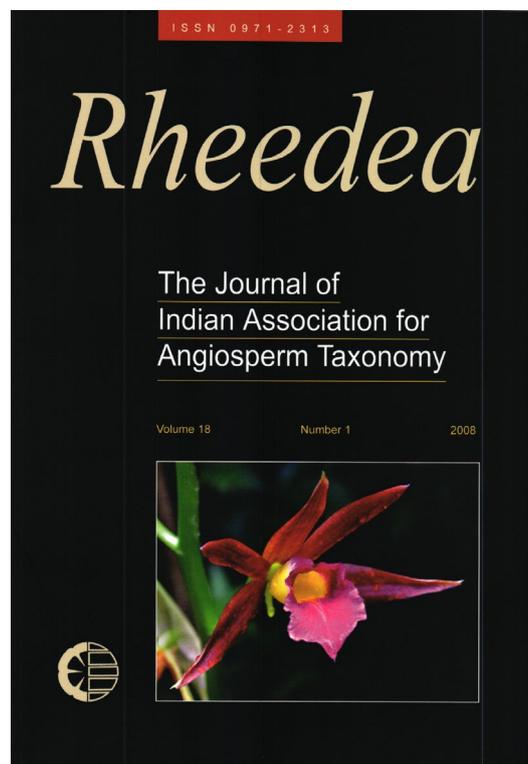




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A Review of the Genus *Spathoglottis* Blume (Orchidaceae) in Thailand

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Abstract

The Thai species of the genus *Spathoglottis* are reviewed. Six species are recognised. *S. hardingiana* Par. & Rchb. f., *S. plicata* Blume, *S. affinis* de Vriese, *S. pubescens* Lindl. and *S. eburnea* Gagnep. have been known to occur in Thailand already for a long time and are fairly widespread in the country. A sixth species, *S. aurea* Lindl., is reported here as a new record for Thailand and is so far known only from the extreme south of the country. *Spathoglottis hardingiana*, *S. plicata*, *S. affinis* and *S. aurea* are morphologically very distinct, particularly in lip structure. *Spathoglottis pubescens* and *S. eburnea* are similar in critical features and hence, the differences between the two are discussed.

Keywords: Thailand, Orchidaceae, *Spathoglottis*, Taxonomy

Introduction

The terrestrial orchid genus *Spathoglottis* Blume comprises about 40 species which are distributed from India through the whole of South-East Asia to northern Australia (Queensland) and the islands of the Western Pacific Ocean. One species, *S. plicata* Blume, is very widespread in Asia and naturalised in other parts of the tropics (Kenya, Seychelles, Hawaii, Florida, some Caribbean islands). *Spathoglottis* species are mostly found in scrubland, along forest margins and in degraded habitats like wasteland or road-cuttings from low elevations to about 1200 m. The genus is currently placed in tribe Collabieae of the subfamily Epidendroideae together with genera such as *Acanthephippium* Blume, *Calanthe* R. Br., *Phaius* Lour. and *Plocoglottis* Blume (Pridgeon *et al.*, 2005).

The present review will form the basis for a contribution to the Flora of Thailand. The species concept of this paper is that established in earlier studies of the Thai *Spathoglottis* (Seidenfaden & Smitinand, 1961; Seidenfaden, 1986) which was based on an examination of the available literature and of numerous Thai as well as non-Thai herbarium specimens. Unlike in Seidenfaden's publications, short species descriptions are provided in the present

paper; so also the synonyms relevant to the Flora of Thailand.

Five species found in Thailand, *viz.*: *S. hardingiana* Par. & Rchb.f., *S. plicata* Blume, *S. affinis* de Vriese, *S. pubescens* Lindl. and *S. eburnea* Gagnep., have already been known to occur in Thailand for a long time and were already listed in the afore-mentioned publications. *S. hardingiana*, *S. pubescens* and *S. eburnea* are restricted to continental Asia and mainly found in the Indo-Burmese region. The remaining species *S. plicata* and *S. affinis* are widespread in the Asian continent but range further south-east and are found in the Malesian islands or beyond.

A sixth species, *S. aurea* Lindl., is added in the present paper. It has recently been discovered in the southern Thai province of Yala near the Malaysian border and is here newly reported for the country. It is rather widespread in tropical Asia, being found in Malesia and Indochina.

Spathoglottis hardingiana, *S. plicata*, *S. affinis* and *S. aurea* are morphologically very distinct because of their flower, especially the lip structure, and can hardly be mistaken for any other species of the genus. *S. pubescens* and *S. eburnea* are similar in critical features

such as their laminate lip callus and are in some cases difficult to distinguish. Based on the details of the structure of the lip and its callus, it is, however, possible to differentiate them as was already suggested by Seidenfaden (1986). Measurements of lips of a number of specimens of the two taxa are presented here in order to add further support.

Spathoglottis Blume

Bijdr.: 400. 1825; Seidenf., Opera Bot. 89: 57–64. 1986; Pridgeon *et al.*, Gen. Orchid. 4: 156–157. 2005.

Terrestrial herbs, 20-130 cm tall, often deciduous, pseudobulbous. *Basal scales* at the base of the leafy shoots one or two, largely sheathing, mostly decayed at the flowering time. *Pseudobulbs* short, underground, in the leafy state hidden by the leaf petioles, close together. *Leaves* one to few, suberect or spreading, plicate, lanceolate-oblong or grass-like, acute or acuminate, glabrous, petiolate. *Inflorescences* unbranched, arising from the base of the leafy shoot, usually pubescent; peduncles with one to a few partly sheathing and mostly pubescent sterile bracts; flower-bearing part racemose, a few-flowered; floral bracts persistent, narrowly ovate-lanceolate, mostly pubescent, much shorter than the ovary plus the pedicel. *Flowers* medium-sized or large, often showy, resupinate, in Thai species pink, purple or yellow; ovary pubescent, at flowering time indistinguishable from the pedicel; sepals free, spreading, usually pubescent on the outside; petals similar but almost always glabrous; lip 3-lobed with large erect oblong or rarely obscure side lobes and a spatulate or linear-oblong midlobe, spurless, with basal twin-calli; gynostemium long, glabrous, lacking a column-foot; anther incumbent, operculate, with 8 waxy, clavate pollinia; stigma in a cavity below the rostellum. *Fruits* ellipsoid.

