

A new species of *Nepenthes* (Nepenthaceae) from Thailand

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ABSTRACT

This paper describes and illustrates a new species of Nepenthaceae, *Nepenthes krabiensis*. The new species is closely related to *N. rosea* which has been found in the same habitat of the wildlife sanctuary of Krabi Province in Southern Thailand.

KEYWORDS: Thailand, Krabi, Peninsular Thailand, taxonomy.

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INTRODUCTION

Nepenthaceae is a monotypic family of carnivorous pitcher plants widely distributed in southern China, Indonesia, Thailand, Malaysia and the Philippines. The sole genus *Nepenthes* L. is found westward to Madagascar and the Seychelles, southward to Australia and New Caledonia and northward to India and Sri Lanka. The *Nepenthes* flora of Indochina suffers from a critical lack of recent research (e.g. see Mey, 2009). However, several new taxa have been recently described: *N. thai* Cheek (Cheek & Jebb, 2009), *N. bokorensis* Mey (Mey, 2009), *N. andamana* M.Catal., *N. chang* M.Catal., *N. suratensis* M.Catal., *N. mirabilis* (Lour.) Druce var. *globosa* M.Catal., *N. kerrii* M.Catal. & Kruetr., (Catalano, 2010), *N. rosea* M.Catal. & Kruetr. (Catalano, 2014), *N. halmahera* Cheek, *N. weda* Cheek (Cheek, 2015) and *N. maryae* Jebb & Cheek (Cheek & Jebb, 2016). In Thailand, currently 13 species and 1 variety of *Nepenthes* are recognized. The new endemic species described here was found on mountain tops, namely Khao Nor Ju Jee in Khao Pra-Bang Khram Wildlife Sanctuary in Krabi province, southern Thailand.

DESCRIPTION

Nepenthes krabiensis Nuanlaong, Onsanit, Chusangrach & Suraninpong, **sp. nov.**

This species is closely related to *N. rosea* but differs in longer decurrent leaves (1.4–2 cm vs. 0.2–0.5 cm); inconspicuous brown hairs (vs. hairs white, 0.1 mm); indumentum specifically distributed on the tendril, outer pitcher, leaf axil, inflorescence but absent on the lamina (vs. covering the inflorescence and often leaf margins and midrib); larger lower pitcher (vs. 3–4.5 × 8–15 cm) with green to orange with red stripes outside and red blotches over the inner surface (vs. green to light pink with dark pink stripes outside and uniformly green to dark pink over the inner surface); broadly ovate lid (vs. orbicular to slightly ovate); larger lid (vs. 3–4.5 × 2.5–4.5 cm); two types of nectarioles (vs. one type); larger peristome in lower pitcher (vs. 0.2–0.5 cm); wings in upper pitcher absent (vs. wide 0.5 mm); longer male and female inflorescence (vs. 40–50 cm and 20–50 cm, respectively); longer pedicle and rachis (vs. 25–30 cm and 10–25 cm, respectively); numerous male flowers (vs. 25–90 flowers); longer androphore (vs. 2–3 mm); and tepals oval in male inflorescence (vs. elliptic). Type: Thailand, Krabi Province, Khlong

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Thom District, Mt Nor Ju Jee, 600–700 m, 7°54'1.50"N, 99°18'15.90"E, ♂ fl. lower and upper pitchers, 29 July 2015, *Nuanlaong 01464* (holotype Herbarium of Walailak University; isotype BKF). Figs. 1, 2 & 3.

