

Taxonomic notes on Thai *Parnassia* L. (Parnassiaceae) and threats to them

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ABSTRACT. Previous herbaria and literature studies have led to the recognition of three species of *Parnassia* L. in Thailand, *P. mysorensis* Heyne ex Wight & Arn., *P. siamensis* Shimizu and *P. wightiana* Wall. ex Wight & Arn. Recent fieldwork in northern Thailand has revealed large variation in characters traditionally ascribed diagnostic value, which suggests that *P. siamensis* is probably conspecific with *P. mysorensis*. The consequence of these findings may well be that the size of the genus worldwide is overestimated. *Parnassia* is endangered in Thailand by various threats, the most imminent ones are being forest fire, cattle grazing and invasive weeds. Excessive collection for herbarium specimens imposes an increasing threat.

KEYWORDS: Taxonomy, Parnassiaceae, *Parnassia*, Thailand.

INTRODUCTION

Parnassia is a genus of small perennial mountain herbs in various open-moist habitats, including rock outcrops, bogs, wet meadows and grasslands. The genus consists of *ca.* 70 species distributed from arctic-alpine regions of the northern hemisphere to N Mexico, Morocco and N Sumatra with a center of diversity in Himalayan-China (*ca.* 59 species, 46 endemic). (Ku, 1987, 1995; Wu *et al.*, 2003; Simmons, 2004).

The genus is fairly homogeneous with many unique morphological characters, *i.e.*, solitary, terminal, bisexual and pentamerous flowers with antipetalous staminodes (Simmons, 2004). Its systematic position has, however, long been in dispute. Hooker & Thomson (1858), Engler (1930) and Cronquist (1981) treated *Parnassia* as a member of Saxifragaceae. It has also been suggested by several works to be closely related to Droseraceae, Hypericaceae, or even Nymphaeaceae (Hallier, 1901; Arber, 1913), while some botanists have agreed to place it in its own family, Parnassiaceae (Gray, 1821). Recent molecular systematic studies

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have confirmed that Parnassiaceae, including *Parnassia* and *Lepuropetalon* Elliott should be retained separately as a sister to Celastraceae (APGII, 2003; Chase *et al.*, 1993; Soltis *et al.*, 2000).

MORPHOLOGICAL VARIATION

Recent fieldwork in N Thailand has revealed large variation in characters traditionally ascribed diagnostic value, *i.e.*, staminode shape, petal punctation, petal margin, and cauline leaf position. These characters are frequently used for classification of sections and species in several treatments (Clarke, 1879; Engler, 1930; Ku, 1987, 1995; Gu & Hultgård, 2001). In China many closely related species are recognised by a combination of these variable characters (Gu & Hultgård, 2001), suggest-

ing that size of the genus worldwide, especially in China, could be overestimated.

Staminode shape

In Thai material of *P. mysorensis* the staminode shape varies from simple cylindrical, dilate to discoid, or sometimes dilate with 2-3 regular to irregular lobes, the lobes with or without a knoblike apex (Table 1 & Fig. 1A). Similarly in *P. siamensis*, the staminode shape varies from simple undulated-discoid to apex dilate with 2-3 irregular lobes, or to candelabriform, the lobes with or without a knoblike apex (Table 1 & Fig. 1B). Using these variable characters with keys and descriptions provided in the Flora of China (Gu & Hultgård, 2001), three to six species would possibly occur in one place.

Table 1. Variation of staminode shape in two species of Thai *Parnassia* from four localities in N Thailand.

Species names & Localities	Altitudes (m)	Staminode shapes	Voucher specimens
<i>P. mysorensis</i> Doi Pui, Mae Hong Son	1,700	- discoid with 0-4 shallow lobe(s) - dilate with 2-3 regular-irregular lobes - lobe-apex simple or +- knob-like	Suksathan 2809 (QBG)
<i>P. mysorensis</i> Doi Phe Pan Nam, Chiang Rai	1,500-1,800	- simple, dilate - dilate with 2-3 irregular lobes - lobe-apex simple or +- knob-like	Suksathan 3057 (QBG), 2873 (QBG)
<i>P. mysorensis</i> Doi Hua Suea, Chiang Mai	1,650	- simple, cylindrical - 3 irregular lobes	Suksathan 3592 (QBG)
<i>P. siamensis</i> Doi Chiang Dao, Chiang Mai	2,200	- discoid with 4-7 shallow lobes - candelabriform - dilate 2-3 irregular lobes - lobe-apex simple or +- knob-like	Suksathan s.n. (QBG)

Petal punctation

This character seems to vary in dry specimens. The punctate petals are clearly visible in old specimens (*P. mysorensis*: Garrett 702, BKF), while it is rarely present in newly collected specimens of the same species from a locality nearby (*Watthana et al.* 584, QBG).

Petal margin

Petal margin is also one of main characters used in several keys. For two

Thai species (*P. mysorensis* and *P. siamensis*), petal margins vary from subentire, erose, shortly fimbriate proximally or throughout (Table 1. & Fig. 1A–B).

Cauline leaf position

Different positions of cauline leaf on the scape, *i.e.*, near the middle, near the base, or near the apex are also used in the Chinese keys (Gu & Hultgård, 2001). In Thai plants this character seems, however, to vary within the same population.