Key to species

- 1a. Lip side lobes small and obtuse-triangular. Sepals, petals and lip midlobe narrowly lanceolate. Flowers pink, lip calli yellow.....
..... **S. hardingiana**
- 1b. Lip side lobes large, upward curved around gynostemium, rounded, rectangular or square 2
- 2a. Flowers purple or dark pink. Petals distinctly broader than the sepals. Lip midlobe with a narrow claw as long as or longer than the blade **S. plicata**

- 2b. Flowers yellow or cream, sometimes with a purple flush on the sepal outside or with purple markings on the lip. Petals about as wide as the sepals or only slightly wider 3
- 3a. Lip midlobe narrowly oblong or pointed, not bilobulate at the apex **S. aurea**
- 3b. Lip midlobe with a narrow stalk and a much wider bilobulate blade 4
- 4a. Calli at the base of the lip midlobe semi-circular when seen from above, fleshy, terete, clavate, basally united; claw of the midlobe nearly as long as the bilobulate blade. Flowers yellow, sepals often with purple streaks, calli purple mottled; sepals mostly 16–21 mm long.....
..... **S. affinis**
- 4b. Calli at the base of the lip midlobe appearing laterally compressed (lamine), fleshy, basally not or only weakly united; claw of the midlobe elongate, short or absent. Sepals 10.5–22 mm long 5
- 5a. Claw of the lip midlobe distinct; lip midlobe mostly 4-8 mm wide which is less than half of the total lip width (when spread out). Lamine twin-calli broadest at their distal part and tapering towards the lip base. Sepals mostly 12-16 mm long. Flowers golden yellow to sulphur yellow, sometimes with a purple flush on the sepal outsides and with purple markings on the lip inside **S. pubescens**
- 5b. Claw of the lip midlobe indistinct or absent; lip midlobe 7-11.6 mm wide and wider than half of the total lip width (when spread out). Sepals 17-22 mm long. Lamine twin-calli semi-circular or rounded-triangular when seen from above and not tapering towards the lip base. Flowers cream with yellow centre.....
..... **S. eburnea**

Spathoglottis affinis de Vriese, Ill. Orchid. Ind. Orient. 3: pl. 15. 1855; Seidenf. & Smitinand, Orch. Thail.: 346. 1961; Seidenf., Opera Bot. 89: 58, fig. 28a–f, pl. IVd. 1986; Opera Bot. 114: 87. 1992; Comber, Orch. Java: 103, pl. (not numb.). 1990; Seidenf. & Wood, Orch. Penins. Malaysia Singap.: 161, fig. 70c–d. 1992; Vaddhanaphuti, Wild Orch. Thailand: 221, pl. (not numb.). (2005). **Fig. 1a**
Type: Indonesia, Java, Mt. Salak (Iconotype, de Vriese illustration).
Spathoglottis lobbii Rchb.f. in W.G.Walper’s, Ann. Bot. Syst. 6: 455. 1862; Seidenf. & Smitinand, Orch. Thail.: 342, 793, fig. 261a–b. 1961–1965.

Type : India, Khasia, *Lobb s.n.* (not found) [Locality possibly erroneous, see note in Seidenfaden 1986: 60].

Terrestrial or occasionally epilithic herbs, deciduous, (24) 30-60(-77) cm tall. *Basal scales* 1-4, mostly decayed and with only their veins remaining at the flowering time, to 5 cm long. *Pseudobulbs* somewhat flattened, inconspicuous in the leafy state and largely enclosed by petioles but prominent in leafless state, underground, to 1 × 3 cm, close together; rhizome short. *Leaves* 2-4, suberect or spreading, plicate, narrowly lanceolate-linear and grass-like, acute, (10-) 18-42 × (0.6-) 1-2.3 (-3.1) cm, glabrous, sometimes already decayed and only with the bases of the petioles remaining at the flowering time; petioles 3-5(-12) cm long. *Inflorescences* arising from the base of the leafy shoot, pubescent, maroon; peduncles (16-) 23-50 (-61.5) cm long; sterile bracts of the flowering stem 4-8, tubular, erect or suberect, scattered along the stem and a few clustered at its base, lanceolate-oblong, acute or shortly acuminate, (0.5-) 0.9-3 cm long, pubescent or the lower subglabrous, all or only the lower sheathing, sometimes partly decayed and with only their veins remaining; raceme erect, lax, 3- to 15 (-20)-flowered, 3-6 flowers open at a time; rachis (4-) 7-20 cm long, pubescent; floral bracts persistent, ovate-lanceolate, subacute, 3-7 (-10) × 1-3 (-4) mm, pubescent, maroon, much shorter than the pedicel plus ovary. *Flowers* yellow, perianth lobes sometimes with red veins, calli mostly with red markings, gynostemium yellow; ovary and pedicel 14-30 (-33) mm long, pubescent; sepals elliptic, obtuse or subacute, 5- or 7-veined, (15-) 16-21 (-23) × 6.5-10 (-12) mm, pubescent on their outside and sometimes also inside the lower part; petals elliptic, obtuse, 7- to 9-veined, 15.5-20 (-22) × 7-11 (-13) mm, glabrous or pubescent in the lower half of the outside; lip 3-lobed, (13-) 18-20 (-22) × 15-20 (-22) mm, spurless, glabrous except for the calli; midlobe fan-shaped with emarginate apex, 9-15 (-18) × (6-) 7.5-10.5 mm, with a distinct narrow 4-8 mm long claw, with two lateral teeth up to 2 mm near the base of the claw next to the calli; side lobes oblong and apically slightly widening, broadly obtuse, (3-) 5-8 (-10) × (1.5-) 3-5 mm, erect and enclosing the gynostemium; calli above the base of the midlobe two, fleshy, terete, clavate, basally joined, vertically raising, usually with long white hairs in an area on the outer face, sometimes with one or three keels in front of them : gynostemium 10-12(-14) mm long, glabrous, curved, slender below and expanded above. *Fruit* ellipsoid, 18-30 × 6-8 mm, pubescent.

Flowering: Mainly from September to December but also reported in May.

Habitat: Found in open and frequently grassy areas in forest and savanna up to 1200 m.

Distribution: Widespread throughout Thailand [42 collections seen], also found in Myanmar, Indochina, Malaya, Java and Borneo.

Specimens Examined: **Without locality**, Chankaew 1 (BKF [spirit]); McKee 37207 (P); Thorut 13 (BCU [spirit]). **Northern Thailand**, Chiang Mai, Doi Suthep, Nanakorn et al. 25399 (QBG [spirit]). **North-Eastern Thailand**, Loei Province, Phurna, Kasem 505 (BK); Kasem 512 (*fide* Seidenfaden; BK [single flower is glued onto the sheet]); Phu Ruea National Park, Nanakorn et al. 8213 (QBG); Smitinand 10152 (BKF); Phu Paek, v. Beusekom et Phengklai 3006 (AAU, C, K, L, P); Nong Khai Province, Bungkla, Niyomdham 4858 (BKF); Sakon Nakhon Province, Phu Pan National Park, Murata et al. T 51676 (BKF); Phu Phan National Park, Koyama et al. 31039 (BKF). **Eastern Thailand**, Chaiyaphum Province, Pa Hin Ngam National Park, Suddee 01 (BCU); Suddee 160 (BCU); Suddee 191 (BCU, BCU [spirit]); Nakhon Ratchasima Province, Khao Yai National Park, Orchid Waterfall, Charoenphol et al. 4348 (AAU, BKF, K, P); v. Beusekom & Charoenphol 1827 (AAU, BKF, C, L, P); Si Sa Ket Province, Panom Dongrak Wildlife Sanctuary, Maxwell 03-401 (CMU, CMU [spirit]); Ubon Ratchathani Province, Khong Chiem District, Wongprasert et al. s.n. (BKF SN120800); Pha Team National Park, Boonjaras 141 (identification uncertain; BCU [single flower is glued onto the sheet]). **South-Western Thailand**, Kanchanaburi, Thong Pha Phum, Chermisiriwaththana 1586 (BK). **Central Thailand**, Nakhon Nayok Province, Khao Yai National Park, Buakhlai 90 (BKF, BCU [spirit]); Maxwell 00-387 (BKF, CMU, CMU [spirit]); Murata et al. T 52249 (BKF); Shimizu & al. T 19605 (BKF); Shimizu et al. T 19795 (BKF). **South-Eastern Thailand**, Sa Kaeo Province, Aranya Pratet, Kerr 0896 (BK, C, K); Kerr s.n. (K H2007/02483-175); Kerr s.n. (K H2007/02483-177); Aran Pratet, Kerr s.n. (K H2007/02483-173); Aran Pratet, Put 1984 (K); Aran Pratet, Put 2025 (BK, C, K); Prachin Buri Province, *Thaithong* 123 (BCU); *Thaithong* 744 (BCU [spirit]); Chanthaburi Province, Bunnak 563 (BKF); Taruang, Kerr 0204 (BK, C, K). **Peninsula**, Nakhon Si Thammarat Province, Khao Luang National Park, v. Beusekom & Phengklai 1047 (BKF, L); Satun Province, Boripath Falls, Larsen et al. 42374 (AAU); Songkhla Province, Dton Ngah Chang Reserve, Hamilton & Congdon s.n. (PSU SN187610); Maxwell 84-403 (BKF, PSU); Ton Nga Chang Falls, Pedersen 41046 (AAU); Shimizu et al. T 27698 (BKF).

