on the Genus *Helicteres* L. (Malvaceae) from Thailand, Cambodia and China

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**ABSTRACT.**— Two new species, *Helicteres oblongifolia* and *H. thailandica* from Thailand are described and illustrated. *Helicteres geoffrayi* is a new record for Thailand and China and *H. gagnepainiana* is placed under *H. geoffrayi*. *Helicteres elliptica* from Cambodia is lectotypified.

**KEY WORDS:** Helicteroideae, taxonomy, typification

### INTRODUCTION

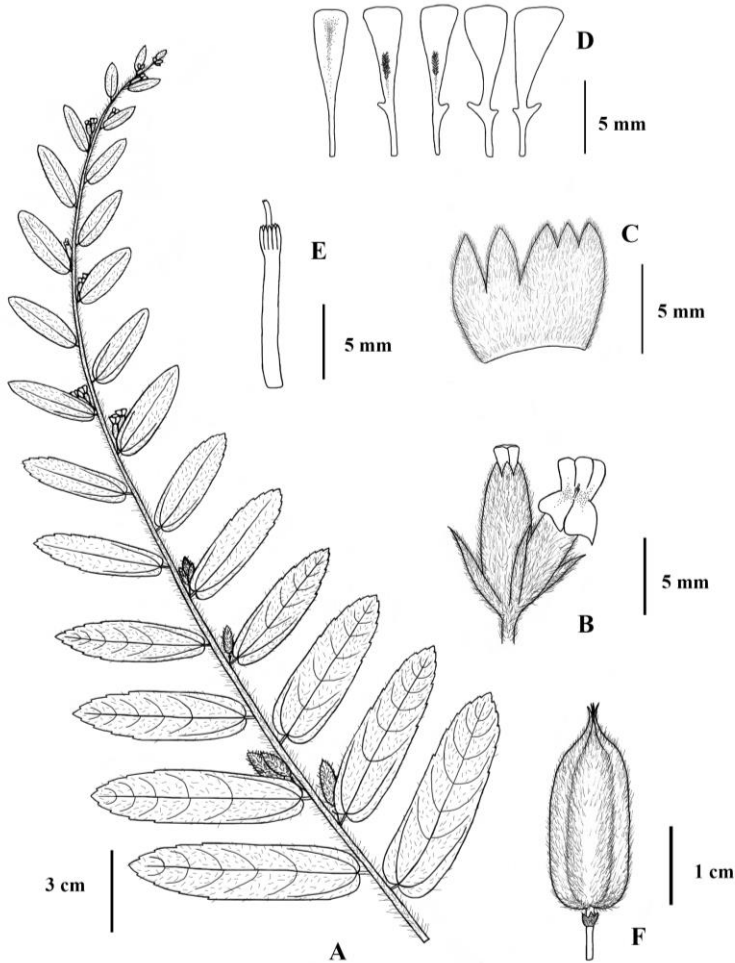
*Helicteres* L. was described by Linnaeus (1753) based on two species, *H. angustifolia* and *H. isora*. The genus comprises approximately 60 species distributed in tropical America and Asia (Bayer & Kubitzki, 2003). The genus was traditionally placed in the Sterculiaceae, but a new classification, based on morphological and molecular studies, now places the genus in the Malvaceae subfamily Helicteroideae (Alverson et al., 1999; Bayer et al., 1999).

The genus *Helicteres* is characterized by having its stamens and pistil on an androgynophore, united sepals, oblong fruits with hairs and seeds that are wingless. In the *Flora of Thailand* account of the genus *Helicteres*, seven species (eight taxa) were reported (Phengklai, 1995 and 2001). Later, Chantaranonthai & Poompo (2019) published *Helicteres prostrata* as a new record for Thailand. In August 2019, we undertook a plant survey in Roi Et and Ubon Ratchathani provinces, Thailand, and many unknown plant specimens were collected.

After careful examination two unknown specimens of *Helicteres* from Ubon Ratchathani appeared to be distinctive and it became clear that they represented two new species, namely *H. oblongifolia* Chantar. & S. Poompo and *H. thailandica* Chantar. & S. Poompo. Additionally, herbarium specimens and taxonomic literature relating to this genus were consulted and found that *H. geoffrayi* Gagnep. is a new record for Thailand and China. We also determined that *H. gagnepainiana* Craib is conspecific with *H. geoffrayi*. Herein, *Helicteres elliptica* Tardieu from Cambodia is also lectotypified.