Dioecious, glossy climbing herb, stems terete, 1.5–2.5 m long, 3.5–5 mm diam.; internodes 1.7–2.7 cm long; axillary buds present in the upper part of plant; green as the upper and brown as the lower. *Indumentum* of brown hairs, 0.1–0.2 mm long, present on leaf axils, tendrils, outer surface of pitchers, peduncles, rachis, sepals, androphore, and ovary; more inconspicuous on midrib (only 0.02–0.06 mm long); absent on lamina. *Leaves* glossy light-green in a rosette when young, green when mature; emerging from an orange-brown triangle lateral bud at the base of the midrib near the leaf attachment; coriaceous, lanceolate, apex acute, clasping the stem by three quarters of its circumference, decurrent for 1.4–2 cm of its length; pseudo-petiolate, alternate, dilating at

the node, 2.2–4.2 × 12.4–19.3 cm, projecting along the stem as wings; longitudinal nerves 2–3 on each side of the midrib in outer third of lamina, inconspicuous pinnate nerves; midrib conspicuous; tendrils straight, terete, 2.0–2.5 mm diam., 10.5–15 cm long in lower pitchers and 1.5–2.5 mm diam., 8.0–11.5 cm long in upper pitchers, coiling. *Lower pitchers* green to orange with red stripes outside, red blotches over the inside, absent in glandular zone; green to orange or red peristome; lid green to red on the upper surface, green to yellow or orange on the lower surface, ca 3.5–5.2 × 12.1–19.5 cm; 50 to 60% ovate at the lower with digestive glandular at the inner surface, narrowing at the upper; conspicuous midsection hip with two fringed wings as 3–6 mm long, serrate to double serrate, along the length of the pitcher, 4.5–11 cm or run down ventral exterior surface from mouth to tendril, fringe elements 6–9 mm long; oblique ovate pitcher mouth rising toward the lid; peristome cylindrical or flattened, 1.0–1.6 cm wide, inner edge

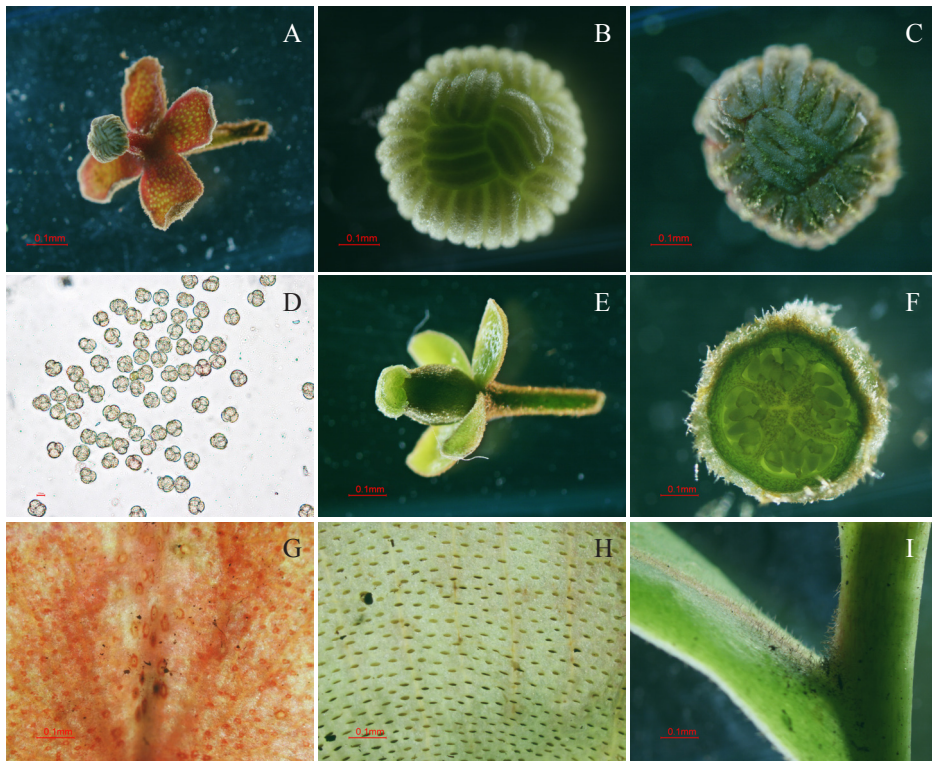


Figure 1. Morphology of *Nepenthes krabiensis* under stereo and light microscope. (A–C and E–I; 5x magnification, Bar = 0.1 mm and D; 20x magnification, Bar = 100 μ m) A. male flower contained tepal, nectar glands on the tepal surface, androphore and anther, B. anthers, C. longitudinal anther dehiscence, D. tetrad pollen; E. female flower contained tepal, nectar glands on the tepal surface, stigma and ovary, F. superior ovary with four syncarpous carpels, G. nectar gland in lower surface of lid, H. digestive glands in lower pitcher and I. brown hair at the stem.