Note: *Spathoglottis affinis* is superficially similar to the other two yellow-flowered species with flabellate and bilobed lip midlobe, *S. pubescens* and *S. eburnea*, but can be readily distinguished by the long midlobe-claw and the terete, clavate and rather high twin-calli.

The Thai plants were originally known as *S. lobbii* which was later found to be conspecific with *S. affinis* (Seidenfaden, 1986: 58).

The collection *Nanakorn et al.* 8213 at QBG is untypical with its short lip and small side lobes (total lip length 13 mm, side lobes 3 × 1.5 mm) but otherwise matches the species well.

Spathoglottis aurea Lindl., J. Hort. Soc. London 5: 34. 1850; Comber, Orch. Java: 102, pl. (not numb.). 1990; Orch. Sumatra: 296, pl. (not numb.). 2001; Seidenf., Opera Bot. 114: 88. 1992; Seidenf. & Wood, Orch. Penins. Malaysia Singap.: 163, fig. 70j-k, pl. 8d. 1992.

Fig. 1b

Type : ? Peninsular Malaysia, Malacca, Veitch & Co. (K).

Spathoglottis wrayi Hook. f., Fl. Brit. India 5: 813. 1890.

Type : Peninsular Malaysia, Perak, 4500 ft. *Wray s.n.* (not found).

Spathoglottis microchilina Kraenzl., Bot. Jahrb. Syst. 17: 484. 1893; Seidenf. & Wood, Orch. Penins. Malaysia Singap.: 163, fig. 70h-i. 1992.

Type : Indonesia, Sumatra, Mountains, Near Padang, *Micholitz s.n.* (not found).

Terrestrial herbs, glabrous except for the lip calli, 60-90 cm tall. *Pseudobulbs* ovoid, underground, close together; rhizome short. *Leaves* 2-3, suberect or spreading, plicate, lanceolate, acuminate, 30-50 × 2.5-4 cm, sometimes tinged with purple; petioles 10-20 cm long. *Inflorescences* arising from the base of the leafy shoot; sterile bracts of the flowering stem 2-4, tubular, erect, lanceolate-oblong, acute, sheathing, 1.6-2 cm long, sometimes tinged with purple; raceme erect, lax, about as long as the leaves, to 10-flowered, 1-3 flowers open at a time; rachis elongating to about 22 cm; floral bracts persistent, ovate, obtuse, lower 10-12 × c. 13 mm, much shorter than the pedicel plus ovary. *Flowers* 30-50 mm across, yellow, lip with red markings, side lobes sometimes entirely purple; ovary and pedicel 27 mm long; sepals oblong, more or less acute, 7- or 9-veined, 20-25 × 10-12 mm; petals oblong, obtuse, narrowed towards the base, 20-25 × 11-14 mm; lip 3-lobed, in our Thai specimen c. 22 × 32 mm, spurless; midlobe narrowly oblong and slightly broadened towards the apex, obtuse or pointed, c. 16 × 4 mm, with two lateral teeth to 3.5 mm long near the base of the claw next to the calli, lip margins turned down; side lobes strap-shaped, truncate or obtuse, c. 15 × 4.5 mm, curved inwards to lie parallel to the gynostemium; calli just above the base of the midlobe as two tall and spreading knobs,

fleshy, terete, clavate, basally joined, 4 mm high, with three obscure ridges in front of them; gynostemium 15-18 mm long, curved, narrow at the base and widened above. *Fruit* not seen.

Flowering: The single Thai specimen known was found flowering in May.

Habitat: The only known collection was made on a mountain top at 1490 m.

Distribution: Widespread in Malesia from Sumatra to Sulawesi, possibly also in New Guinea and in Vietnam. In Thailand only collected recently in the extreme south of the country.

Specimen Examined: **Peninsula**, Yala Province, Hala Bala Wildlife Sanctuary, *Middleton et al.* 3672B (BKF [spirit]).

Note: This is the only *Spathoglottis* species in Thailand with an oblong or narrowly oblong lip midlobe and therefore, very distinct (all other species have a flabellate or bilobulate lip midlobe).

Cleistogamous forms are said to be common in this species but Comber (2001: 296-297) raised doubts about this and reported that in Sumatran populations such 'cleistogamous' plants suddenly had open flowers. He suggested that this was triggered by a stimulus, yet unknown.

Spathoglottis eburnea Gagnep., Bull. Mus. Natl. Hist. Nat., II, 3: 685. 1931; Seidenf. & Smitinand, Orch. Thail.: 343, fig. 262B. 1961; Seidenf., Opera Bot. 89: 63, fig. 30a-f. 1986; Opera Bot. 114: 88. 1992; Vaddhanaphuti, Wild Orch. Thailand: 221, pl. (not numb.). 2005.

Fig. 1c

Type : Cambodia, Siemreap, Dangrek, 30th October 1929, *Poilane 13850* (p).

Terrestrial herbs, deciduous, (23-)34-58 cm tall. *Basal scales* elliptic-lanceolate, acute, mostly decayed and only the veins remaining at the flowering time. *Pseudobulbs* globular to conical, in the leafy state inconspicuous and largely enclosed by petioles but prominent in leafless state, underground, 0.7-0.8 × 1.5-1.8 cm, close together; rhizome short. *Leaves* 2-3, suberect or spreading, plicate, present during flowering, narrowly lanceolate to linear, grass-like, acute, 16-40 × 0.6-1.1(-1.4) cm, glabrous; petioles (3-)7-9 cm long. *Inflorescences* arising from the base of the leafy shoot, pubescent, dark maroon; peduncles 30-63.5 cm long; sterile bracts of the flowering stem 4-7, erect or suberect, scattered along the stem and a few clustered at its base, lanceolate-oblong, acute, 0.5-2.5 cm long, pubescent or the lower ones subglabrous, the lower sheathing; raceme erect, lax, to 12-flowered;



Figure 1. a. *Spathoglottis affinis* de Vriese; b. *S. aurea* Lindl.; c. *S. eburnea* Gagnep.; d. *S. hardingiana* Par. & Rchb. f.; e. *S. plicata* Blume f. *S. pubescens* Lindl. (a, d, e, f photographed by O. Thaithong; b by S. Chantanaorrapint; c by P. Thanapermpoonpol).