### MATERIALS AND METHODS

This study is based on field collections. Herbarium material has been consulted at, or borrowed from herbaria, namely AAU, BK, BKF, K, KKU, KYO, PSU and QBG (acronyms follow Thiers, 2020, continuously updated). Line drawings of the new species, photos, specimens examined and ecological data are provided.



**FIGURE 1.** *Helicteres oblongifolia*: A. Leaves and inflorescences; B. Flowers; C. Calyx; D. Petals; E. Upper part of stamens, style and stigma; F. Fruit (drawn from Chantaranothai et al. 19-54). Illustration by N. Triyuthachai

## TAXONOMIC TREATMENT

*Helicteres oblongifolia* Chantar. & S. Poompo, *sp. nov.* Type: Thailand, Ubon Ratchathani, Khong Chiam, Na Po Klang subdistrict, Ban Nong Phue, along the way to Soi Sawan waterfall, 10 Aug. 2019, Chantaranothai et al. 19-54 (holotype **KKU**, isotypes **BKF**, **QBG**). Figs. 1, 2

Prostrate subshrub up to 1.5 m long; young branchlets terete, pale brownish soft hairs, older dark brownish, glabrescent. *Leaves* alternate, thickly coriaceous, oblong, rarely lanceolate, (4–) 6–12 x 2–5 cm, apex obtuse or slightly acute, base cordate, margin entire, denticulate along apical half, ciliate, both surfaces with soft hairs, upper surface dark green, lower surface pale green or greyish white; midrib prominent on lower



**FIGURE 2.** *Helicteres oblongifolia*: A. Habit and habitat; B. Inflorescences; C. Fruit. Photos by S. Poompo

surface; basal veins 3; lateral veins 4–8 pairs; petioles 5 mm long, terete, hairy; stipules linear, 3–4 mm long, hairy. *Inflorescences* axillary or terminal; bracts 3.5–5 mm long; peduncle 4–7 mm long, hairy. *Flowers* with short pedicels. *Calyx* valvate, campanulate, with 5 lobes, hairy; lobes unequal, creamy white. *Petals* 5, free, spatulate, slightly unequal, 10–12 x 5–7 mm, whitish purple, yellowish purple or

purplish, apex obtuse; claw with 1- or 2-toothed appendages, pilose. *Androgynophore* ca 5 mm long, villous at base. *Stamens* 10, alternating with 5 staminodes; filaments column glabrous; anthers 0.5 mm long, oblong; staminodes ca 0.5 mm long. *Ovary* superior, oblong, surrounded by the filament column, longitudinally 5-lobed, hairy; styles 5, more or less united, 5–6 mm long, with 5-toothed stigma; ovules numerous. *Capsule*

**TABLE 1.** Comparison of *Helicteres oblongifolia*, *H. prostrata*, *H. angustifolia* and *H. lanceolata*. Data for *H. angustifolia* and *H. lanceolata* are adopted from Phengklai, 2001.

Chatacters	<i>H. oblongifolia</i>	<i>H. prostrata</i>	<i>H. angustifolia</i>	<i>H. lanceolata</i>
Habit	Prostrate subshrub, to 1.5 m long	prostrate, ca. 0.5 m long	shrub, 1–3 m tall	shrub, 1–2 m tall
Leaf shape	oblong, rarely lanceolate	oblong, oblong-ovate or ovate	elliptic, oblong or lanceolate	lanceolate-oblong or elliptic
apex	obtuse or slightly acute	acute	acuminate, acute or obtuse	acute to acuminate
size (cm)	(4–) 6–12 x 2–5	2–7 x 2–4	3–15 x 1–4	4–18 x 2–5.5
texture	thickly coriaceous	thickly coriaceous	coriaceous	chartaceous to subcoriaceous
upper surface	hairy	glabrous	glabrous	glabrous
no. of basal veins	3	5	3	3
petiole length (mm)	5	2–5	3–15	up to 10
calyx colour	creamy white	white green	green	green
petal size (mm)	10–12 x 5–7	9–10 x 4	5–10 x 1–2	8–10 x 4–5

oblong, straight, 2–3 x 1 cm; stipe 0.5–1 cm long, with beak 5–7 mm long at the apex; young fruit brownish green; mature dark brown, with densely shaggy hairs. *Seeds* rhomboid, 2.5 x 2 x 1.5 mm; young seed white; mature seed black.