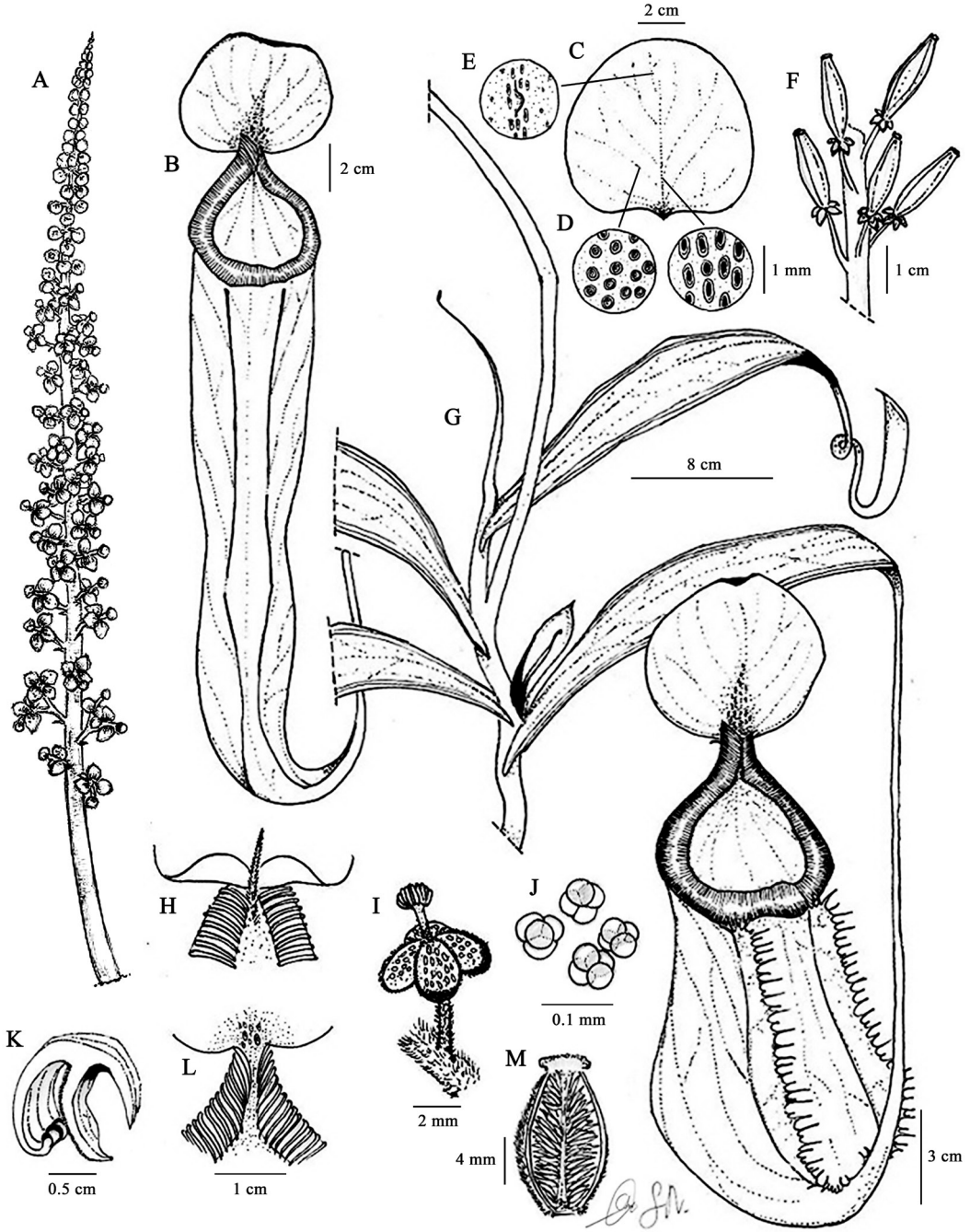


Figure 2. *Nepenthes krabiensis*. A. male inflorescence, B. upper pitcher, C. lid of lower pitcher, D. nectar gland, E. appendage of lower surface's lid, F. infructescence, G. habit, climbing stem with immature upper pitcher, mature lower pitcher and axillary bud, H. spur filiform, I. male flower, J. tetrad pollen, K. peristome of lower pitcher in transverse section, L. peristome-teeth and ridge of lower pitcher, M. ovary with transverse section. Drawn by Sunya Nuanlaong and Chayan Yodthammarat.



Figure 3. *Nepenthes krabiensis*. A. habitat and habit, B. male inflorescence (left) and female inflorescence (right), C. lower pitcher; D. upper pitcher.

with teeth 0.5–1 mm, ridges 0.05 mm apart; broadly ovate lid, 3.6–5.3 × 3.7–6 cm, larger than mouth, sometime vaulted or bent towards the mouth, base cordate 2–4 mm, may or may not have appendage as a lower surface (14% vs. 86%, respectively); nectar glands numerous, elliptic, 0.25 mm diam. along the midrib, and with crateriform glands 0.13 mm diam. scattered over the lower surface of the lid; spur filiform, 3–8 mm long, with no branches. *Upper pitchers* light green, with red blotches over the inner surface, absent in glandular zone; peristome white, green to white or light green; lid light green; tendrils coiled; tubulose or narrowly to infundibular, 12–19 × 2–3 cm; hip comprising one third of the lower part; wings absent but with two conspicuous ribs from the mouth toward the tendrils; pitcher mouth ovate, less oblique than lower pitcher; peristome cylindrical to