rachis 7-15 cm long, pubescent; floral bracts persistent, ovate-lanceolate, subacute or acute, 3-7(-8) × 1.5-2.5 mm, much shorter than the ovary plus pedicel, pubescent. *Flowers* creamy white with yellow centre, side lobes once reported with red dots; ovary and pedicel 15-27 mm long, pubescent; sepals elliptic-lanceolate, acute or subacute, 5- to 7-veined, 17-22 × 6.5-10 mm, pubescent; petals elliptic, obtuse, 7-veined, 17-22 × 8-12 mm, pubescent in the lower half; lip 3-lobed, 15-19 × 13-17 (-18.6) mm, spurless, mostly glabrous but hypochile often hairy; midlobe reniform with obtuse, truncate or emarginate apex, 9-11 × (7-) 8-11.6 mm, wider than half the total lip width, not or only indistinctly clawed, mostly with two teeth near the base of the claw and with one or three keels in its distal part, the middle keel a short raised lamella; side lobes square, obtuse, 4-7 × 4.8-8 mm, erect and enclosing the gynostemium; two 2.4-3 mm high laminate calli above the base of midlobe, semi-circular or rounded-triangular when seen from above, not tapering towards the lip base, not or only slightly united at their base; gynostemium 7-11 mm long, curved, slender basal part short, expanded above, glabrous. *Fruit* ellipsoid, c. 15 × 7 mm, pubescent.

Flowering: Flowering takes place from September to November.

Habitat: In deciduous forest and savanna in the lowlands and up to 350(-900) m.

Distribution: In northern, north-eastern and eastern Thailand [17 collections seen], also found in Indochina.

Specimens Examined: **Thailand, without locality**, *Thaithong s.n.* (BCU [spirit] 008783). **Northern Thailand**, Chiang Mai Province, Chiang Dao, *Nanakorn et al.* 1969 (identification uncertain, QBG); Lampang Province, *Winit 1812* (BKF, C, K); Doi Kuhn Dahn National Park, *Maxwell 94-1086* (BKF, CMU, CMU [spirit]); Ngao, *Suvarnakoset 456* (BKF); Phitsanulok Province, Thung Salaeng Luang National Park, *Chantaranonthai et al.* 90/260 (AAU, K). **North-Eastern Thailand**, Phetchabun Province, *Kasem 249* (identification uncertain, BK [flowers glued onto sheet]); Phetchabun Province, Nam Nao National Park, *Shimizu et al.* T 22534 (BKF); Loei Province, Phu Ruea National Park, *BCU s.n.* (BCU [spirit]); Sakon Nakhon Province, Phu Pan National Park, *Chantaranonthai & Parnell 90/711* (K); Khon Kaen Province, Chum Phae District, *Shimizu et al.* T 18235 (BKF); *Shimizu et al.* T 18289 (BKF). **Eastern Thailand**, Chaiyaphum Province, Phu Khieo Wildlife Sanctuary, *Phengklae et al.* 12309 (BKF); Chaiyaphum Province, without collector (BKF [spirit]); Surin Province, near Sangkha, *Murata et al.* T 37680 (AAU,

BKF); Ubon Ratchathani Province, Pha Team National Park, *Boonjaras 91* (BCU); Phu Jong Na Yoi National Park, *Suddee et al.* 2612 (BKF [spirit], QBG).

Note: The specimen *Winit 1812* (BKF, C, K) is rather unusual. It has a lip with a short, fairly distinct claw. It was previously referred to *Spathoglottis pubescens* (Seidenfaden, 1986: 62) but its flower size and colouring, the lip midlobe (wider than half of the total lip width) and the shape of semi-circular calli (hardly tapering towards the hypochile) support placement of it under *S. eburnea*.

Spathoglottis hardingiana Par. & Rchb. f., *Otia Bot. Hamburg.*: 45. 1878; Seidenf. & Smitinand, *Orch. Thail.*: 341, 793, fig. 260. 1961-1965; Seidenf. & Wood, *Orch. Penins. Malaysia Singap.*: 163, fig. 70l. 1992; Seidenf., *Opera Bot.* 89: 64, fig. 31a-c. 1986; Vaddhanaphuti, *Wild Orch. Thailand*: 221, pl. (not numb.). 2005.

Fig. 1d

Type: Myanmar, Bhamo (cult. Rangoon), *Parish 352* (K).

Terrestrial or lithophytic herbs, 16-33(-40) cm tall. *Pseudobulbs* ovoid to conical, underground, to 1.7 × 1 cm, close together; rhizome short. *Leaves* 2-3, suberect or spreading, plicate, narrowly linear-lanceolate, grass-like, acute, (9.5-)14-27 × 0.7-2.9 cm, glabrous; petioles 1.5-8 cm long. *Inflorescence* arising from the base of leafy shoot, pubescent; peduncles 10-20(-27) cm long; sterile bracts of the flowering stem 4-7(-8), tubular, scattered along the stem and a few clustered at its base, erect or suberect, lanceolate-oblong, acute or shortly acuminate, (0.7-)1-2.6 cm long, pubescent or the lower glabrous, lower sheathing; raceme erect or slightly arching, lax, 8- to 15-flowered, 2-3 flowers opening at a time; rachis 4.5-13 cm long, pubescent; floral bracts persistent, ovate-lanceolate, subacute, 3-6(-8) × 1-2.5 mm, pubescent, much shorter than the ovary plus pedicel. *Flowers* to 25 mm wide, pinkish purple, calli yellow; ovary and pedicel 25-40 mm long, pubescent; sepals narrowly lanceolate, acute, 5-veined, 10-14 × 2.8-4.6 mm, sparsely pubescent on the outside; petals narrowly lanceolate, acute, 3-veined, 9.5-13.7 × 1.9-3.2 mm, glabrous; lip 3-lobed, 11-15 × 3-5 mm, spurless, glabrous; midlobe linear-lanceolate, 6-8 × 0.7-1 mm; side lobes small, triangular, obtuse, 1.2-2.3 × 3.5-4.8 mm; calli above the base of the midlobe two, fleshy, club-shaped, vertically raising; gynostemium 10-12 mm long, glabrous, slender at the basal part and thickened above. *Fruit* not seen.

Flowering: At different times of the year, mainly from October to January but also in April and August.

Habitat: In limestone forest, up to 300 m.

Distribution: Peninsular and northern Thailand [8 collections seen]; also found in Myanmar and Peninsular Malaysia.

Specimens Examined: **Unlocalised**, "Pulau Kopang", Haniff 5562 (K). **Northern Thailand**, Phayao Province, Pumicong 455 (QBG, QBG [spirit]). **Peninsula**, Phangnga Province, Sra Nang Manora, Komprai 025 (QBG, QBG [spirit]); Tam Rue-see, *Thaithong* 1801 (BCU [spirit]); Krabi Province, near Tam Soea, *Larsen et al.* 42552 (AAU); Nakhon Si Thammarat Province, Tung Song, *Kerr* 0889 (K); *Kerr* 0949 (BK, C, K); Trang Province, Nam Tai, *Charoenphol et al.* 3652 (AAU, K).

Note: *Spathoglottis hardingiana* is very distinct with its mauve or pink flowers, narrow sepals and petals and lip with its small triangular side lobes. The line drawing provided in Seidenfaden (1986: 64, fig. 31) is misleading as the lipside view does not show any sidelobes.

The collection Pumicong 455 [QBG, QBG (spirit)] from Phayao appears to be the first record of this species outside the Thai Peninsula and may seem somewhat surprising. However, the type specimen of *Spathoglottis hardingiana* was collected in Bhamo in Kachin State in northern Myanmar (*vide* Seidenfaden, 1986: 64) which is more towards north than the Thai province of Phayao.