**Distribution.**— Endemic to Thailand.

**Ecology.**— In open space on rock platform of mixed deciduous forest. Flowering and fruiting were collected in August.

**Etymology.**— The specific epithet refers to the oblong leaf shape.

**Vernacular.**— Khi on laan hin (ชื่อถิ่นลานหิน).

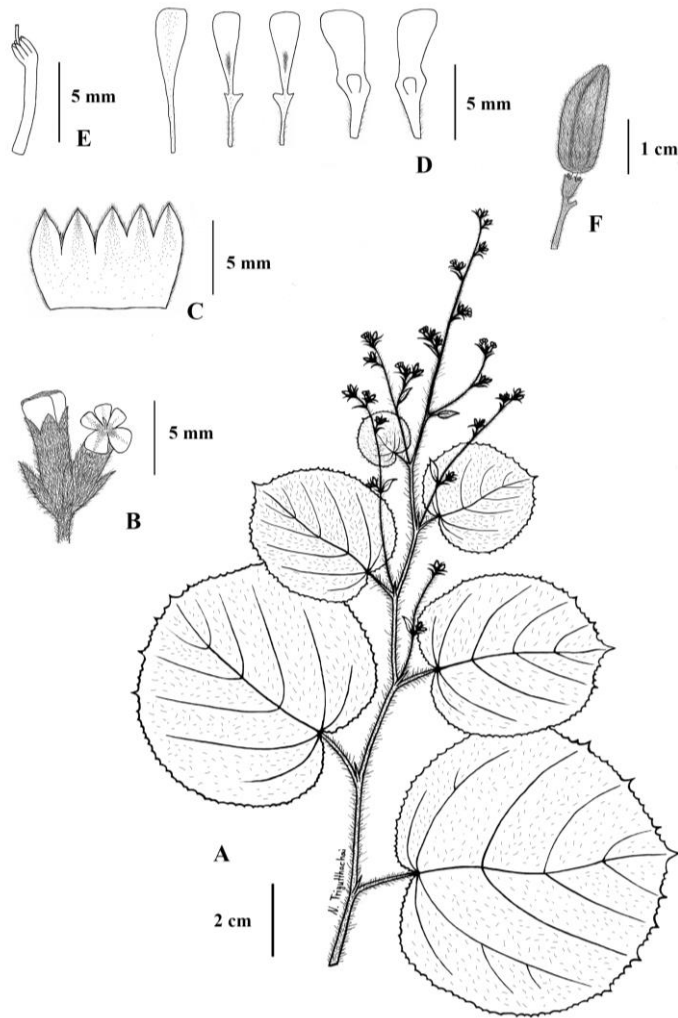
**Additional examined specimen.**— Ubon Ratchathani, Pha Tam, 21 Aug. 2016, *Poompo 07* (KKU).

**Notes.**— *Helicteres oblongifolia* has similar creeping habit to *H. prostrata* S.Y. Liu but differs in having larger leaves which are thickly coriaceous, oblong, rarely lanceolate, glabrescent on the upper surface and densely hairy on the lower surface. The new species has also morphologically similar to *H. angustifolia* L. and *H. lanceolata* DC. but differs in having thickly coriaceous leaves with soft hairs on the

upper surface and creamy white calyx. The four species are compared in Table 1.