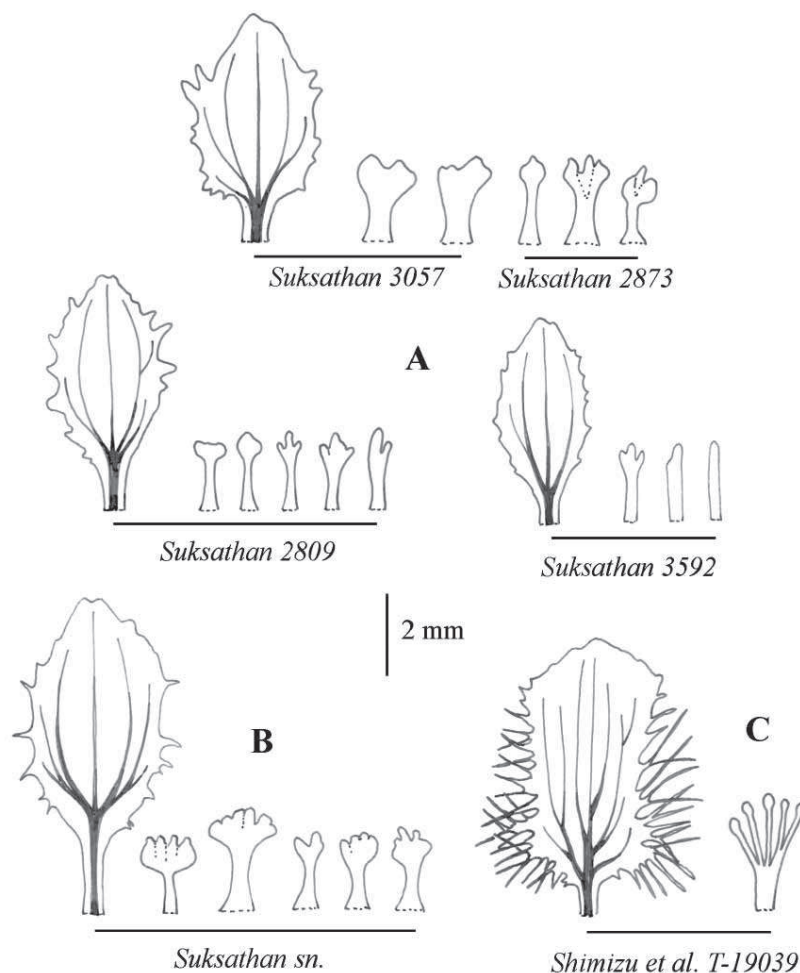


Figure 1. Petals and staminodes A. *Parnassia mysorensis* Heyne ex Wight & Arn.; B. *P. siamensis* Shimizu; C. *P. wightiana* Wall. ex Wight & Arn.

THAI *PARNASSIA* AND THREATS TO THEM

In Thailand, three *Parnassia* species have been recorded.

1. *Parnassia mysorensis* Heyne ex Wight & Arn., Prodr. Fl. Ind. Orient. 35. 1834. (Figs. 1A, 2A–B).

A widespread species, ranging from N India (Sikkim) to S China and N Thailand. The species is characterised by having tri-lobed staminodes. However, large variation of staminode shape in Thai plants has been observed.

Habitat: Open mountain ridges between 1500–2220 m alt.

Distribution: NORTHERN: Mae Hong Son (Muang district, Doi Pui), Chiang Mai (Chom Thong district, Doi Pa Kao, Doi Hua Suea, Doi Song Mea), Chiang Rai (Wiang Pha Pao district, Doi Phe Pan Nam-Doi Hua mot), and Phitsanulok (Chattrakaan district, Phu Soi Dao).

Threats: A serious forest-fire in 2007 completely destroyed at least two populations of *P. mysorensis* at Doi Inthanon and Khun Jae national parks.

Specimens examined: *Garrett* 702 (BKF); *Suksathan* 2809 (QBG), 2873 (QBG), 3057 (QBG), 3585 (QBG), 3592 (QBG), 4615 (QBG); *Wattana*, *Suksathan* & *Argent* 584 (E, QBG), 638 (E, QBG).

2. *Parnassia siamensis* Shimizu, Acta Phytotax. Geobot. 24: 41. 1969. (Fig. 1B).

This species is known only from the type locality at Doi Chiang Dao, Chiang Mai.

Parnassia siamensis is characterised by having petals with shortly fimbriate margins, and candelabriform staminodes. However, both characters seem to be very variable, suggesting that the species is probably conspecific with *P. mysorensis*. Further studies are needed before the status of this species is made.

Habitat: Limestone crevices in open limestone scrub near summit of Doi Chiang Dao, Chiang Mai province, 2220 m alt.

Distribution: NORTHERN: Chiang Mai (Chiang Dao district, Doi Chiang Dao).

Threats: Small population, less than 50 plants have been observed. Invasive weed, *Eupatorium adenophorum* Spreng. and forest fire are the most serious threats in this area.

Specimens examined: *Suksathan* sn. (QBG).

3. *Parnassia wightiana* Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 35. 1834. (Fig. 1C).

A clearly distinct species characterised by having proximally long fimbriate petal margins and five-lobed staminodes. It is the most widespread species, ranging from India to S China and N Thailand.

Habitat: Bog areas among open pine-dipterocarp forest at Ban Bo Luang, Chiang Mai province.

Distribution: Chiang Mai (Om Koi district, Bo Luang tableland)

Threats: Only three collections were made in the same area in 1969, 1973, and 1980. Intensive searches for the plant took place at the same locality in 2001, 2004, and 2007,

and not a single plant was found. Water-buffalos are the most serious threat in the area. However, it cannot be denied that collection of plants for herbarium specimens has also imposed an increasing threat.

Specimens examined: *Beusekom & Phengklai* 2251 (BKF); *Shimizu et al.* T-19039 (BKF); *Smitinand* 11846 (BKF).



Figure 2. *Parnassia mysorensis* Heyne ex Wight & Arn. A. natural habitat, open sandstone area at 2,100 m alt., Phu Soi Dao, Phitsanulok province; B. flowers and fruits, same locality.

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