Studies in the *Peristylus tentaculatus*-complex (Orchidaceae) in Thailand

H. KURZWEIL

The Herbarium, Singapore Botanic Gardens
1 Cluny Road, Singapore 259569

Abstract

A large number of Thai specimens belonging to the *Peristylus tentaculatus*-complex were examined in the present study. No characters were found to distinguish between the three previously recognised species, *Peristylus tentaculatus* (Lindl.) J.J.Sm., *P. tipuliferus* (C.S.P.Parish & Rchb.f.) Mukerjee and *P. garrettii* (Rolfe ex Downie) J.J.Wood & Ormerod, which are therefore considered as conspecific.

Introduction

During the preparation of the treatment of the orchid genus *Peristylus* for the Flora of Thailand a large number of specimens of the group comprising the three very similar species, *Peristylus tentaculatus* (Lindl.) J.J.Sm., *P. tipuliferus* (C.S.P.Parish & Rchb.f.) Mukerjee and *P. garrettii* (Rolfe ex Downie) J.J.Wood & Ormerod, were examined with the aim of finding distinguishing characters between them. Special attention has been paid to the characters which have been identified as taxonomically informative before (Seidenfaden, 1977). It was concluded that many specimens in this group can indeed clearly be referred to one of the three species, but that they are interconnected by a large number of intermediate forms. Although only material from inside Thailand was examined here, the results of the present study are nevertheless significant and indicate that the previously recognised species are not sufficiently different from each other to be recognised as separate species. Therefore they are here considered as belonging to a single variable species *P. tentaculatus*.

The inclusion of the concept of *Peristylus garrettii* in *P. tentaculatus* is in agreement with the original suggestion of Seidenfaden (1977, p. 41) (as *Habenaria garrettii* Rolfe ex Downie). *Peristylus tipuliferus* and *P. tentaculatus* have in the past been maintained as separate entities. A detailed comparison of the two was presented by Seidenfaden (1977, p. 44), where it

was pointed out that the species differ mostly in their vegetative habit and in the thickness of their lip spur. However, Seidenfaden himself admitted that some of the Thai specimens of these two taxa are difficult to place, stating that further research on them is needed.

In the present study measurements of 38 specimens from 19 different collections were taken, and additional information was obtained from the literature (particularly from Seidenfaden & Smitinand, 1959; Seidenfaden, 1977).

The total plant size, leaf number, leaf size, leaf insertion, as well as distance from lowermost to uppermost leaf, are indicated in Table 1, and various spur measurements are shown in Table 2. Previous identifications are also given in the two tables where available, but it needs to be pointed out that these need not necessarily be correct. Of particular interest are the features in different plants of the same collection (either deposited in different herbaria or in the same), indicating that the critical characters are sometimes variable within the same population.

Total plant height: An even increase of the stem height from 14 to 57 cm was found which is probably largely caused by environmental and age factors. Specimens that have previously been referred to *Peristylus tipuliferus* are mostly taller than specimens that have been identified as *P. tentaculatus* as already pointed out by Seidenfaden (1977, p. 44), but no obvious taxonomic grouping based on the plant size can be made as the distribution of this character shows an entirely continuous pattern.

Leaf size: The size of the blade of the largest leaf varies extensively, but also in this character the variation is continuous and does not reveal any obvious grouping (Fig. 1). Leaves can be as short as 3 cm or as long as 16.2 cm, with their width ranging from 0.7 to 3 cm. It is, however, evident that specimens previously referred to *P. tipuliferus* often have larger leaves than specimens of *P. tentaculatus sensu stricto* (= *s.s.*), which was used as one of the distinguishing features in the past (Seidenfaden 1977, p. 44).

Leaf arrangement: Also the arrangement of the leaves has previously been regarded as critical in delimiting the two species *Peristylus tipuliferus* and *P. tentaculatus s.s.* (Seidenfaden 1977, p. 44; see also references given there). Typical specimens of *P. tipuliferus* have the leaves scattered or clustered on the stem 10-15 cm above the ground while typical specimens of *P. tentaculatus s.s.* have their leaves clustered near the soil surface. A large number of intermediate forms between these two character states were found in the present study, as the insertion of the lowest leaf ranges continuously from 0.5 to well over 6 cm. A whole range of variation was also found in the distance of the lowermost and uppermost leaf (0.2 to over 6 cm). Both observations suggest that the two species cannot be separated on this basis.

Table 1. Vegetative features of various specimens of *Peristylus tentaculatus*, indicating total plant size, leaf number, leaf blade size, height of insertion of the lowermost leaf, height of insertion of the uppermost leaf and distance from uppermost to lowermost leaf. All measurements in centimetres. In collections which have been identified before their previous name is given. [-] data not available.