***Helicteres thailandica*** Chantar. & S. Poompo, *sp. nov.* Type: Thailand, Ubon Ratchathani, Khong Chiam, Na Po Klang subdistrict, Ban Nong Phue, along the way to Soi Sawan waterfall, 10 Aug. 2019, *Chantaranothai et al. 19-79.* (holotype **KKU**, isotypes **BKF**, **QBG**). Figs. 3, 4

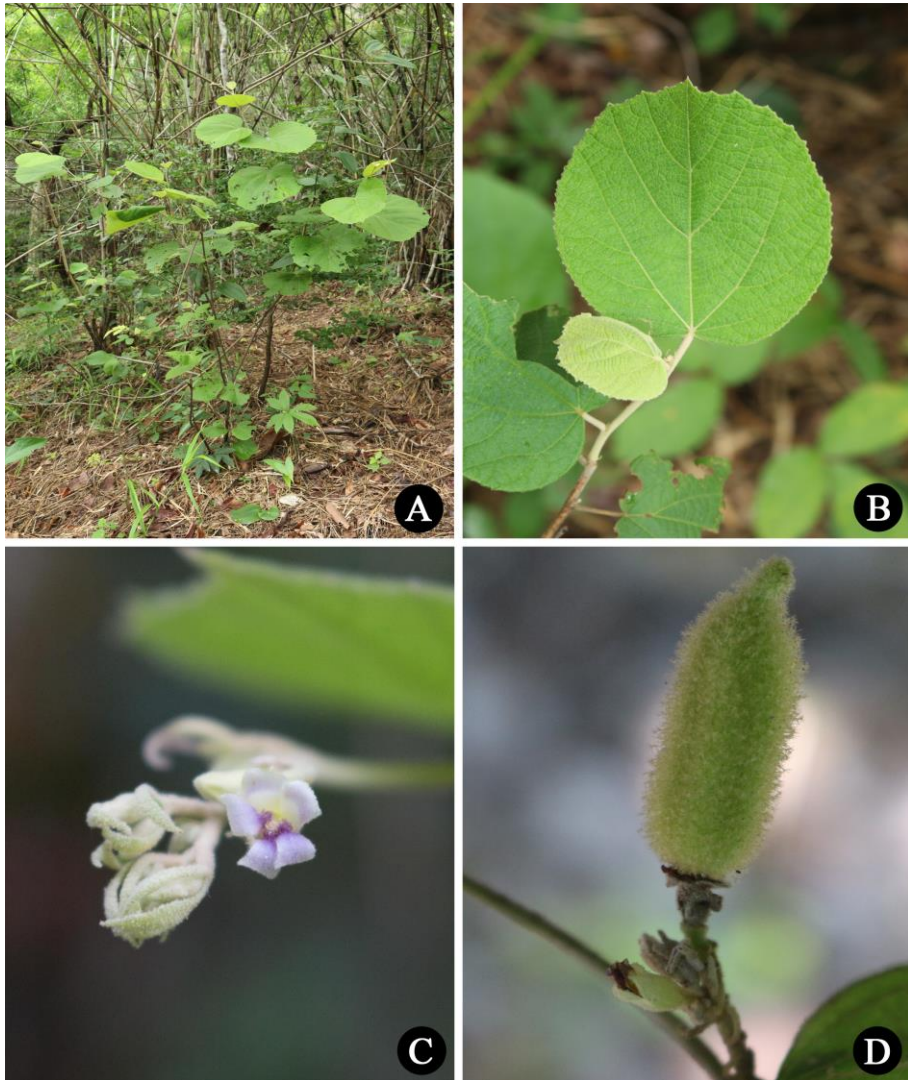
Shrub 1–2.5 m tall; branches terete, young branchlets creamy green, hairy; branches brownish, glabrous. *Leaves* spiral, chartaceous, orbicular, 7–15 x 9–18 cm, apex rounded, base cordate, margin irregularly serrate; both surfaces hairy, upper surface dark green, lower surface pale green or greyish white, with dense stellate hairs; midrib prominent on the lower surface; basal veins 3–5 (–7); lateral veins 4–6 pairs; petioles 1.5–5 cm long, terete, hairy; stipules linear, 6–10 mm long, hairy. *Inflorescences* axillary or terminal, helicoid cymes, (2–) 4–26 cm long bract 4–7 x 0.5–1.2 mm; peduncle 3–7 mm long, hairy. *Flowers* with short pedicels. *Calyx* valvate, campanulate, 5–7 mm long, with 5 unequal lobes, creamy