Spathoglottis plicata Blume, Bijdr.: 401. 1825; Seidenf. & Smitinand, Orch. Thail.: 341. 1961; Seidenf., Opera Bot. 89: 58, fig. 27a-f. 1986; Opera Bot. 114: 86. 1992; Comber, Orch. Java: 102, pl. (not numb.). 1990; Orch. Sumatra: 294, pl. (not numb.). 2001; Seidenf. & Wood, Orch. Penins. Malaysia Singap.: 161, figs. 2, 5, 70a-b, pl. 8c. 1992; Pearce & Cribb, Fl. Bhutan 3(3): 308. 2002; Pridgeon *et al.*, Gen. Orchid. 4: pl. 46. 2005; Vaddhanaphuti, Wild Orch. Thailand: 222, pl. (not numb.). 2005. **Figs 1e, 2**

Type: Indonesia, Java, *Blume s.n.* (L!, holotype).

Calanthe poilanei Gagnep., Bull. Mus. Natl. Hist. Nat., II, 22: 625. 1951.

Type: Vietnam, Darlac, *Poilane* 32450 (P!).

Normally terrestrial herbs, evergreen, sparsely pubescent to glabrous, (39-) 80-130 (-187) cm tall. *Basal scales* elliptic-lanceolate, acute, to 11.5 cm long, mostly decayed and only with the veins remaining at the flowering time. *Pseudobulbs* conical, inconspicuous and largely enclosed by the leaves, underground, close together; rhizome short, stout. *Leaves* (3-) 4-9, suberect or spreading, plicate, narrowly lanceolate-oblong, acuminate, (37-) 61-125 × (1.5-) 2.2-5.8 (-11)

cm, glabrous, lowermost leaves often already partly decayed at the flowering time; petioles (6-) 12-30 (-44) cm long. *Inflorescences* arising from the base of the leafy shoot, sparsely pubescent to subglabrous or entirely glabrous; peduncles 52-108 cm tall; sterile bracts of the flowering stem (3-) 4-9, scattered along the stem and a few clustered at its base, erect, lanceolate-oblong, shortly acuminate, 1-3.5 (-5) cm long, glabrous or rarely with scattered hairs, sheathing, occasionally partly split longitudinally and therefore, appearing bipartite; raceme erect, lax or semi-dense, 15- to many-flowered; rachis 7-15 (-20) cm long, hairy to subglabrous or rarely glabrous; floral bracts persistent, ovate-lanceolate, acuminate, (12) 14-21 (-23) × (4-) 6-16 mm, glabrous or hairy at their basal part (both inside and outside), much shorter than the ovary plus pedicel, usually deflexed and facing down, often pinkish or dark violet. *Flowers* sometimes not opening very widely; purple or pink, lip reddish violet, calli reddish and sometimes with yellow markings; ovary and pedicel (27-) 32-45 (-50) mm long, maroon-coloured or violet, hairy; sepals obovate-lanceolate, acute or acuminate, 7- or 9-veined, 14-26 × 6-12 mm, hairy at the outside base; petals obovate-elliptic, obtuse or shortly acuminate, 10- or 11-veined, (13-) 15-28 × 8-15 mm, distinctly wider than the sepals, glabrous; lip 3-lobed, 13-20 × 12-20 mm, spurless, glabrous except for the callus; midlobe reniform with obtuse, truncate or emarginate apex, 9-15 × 5.5-11 mm, claw as long as or longer than the blade, with two lateral teeth near the base of the claw; side lobes oblong, obtuse, 6-10 × 2.3-3.7 mm, erect and enclosing the gynostemium; two prominent calli above the base of the midlobe, often with long white hairs. Gynostemium 11.5-12.5 (-14) mm long, glabrous, slender at the base and thickened above. *Fruit* ellipsoid, 22-32 × 6-10 (-13) mm, glabrous or pubescent, violet.

Flowering: Flowering takes place mainly from October to January and from March to August.

Habitat: Evergreen lowland or hill forest up to 1300 m, often on sand or clay over shale and granite, sometimes also in disturbed sites like building ruins or road cuttings.

Distribution: In most parts of Thailand [33 collections seen] but most common in the peninsula; also very widespread throughout tropical and subtropical Asia from India and Sri Lanka eastwards as far as New Guinea and some Pacific Ocean islands. The species is also naturalised in some other tropical countries like Kenya, the Seychelles, Hawaii, Florida and several Caribbean Islands.

Specimens Examined: **Thailand, without locality**, BCU 008932 (BCU [spirit]); *Pumicong* 216 (QBG [spirit]); *Thaithong* 1138 (BCU [spirit]). **Unlocalised**, "Khao Panta Tong Kaew", *Middleton et al.* 3945 (BKF [spirit]). **Northern Thailand**, Chiang Mai Province, Muang, *Nanakorn & al.* 9963 (QBG, QBG [spirit]). **Peninsula**, Chumphon Province, *Indrapong* 74 (BKF, C, K, L);

Bang Son, *Put* 1556 (BK, C, K); *Savee, Sakol* 2210 (BK); Ranong Province, Khao Pawta Luang Keow, *Geesink et al.* 7448 (L); Muang Len, *Hansen & Smitinand* 11934 (BKF, C, SING); *Kerr* 0674 (BK, C, K); Khao Pho Ta Luang Khew, *Niyomdham et al.* 1438 (AAU, BKF, C, K, L); Boanyapan Falls, *Santisuk* 647 (BKF); Phangnga