flattened, slightly raised at the front to form a triangular point, 0.5–1 cm wide, inner edge with teeth 0.5–1 mm, ridges 0.05 mm apart; lid broadly ovate, 3.6–5.3 × 3.7–6 cm, base cordate 2–4 mm, appendages absent; nectar glands similar to the lower pitcher; spur filiform, 1.5–5 mm long, no branches. *Male inflorescences* racemose, 58.6–62 cm long; petals green when young, red when old; peduncle 32–37 cm long, 2–4 mm diam., rachis 26.5–30 cm long; flowers 97–130, singly arranged, occasionally with 2-flowered partial peduncles, pedicels 0.9–1 cm long, bracts 3–4 mm long, present at the base or on the lower half of pedicel; flowers actinomorphic; tepals 4, ovate, 2.0–2.5 × 3.0–3.5 mm, cruciferous, valvate, densely covered with circular to elliptic nectarioles 0.01–0.02 mm diam.; androphore 4 mm long, anthers basifixed, anther head globular, 1.5–2.5 mm diam., anthers with 15–22 cells, dehiscence longitudinal; pollen in tetrads. *Female inflorescences* racemose, 47–63 cm long; green when young, green to yellow when old; peduncle 35.5–52 cm long, 2.5–4 mm diam., rachis 11.5–27.5

cm long; solitary flowers ca. 28–56 arise on pedicles, 0.7–1.2 cm long; bract absent; actinomorphic flower, tepals as males except: elliptic, 1.5–2 × 3.0–3.5 mm, nectarioles 0.01–0.03 mm diam.; stigma 2.0–2.5 mm diam.; ovary oblong, 4.5–6 mm long, superior with four syncarpous carpels; placentation axile. *Infructescence* similar to female inflorescence; sepals persistent; four valves, 1.4–2 cm long with septicidal capsule; seeds narrowly ovate, 3–5 mm long; 87–118 seeds per fruit.