**FIGURE 3.** *Helicteres thailandica*: A. Leaves and inflorescences; B. Flowers; C. Calyx; D. Petals; E. Upper part of stamens, style and stigma; F. Fruit (drawn from Chantaranothai et al. 19-79). Illustration by N. Triyutthachai

white, hairy. *Petals* 5, free, spatulate, 8–10 x 3–4 mm, yellowish purple, whitish purple or purplish; claw with unequal appendages. *Androgynophore* ca 5 mm long, villous at base. *Stamens* 10, alternating with 5 staminodes; filament column glabrous; anthers 0.5 mm long, oblong. *Ovary* superior, oblong, surrounded by the filament column, longitudinally 5-lobed, hairy; styles

5, more or less united, ca 7 mm long, with 5-toothed; stigma ca 1 mm long; ovules numerous. *Capsule* oblong, straight, 2–2.5 x 0.8–1.2 cm, beaked at the apex; stipe 5–8 mm long; young fruit green; mature fruit dark brown with densely shaggy hairs. *Seeds* rhomboid, 2.5–3 x 1.5–2 x 2–2.5 mm, young seed whitish; mature seed black.



**FIGURE 4.** *Helicteres thailandica*: A. Habit and habitat; B. Leaves; C. Inflorescences; D. Fruit and withered flower. Photos by S. Poompo

**Distribution.**— Endemic to Thailand.

**Ecology.**— In mixed deciduous and dry evergreen forests. Flowering and fruiting specimens were collected in August.

**Etymology.**— The specific epithet refers to Thailand: the only country where this is known to occur.

**Vernacular.**— Khi on bai klom (ขี้ฮั่นใบกลม).

**Additional examined specimen.**— Ubon Ratchathani, Pha Tam, 21 Aug. 2016, Poompo 09 (KKU).

**Notes.**— *Helicteres thailandica* is a unique species of *Helicteres* because of the remarkably long helicoid cymes up to 26 cm long. It is also distinctive in having leaves which are more or less rounded. The habit

**TABLE 2.** Comparison of *Helicteres thailandica*, *H. isora*, *H. viscida* and *H. daknongensis*. Data for *H. isora* and *H. viscida*, and *H. daknongensis* are adopted from Phengklai, 2001 and Hoang et al., 2020, respectively.

Characters	<i>H. thailandica</i>	<i>H. isora</i>	<i>H. viscida</i>	<i>H. daknongensis</i>
Leaf				
shape	orbicular	ovate	ovate	ovate or oblong-ovate
apex	rounded	3–5-cuspidate	3–5-cuspidate	acute or acuminate
no. of basal veins	3–5 (–7)	5 (–7)	5 (–7)	5
petiole length (cm)	1.5–5	1–3	ca. 1	0.3–0.5
Petal				
colour	yellowish purple, whitish purple or purplish	orangish red with black dots on inner petal	white or yellow	whitish pink, yellowish at base of limb
length (cm)	0.8–1	2.5–3	2.5–3	1.5–1.9
Fruit				
surface after dehiscent	with densely shaggy hairs, not twisted	glabrescent, twisted	with shaggy hairs, not twisted	densely villous, not twisted

and broad leaves do lend a superficial resemblance to *H. isora* L., *H. viscida* Blume and *H. daknongensis* V.S. Dang & D.T. Bui, but there are many points of difference. The strongly twisted fruits, orangish red with black dots on the inner petal and leaf apex which is cuspidate or fringed of *H. isora* distinguish it immediately from *H. thailandica*. *Helicteres viscida* has a leaf apex that is 3–5-cuspidate or fringed, with 5 (–7) basal veins in the leaf and petals that are 2.5–3 cm long while in *H. thailandica* apex of leaf is rounded, with 3–5 (–7) basal veins and the petals are 0.8–1 cm long. The leaves of *H. daknongensis* are ovate or oblong-ovate with acute or acuminate apices, shorter petioles and longer petals but *H. thailandica* differs in having orbicular leaf shape with rounded apices, longer petioles and shorter petals. The four species are compared in Table 2.

*Helicteres geoffrayi* Gagnep., Notul. Syst. (Paris) 1: 81. 1909. Type: Cambodia, Kampot, Pnom-dong, 23 Aug. 1903, *Geoffray 68* (holotype **P** 06661597).