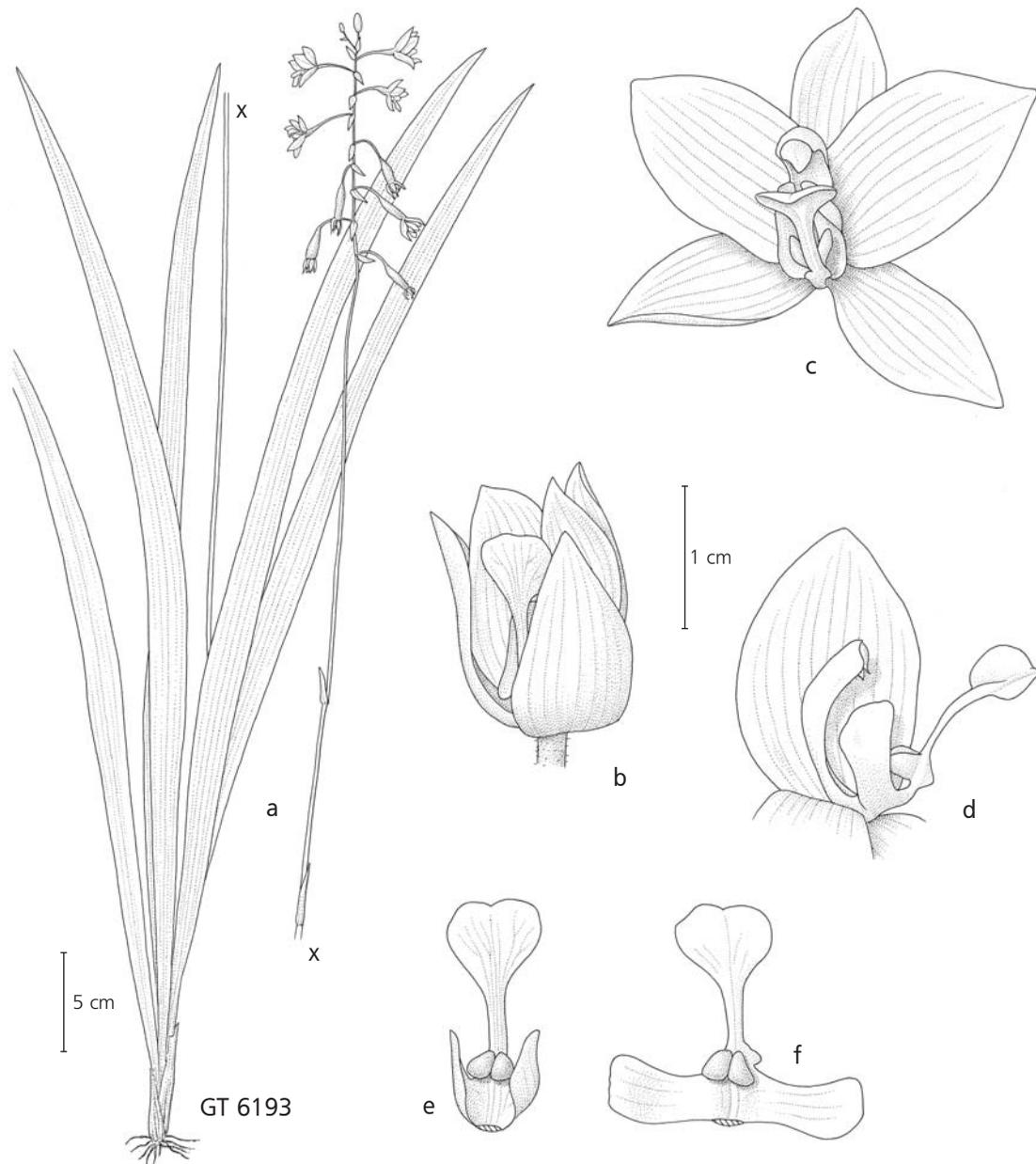


Figure 2. *Spathoglottis plicata* Blume – a. Plant; b. Flower; c. Flower, spread out artificially; d. Lip and gynostemium seen from the side; e. Lip; f. Lip with the side lobes spread out (drawn by Poul Juul).

Province, Khao Pawta Luang Keow, *Geesink et al.* 7709 (C, L); Khao Paw Ta Luang Keo, *Larsen & Larsen* 33471 (AAU); Takuapa, *Pumicong* 497 (QBG, QBG [spirit]); Nakhon Si Thammarat Province, Khao Luang National Park, *Geesink & Santisuk* 5452 (L, SING); *Larsen et al.* 45883 (AAU); *Maxwell* 85-496 (BKF [fragment], BKF [spirit], PSU); Khao Rum, *Smith* 627 (C, K); Kiriwong, *Smitinand* 785 (BKF, P); Phattalung Province, Plai Wan Falls, *Pedersen* 41604 (AAU); Trang Province, Chawng, *Kerr* 0570 (BK, C, K, L); Khao Chong, *Pedersen* 41322 (AAU); *Pedersen* 41570 (AAU); Pattani Province, Banang Sta, *Kerr* 048 (K); *Kerr* 048A (BK, C, K); Yala Province, Banansta, *Adisai* 14 (BK); Yala Province, Banang Sata, *Pedersen* 41818 (AAU, K); Betong, *Santisuk & BN* 481 (BKF); *Thaithong* 1364 (BCU [spirit]); Narathiwat Province, Ban Phu khao thong - Wang, *BCU Herb. Tr.* 1057 (BCU); Waeng District, *Maxwell* 86-1076 (CMU, L, PSU).

Note: *Spathoglottis plicata* is a tall and robust species with purple or pink flowers and wide petals and is, therefore, unmistakable among the Thai species of the genus. Also the frequently large floral bracts are characteristic of this species. It is widely cultivated as an ornamental in Thailand and other SE Asian countries. Its morphological characters are rather variable over its distribution range, particularly the leaf size, colour and flower size.

This species normally grows terrestrial but has been once reported as an epiphyte (*Larsen* 45883, AAU). The exact growing conditions were not specified but it is likely that they grow as low-level epiphytes in humid environment.

The known localities of the Thai specimens are all in the Peninsula, except the collection *Nanakorn et al.* 9963 (QBG) which is from Chiang Mai in Northern Thailand. However, it is not known whether this plant grew wild, a garden escape or a cultivated specimen.

A white self-pollinating form with a poorly developed rostellum was pointed out by Comber (1990: 102; 2001: 294.). Comber (2001: 295) also reported on the occurrence of a natural hybrid with *S. aurea*.

Spathoglottis pubescens Lindl., Gen. Sp. Orchid. Pl.: 120. 1831; Seidenf. & Smitinand, Orch. Thail.: 343, 793, fig. 262A a-i. 1961-1965; Seidenf., Opera Bot. 89: 60, fig. 29a-g. 1986; Opera Bot. 114: 88, fig. 45a-g. 1992; Chen & al., Native Orch. China: 386, pl. (not numb.). 1999. Pearce & Cribb, Fl. Bhutan 3(3): 308. 2002.

Figs 1f, 4

Type: Myanmar, Prome, *Wallich s.n.* Wall. Cat. 3744A

(K, Syntype); Myanmar, Taong Dong, *Wallich s. n.*, Wall. Cat. 3744 B (K, Syntype); India/Bangladesh, Mt. Sylhet, Wall. Cat. 3744 C (K, Syntype).

Spathoglottis bensonii Hook.f., Fl. Brit. India 5: 814. 1890
Type: Myanmar, Prome, *Benson s. n.* (? CAL).

Terrestrial or rarely epilithic herbs, deciduous, (15-)35-60 (-68) cm tall. *Basal scales* elliptic-lanceolate, acute, mostly decayed with only the veins remaining at the flowering time, to 3 cm long. *Pseudobulbs* globular to conical, flattened, inconspicuous in the leafy state and largely enclosed by petioles prominent in leafless state, underground, 0.8-2 × 1.8-2 cm, close together, light brown; rhizome short. *Leaves* (1-) 2-3 (-4), suberect or spreading, plicate, present or absent during flowering, narrowly lanceolate-linear and usually grass-like, acute or acuminate, (5.5-) 15-35 (-45) × 0.5-1.8 (-2.5) cm, glabrous; petioles (2-) 3-7 (-10) cm long. *Inflorescences* arising from the base of the leafy shoot, pubescent, light green to purplish; peduncles 23-55 (-60) cm long; sterile bracts of the flowering stem 3-6 (-9), scattered along the stem and a few clustered at its base, lanceolate-oblong, acute or shortly acuminate, usually erect, pubescent or the lower glabrous, all or only the lower sheathing, (0.4-) 0.7-2 (-4) cm long, the lower sometimes partly decayed with only the veins remaining at the flowering time; raceme erect, lax, (1-) 3- to 8-flowered; rachis (1-) 5-20 cm long, pubescent; floral bracts persistent, ovate-lanceolate, subacute or acute, (3.5-) 4-8.5 × 1-3 (-4) mm, much shorter than the ovary plus pedicel, pubescent. *Flowers* usually golden yellow and less commonly light sulphur yellow or whitish-yellow, sometimes with reddish venation, normally with a brownish-purple tint on the sepal outside and purple or red streaks on the lip side lobes, calli bright yellow, gynostemium yellow; flowers once recorded as pink; ovary and pedicel 12-25 mm long, pubescent;