Distribution.— Southern Thailand, founded only at Khao Pra-Bang Khram Wildlife Sanctuary, Krabi Province, Thailand.

Ecology.— On summit areas, in sandy or mool soil, often growing in limestone rock crevices, at 600–700 m above sea level.

Etymology.— The species is named after Krabi Province, to which it is endemic.

Phenology.— Flowering June to August.

Proposed IUCN conservation outlook assessment (2012).— *Nepenthes krabiensis* is assessed as Critically Endangered [CR B2ab (ii)]. It distributed in an area of 500 m² and only on a single site on the summit of Mt Nor Ju Jee.

Notes.— *Nepenthes krabiensis* is similar to *N. rosea* which grows in the same province and also on limestone mountains. The species share lanceolate, pseudo-petiolate and decurrent leaves, but *N. krabiensis* differs from *N. rosea* in the conspicuous coloration of the lower pitchers: being orange with red stripes, with red blotches over the inner surface and absent in the glandular zone, the green to orange or red peristome, the green to red lid upper surface, and the green to yellow or orange lid lower surface. The lower pitchers of *N. rosea* are green to light pink with dark pink stripes outside, and uniformly green to dark pink over the inner surface.

KEY TO *N. KRABIENSIS* AND RELATED SPECIES

The key below is developed from Mey (2010) and Mey *et al.* (2010)

1. Inflorescences racemose with flowers all arranged singly (a 1-flowered 'pedicel')
 2. Leaves obovate ***N. kerrii***
 2. Leaves linear to lanceolate
 3. Plants with hairs on leaf axils, tendril and pitchers; tendrils long than pitcher; lower pitchers ovate in the lower third, narrowing above; cylindrical peristome ***N. kampfiana***
 3. Plants entirely covered with hairs; lower pitchers ovate to narrowly ovate in the lower half, narrowing above, cylindrical or flattened peristome

4. Short hairs on all vegetative parts; tendrils short than pitcher **N. smilesii**
4. Short hairs on upper parts, absent in lower part of plants
5. Lid smaller than mouth, mouth triangular and as large as 1/3 to 1/2 of the lower pitcher length; flattened peristome; flower bracts that are bent inwards **N. suratensis**
5. Lid larger than mouth, mouth ovate as large as 1/4 of the lower pitcher length; cylindrical peristome; flower bracts that are bent outwards **N. andamana**
1. Inflorescences racemose with 2-flowered partial peduncles
6. Hip present at the mid-section or absent in lower pitchers; long tendrils in lower pitchers (approximately 10–30 cm)
7. Inflorescences with 2-flowered partial peduncle on both male and female; plants glabrous except on flowers, leaf axis, tendrils and pitchers; infundibular upper pitchers, slightly sinuated peristome **N. holdenii**
7. Male inflorescences with some 2-flowered partial peduncles, female inflorescences with single arranged flowers (i.e., 1-flowered 'pedicels'); short hairs on all aerial parts except upper surface of leaves; tubular upper pitchers, cylindrical peristome **N. chang**
6. Hip present at the 1/3 of the lower part in both lower and upper pitchers; short tendrils in lower pitchers (approximately 6–17 cm)
8. Inflorescences with 2-flowered partial peduncle on both male and female either absent, present at the lowest part of the rachis or for the entire length; indumentum covering inflorescence and often leaf margins and midrib; lower pitchers green to light pink, with dark pink stripes outside and uniformly green to dark pink over the inner; peristome smaller **N. rosea**
8. Male inflorescences with some 2-flowered partial peduncles, female inflorescences with single arranged flowers; indumentum specifically found in inflorescence, leaf axil, tendril and outer pitcher, absent on the lamina; lower pitchers green to orange with red stripes outside, red blotches over the inner; peristome larger **N. krabiensis**

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