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:** Heliceroideae, 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 Heliceroideae (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, Chantaranothai & 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 Thierts, 2020, continuously updated). Line drawings of the new species, photos, specimens examined and ecological data are provided.
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
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

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

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

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 (ขี้อ้นลาน)

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. (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
white, hairy. Petals 5, free, spathulate, 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 rhomboïd, 2.5–3 x 1.5–2 x 2–2.5 mm, young seed whitish; mature seed black.

**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
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 (ขี้อ้นใบกลม).

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
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.

### 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.

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


Type: Thailand, Chon Buri, Si Racha (Sriracha), Nong Kaw (Nawng Kaw), 18 Sept. 1911, Kerr 2046 (lectotype K 0006718624, selected by Phengklai, 1995; isolecotypes BM 000630031, E 00284369).


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, spathulate, 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 (ไถ่), khao chi lek (ไก่เลี้ยง) di ngu ton (ไถ่ต้น).

**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.


**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.

**ACKNOWLEDGEMENTS**

We would like to thank the directors, curators and staff of herbaria cited above for allowing us to examine the herbarium specimens and the Department of Biology, Khon Kaen University and the Department of Biological Science, Ubon Ratchathani University for providing research facilities. We thank N. Triyutthachai for the line drawings and P. Kladowong and P. Kunasit for helping in various ways.

**LITERATURE CITED**


and lectotypifications of *H. poilanei* and *H. vinosa*. 