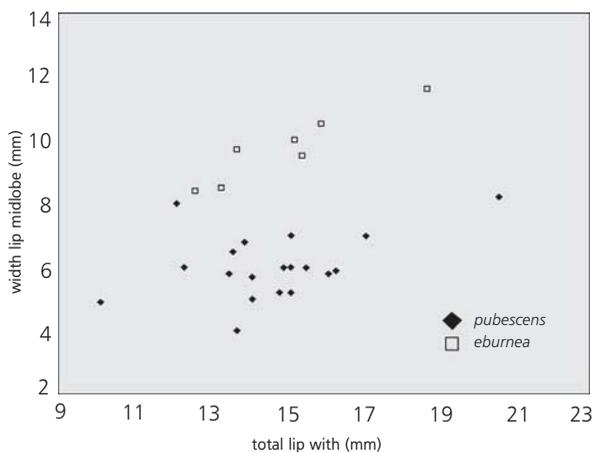


Figure 3. Relationship of total lip width and lip midlobe width in various specimens of *Spathoglottis pubescens* Lindl. and *S. eburnea* Gagnep.

sepals elliptic-lanceolate, acute or subacute, 5- to 7-veined, (10.5-) 12-16 (-20) × 5-8.5 mm, pubescent on the outside; petals elliptic, obtuse, 7-veined, (10-) 13-17.5 × 5-8(-9) mm, glabrous or pubescent (especially in their lower half); lip 3-lobed, 11-15 (-18) × (10-) 12-16 (-20.5) mm, spurless, mostly glabrous but hypochile usually pubescent on the inside; midlobe reniform or flabellate with obtuse, truncate or

emarginate apex, 7-10 (-11) × 4-8 (-10) mm, width usually less than half the width of the total lip, with a distinct claw, mostly with two teeth near the base of claw, mostly with one or three keels at its distal part; side lobes oblong, obtuse, 4.5-8 (-9) × 2.6-5 mm, erect and enclosing the gynostemium; two compressed laminate calli above the base of the midlobe, broadest in their distal part and tapering

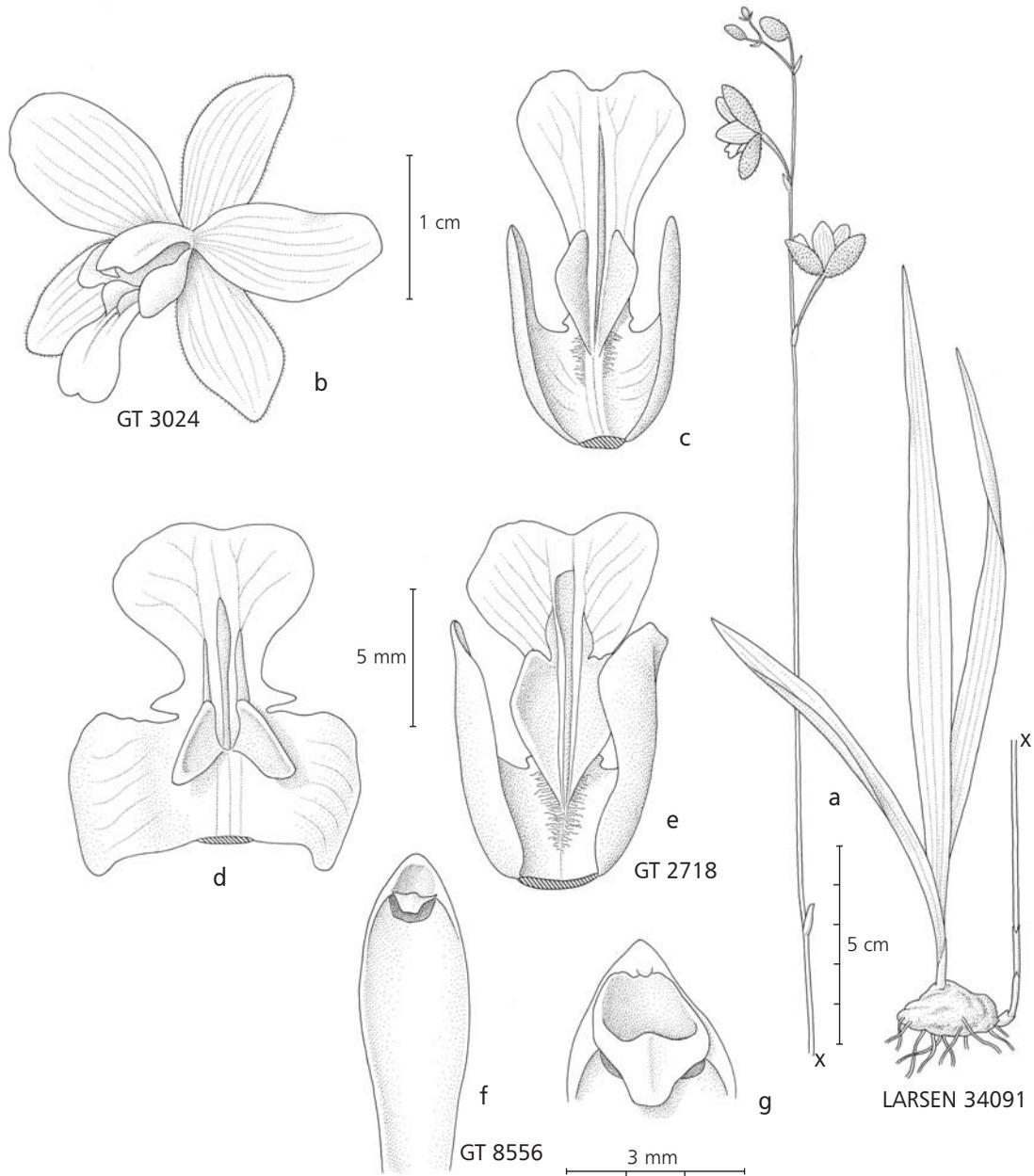


Figure 4. *Spathoglottis pubescens* Lindl. – a. Plant; b. Flower; c–e. Lips from different plants; f. Gynostemium seen from the front; g. Top part of gynostemium with the operculum removed (drawn by Poul Juul).

Table 1. Total lip width, lip midlobe width and their ratio in a number of randomly chosen specimens of *Spathoglottis pubescens* Lindl. and *S. eburnea* Gagnep.