*H. gagnepainiana* Craib, Bull. Misc. Inform. Kew 1912(3): 146. 1912, *syn. nov.* Type: Thailand, Chon Buri, Si Racha

(Sriracha), Nong Kaw (Nawng Kaw), 18 Sept. 1911, *Kerr 2046* (lectotype **K** 0006718624, selected by Phengklai, 1995; isolectotypes **BM** 000630031, **E** 00284369).

*H. lanceolata* DC. var. *gagnepainiana* (Criab) Phengklai, Thai For. Bull., Bot. 23: 89. 1995, *syn. nov.*

Shrub 1–1.5 m tall; young branchlets green, terete, hairy; older pale brownish, glabrescent, with lenticels; bark thick with fibers. *Leaves* alternate, chartaceous, lanceolate, 6–14 x 2–4 cm, apex acute, base obtuse to cordate, margin entire with denticulate along apical half, ciliate, upper surface glabrous, dark green with hairs along venation, lower surface pale green; midrib prominent on lower surface; basal veins 3; lateral veins 4–6 pairs; petioles 4–5 mm long, terete, hairy; dry leaves brownish; stipules linear hairy. *Flowers* in fascicles, axillary or terminal; peduncle 3–5 mm long; pedicel short. *Calyx* campanulate, 5-lobed, unequal, green hairy. *Corolla* 5-lobed, 7–8 x 3–4 mm, purple, yellowish purple or whitish purple, spatulate, free, claw with unequal appendages. *Stamens* 10, alternating with 5 staminodes; filament fused and covered ovary; anthers 0.5 mm long, oblong. *Ovary* superior, 5-loculed, hairy, with numerous

ovules; stigma 5-teeth. *Capsule* oblong, straight or slightly bent, with beak, 2.5–3 x 0.5–0.8 mm; stipe 0.5–1 cm long; young fruit green; mature fruit dark brown, glabrescent. *Seeds* rectangular, 2–2.5 x 1.5–2 x 1–1.5 mm; young seed whitish and black when mature.

**Distribution.**— China (Hainan), Thailand, Cambodia.

**Ecology.**— In open area of dry dipterocarp and dry evergreen forests, 10–500 m alt.

**Vernacular.**— Di ngu (ดีงู), khao chi lek (ข้าวจีเล็ก), di ngu ton (ดีงูตัน).

**Notes.**— *Helicteres geoffrayi* is closely related to *H. lanceolata* DC. but differs in having densely puberulous on young twigs. Craib (1912) described *H. gagnepainiana* as a new species from Thailand. Later Phengklai (1995) considered it as a variety of *H. lanceolata*. On examination of material and all the types of *Helicteres*, we have concluded that *H. gagnepainiana* is conspecific with *H. geoffrayi*. This species was hitherto known only from Cambodia, but it is now seen to have a much wider range, from Thailand and China.

**Specimens examined.**—THAILAND: Ubon Ratchathani, Kaeng Tana National Park, 21 Aug. 2016, *S. Poompo* 11 (KKU); Chon Buri, Satthahip, Ko Samaesan, 13 Jun. 1998, *Phengklai* et al. 15250 (BKF), *ibid.*, *Phengklai* et al. 11176 (BKF). CHINA: Hainan, Pak Shik Ling and vicinity, Ku Tung village, 27 Sept. 1927, *Pol Ma Ming & C.I. Lei* 29 (KYO).

*Helicteres elliptica* Tardieu, Notul. Syst. (Paris) 10: 234. 1942. Type: Cambodia, Kompong Speu, 2 Jun. 1930, *Poilane 17421* (lectotype P 06661372, designated here; isolectotypes P 06661369, P 06661370, P 06661371).

**Notes.**— *Helicteres elliptica* is distinctive in having leaves which are coriaceous, ovate-elliptic, with rounded leaf apices and bases, and is an erect shrub. This species is distributed in mixed deciduous and dry evergreen forests in Cambodia. The original description mentioned a collection of Poilane at P, *Poilane 17421*, which has four sheets. The specimen P 06661372 is designated to be lectotype because it has more leaves and flowers than the others.

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