Species	Collector, collection number and Herbarium	Total width in mm	Midlobe width in mm	Ratio of total lip width to midlobe width
<i>S. pubescens</i>	Charoenphol et al. 4688 (AAU)	17	7	2.43
"	Kerr 116 (C)	14.7	5.2	2.83
"	Kerr 116 (P)	15	5.2	2.88
"	Kerr 0780 (C)	12.2	6	2.03
"	Kerr 0864 (C)	12	8	1.50
"	Larsen et Larsen 34091 (AAU)	13.4	5.8	2.31
"	Larsen et Larsen 34091 (C)	13.6	4	3.40
"	Larsen et al. 46796 (AAU)	10	4.9	2.04
"	Larsen et al. 46796 (SING)	15	6	2.50
"	Larsen et al. 46805 (AAU)	16.2	5.9	2.75
"	Maxwell 87-1025 (AAU)	14	5	2.80
"	Maxwell 87-1025 (L)	14	5.7	2.46
"	Maxwell 87-1238 (L)	13.5	6.5	2.08
"	Put 2920 (K)	15	7	2.14
"	Santisuk 1524 (AAU)	14.8	6	2.47
"	Sorensen et al. 4981 (C)	15.4	6	2.57
"	Sorensen et al. 4981 (L)	16	5.8	2.76
"	Sorensen et al. 5047 (C)	13.8	6.8	2.03
"	Suvarnakoset 1999 (C)	20.5	8.2	2.50
<i>S. eburnea</i>	Chantananothai & al. 90/260 (K)	13.6	9.7	1.40
"	GT 8854 (fide Seidenfaden, 1986)	15.3	9.5	1.61
"	GT 8931 (fide Seidenfaden, 1986)	18.6	11.6	1.60
"	Murata et al. T 37680 (AAU)	15.8	10.5	1.50
"	Poilane 13850 (fide Seidenfaden, 1986)	12.5	8.4	1.49
"	Winit 1812 (C)	13.2	8.5	1.55
"	Winit 1812 (C)	15.1	10	1.51

towards the lip base, not or only slightly united at the base, often with white hairs; gynostemium 7-10 (-12) mm long, glabrous, slender, slightly curved, narrow at its basal part and widened above, rostellum broadly and shortly oblong. *Fruit* ellipsoid, 15-18 × 5-8 mm, pubescent.

Flowering: Mainly from July to December but also recorded in May.

Habitat: In open grassy places in evergreen, deciduous or pine forest or in grassland from about 500 to 1600 m; mostly over granite, shale and sandstone.

Distribution: Widespread in northern, north-eastern and south-eastern Thailand [60 collections seen], also

found in north-eastern India, Bangladesh, Myanmar, Indochina and southern China.

Specimens Examined: **Thailand, without locality**, *Thaithong s.n.* (BCU [spirit] 008782); without collector (K [spirit] 19193). **Unlocalised**, "Doi Pa Mawn", *Garrett 456* (K, P). **Northern Thailand**, Mae Hong Son Province, Khun Yuam, *Larsen & Larsen 34091* (AAU, BKF, C, K, P); Doi Pui, *Larsen et al. 46805* (AAU); Mae Taeng – Pai, *Santisuk 1524* (AAU); Doi Pui, *Triboun 433 (I)* (BK [spirit]); Chiang Mai Province, Doi Chiang Dao, *Garrett 1465* (K); Mae Rim, *Indhamusika 39* (QBG [spirit]); *Watthana 2434* (QBG, QBG [spirit]); Wiang Haeng, *Indhamusika 72* (QBG); Maerim, *Indhamusika 155* (QBG); *Maxwell 03-278* (CMU, CMU [spirit]);

Nanakorn & al. 9697 (QBG); *Pumicong* 453 (QBG, QBG [spirit]); *Watthana & Pumicong* 2150 (QBG, SING); Doi Suthep, *Kerr* 116 (C, K, P); *Kerr* s.n. (P 00404769); *Maxwell* 87-1025 (AAU, BKF, BKF [spirit], CMU, L); *Maxwell* 87-1238 (BKF, CMU, L); *Noi* s.n. (BK SN243426); *Sorensen et al.* 4981 (BKF, C, L); *Sorensen et al.* 5047 (BKF, C); *Maxwell* 88-1206 (identification doubtful, BKF [sterile], CMU [in fruit]); Fang, *Larsen et al.* 2684 (AAU, BKF, L); Sri Lanna National Park, *Larsen et al.* 46796 (AAU, SING); Chiang Dao, *Maxwell* 89-1093 (CMU); *Suddee & al.* 1655 (BKF [spirit]); Chiang Dao District, *Maxwell* 95-615 (CMU, CMU [spirit], L); Maerim, *Maxwell* 96-1183 (CMU, CMU [spirit] [in bud]); Sahn Gahm Pang District, *Maxwell* 96-1192 (BKF, CMU, CMU [spirit], L); Doi Inthanon National Park, *Nanakorn et al.* 12152 (QBG [spirit]); Ob Luang, *Shimizu & al.* T 19342 (BKF); Omkoi, *Smitinand* 11831 (BKF); *Smitinand* s.n. (BKF SN 077564); Angkhang, *Watthana* 1453 (QBG [spirit]); Chiang Rai Province, Doi Duan, *Kombris* s.n. (fide Seidenfaden, BKF [sterile] SN077574); Tak Province, *Thaithong* 1263 (BCU [spirit]); Phitsanulok Province, Phu Hin Rong Kla National Park, *Kitichate* 22 (BCU); Nakornthai, *Suksathan* 1222 (QBG); *Suksathan* 1258 (QBG); *Watthana & Suksathan* 1537 (QBG); *Watthana & Suksathan* 1562 (QBG); Phu Hin Rong Kla National Park, *Watthana* 1537 (QBG [spirit]). **North-Eastern Thailand**, Phetchabun Province, Nam Nao National Park, *Maxwell* 73-639 (identification uncertain, AAU, BK); Loei Province, Phu Krading National Park, *Charoenphol & al.* 4688 (AAU); *PB* 63 (BKF); *Phusomsaeng et al.* 55 (BKF); *Sleumer* 4785 (L); *Smitinand* 11774 (BKF); Loei Province, *Smitinand* 1899 (BKF); *Dee* 676 (fide *Thaithong*, BKF); *Dee* 1015 (BKF); Phu Luang National Park, *Chermisiriwatthana* 1073 (BK); *Watthana & Kurzweil* 2168 (QBG, QBG [spirit]); *Wichien* s.n. (BKF [spirit]); Sakon Nakhon Province, Phu Pan National Park, *Suvarnakoset* 1999 (C). **South-Eastern Thailand**, Prachin Buri Province, *Thaithong* 306 (BCU [spirit]); Trat Province, Kao Kuap, *Kerr* 0780 (BK, C, K); *Kerr* s.n. (K H2007/02483-192); *Put* 2920 (K); *Kerr* 0864 (C, K).

Note: *Spathoglottis pubescens* is the most common Thai *Spathoglottis* species and is characterised by its small or medium-sized golden yellow to lemon yellow flowers (sometimes marked with or flushed with red) with sepals most by having 12-16 mm length. It is superficially similar to *S. eburnea*, but differs by normally having larger, creamy white or whitish yellow flowers with a yellow centre and sepals 17-22 mm in length.

In *S. pubescens* the lip midlobe is distinctly clawed and rather narrow, measuring most often less than half of the entire lip width when spread out (Fig. 3,

Table 1) However, *Kerr* 0864 (C) has unusually wide lip midlobe. *S. pubescens* also differs in the shape of its laminate twin-calli as these are broadest distally or in their middle part and taper towards the lip base. In contrast, *S. eburnea* mostly does not have a clearly clawed lip midlobe, although specimens with short claws sometimes do occur (*Winit* 1812, C; *Poilane* 13850, fide Seidenfaden, 1986). The lip midlobe of *S. eburnea* is comparatively wide (Fig. 3, Table 1). The laminate twin-calli of this species are semicircular or rounded-triangular when seen from above and do not taper towards the lip base.

Spathoglottis pubescens is highly variable particularly the shape of the lip and its twin-calli as discussed in detail by Seidenfaden (1986: 62). However, the variation appears continuous and does not seem to allow any grouping within the species.

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