Collections	Previously referred to	Total plant size	Number of leaves	Blade largest leaf	Insertion lowermost leaf	Insertion uppermost leaf	Distance of lowermost and uppermost leaf
Chanthanaoraphin s.n. (BCU)	*tentaculatus*	24	3	6 x 1	2.5	4	1.5
Chanthanaoraphin s.n. (BCU)	*tentaculatus*	51	5	8 x 1.5	2.5	8.5	6
Garrett 61 (BKF)	*tentaculatus*	26	3	3.7 x 1.1	1.1	2.2	1.1
Garrett 61 (K)	*tentaculatus*	33	3	5.2 x 1.4	1	2.2	1.2
Garrett 61 (K)	*tentaculatus*	15	3	5 x 1.4	1.2	2	1.2
Larsen & al 46277 (AAU)	*tentaculatus*	25	3	4 x 1	1	1.5	0.5
Larsen & al 46277 (AAU)	*tentaculatus*	30	3	6 x 1.2	3	4	1
Larsen & al 46277 (SING)	*tentaculatus*	14	2	4 x 0.7	1.7	2.2	0.5
Larsen & al 46277 (SING)	*tentaculatus*	26	3	5 x 1	2	3	1
Larsen & al 46684 (AAU)	*tentaculatus*	27	2	broken off	2.8	3.2	0.4
Maxwell 00-386 (L)	*tentaculatus*	35	3	6.3 x 1.7	1.5	2.2	0.7
Maxwell 00-386 (L)	*tentaculatus*	57	4	10.8 x 1.6	5.4	7.5	2.1
Maxwell 74-776 (L)	?	47	3	8 x 2	3	5.4	2.4
Maxwell 74-776 (AAU)	?	30	4	6 x 1	0.8	2.5	1.7
Maxwell 74-776 (AAU)	?	40.5	4	7 x 1	1.2	3	1.8
Murata 15894 (Seidenf. 1977)	*tentaculatus*	20.8	3	4.4 x 1	0.8	1.2	0.4
Parish 292 (Myanmar) (Seidenf. 1977)	*tipuliferus*	-	4	16.2 x 2.2	-	-	-
Pumicong 392 (QBG, SING)	*tentaculatus*	26	3	? x 1.2	3	4.3	1.3

Smitinand & Sleumer 8337 (BKF)	*tentaculatus*	31	3	9 x 1.5	1.5	3	1.5
Smitinand & Sleumer 8337 (L)	*tentaculatus*	23	3	5.5 x 1	0.5	0.8	0.3
Smitinand & Sleumer 8337 (L)	*tentaculatus*	38	3	8.5 x 1.8	1.7	2.7	1
Sorensen & al. 4728 (BKF)	*tipuliferus*	31	3	7 x 1.3	3.5	5.2	1.7
Sorensen & al. 4728 (C)	*tipuliferus*	45.5	3	11 x 2.3	4	6.5	2.5
Sorensen & al. 4857 (C)	*tipuliferus*	50	4	9.3 x 1.5	4	8	4
Sorensen & al. 4857 (BKF)	*tipuliferus*	25	3	5 x 1	1.8	2.5	0.7
Sorensen & al. 4857 (BKF)	*tipuliferus*	26	4	6.5 x 2.4	2.5	4	1.5
Sorensen & al. 4857 (BKF)	*tipuliferus*	35	3	7 x 2	3	7	4
Sorensen & al. 4871 (C)	*tentaculatus*	22	2	3 x 1	0.8	1	0.2
Sorensen & al. 5109 (BKF)	*tipuliferus*	41	3	8 x 2.8	3.5	7	3.5
Sorensen & al. 5109 (BKF)	*tipuliferus*	40	4	8.5 x 3	7.5	13	5.5
Sorensen & al. 5109 (C)	*tipuliferus*	25	3	broken off	2	3	1
Sorensen & al. 5109 (C)	*tipuliferus*	45	4	9.3 x 2.6	3.1	9.5	6.4
Sorensen & al. 5109 (C)	*tipuliferus*	33	3	11.3 x 2.9	8.2	11.5	3.3
Thaithong 1132 (BCU)	*tipuliferus*	40	3	7.3 x 1.4	5	10	5
Thaithong 1262 (BCU)	*tipuliferus*	44	5	5 x 1.2	2	7.3	5.3
Thaithong 1495 (BCU)	*tentaculatus*	31	4	4 x 1.5	1.5	3.5	2
Watthana & Wongnak 2153 (QBG, SING)	?	29	3	9.5 x 1.7	2.5	3	0.5

Table 2. Spur characters in various flowers of *Peristylus tentaculatus*. All measurements in millimetres. In collections which have been identified before their previous name is given. [-] data not available.

Collections	Previously referred to	SIDE VIEW				FRONT VIEW
		length spur	width spur	length stalk	width stalk	depth apical incision
Cumberlege 610 (K spirit)	*garrettii*	2.8	1.4	0.5	0.4	0.05
Cumberlege 610 (K spirit)	*garrettii*	3	1.2	0.7	0.6	0.1
Garrett 61 (K)	*tentaculatus*	3.9	2	0.8	0.7	-
Garrett 61 (K)	*tentaculatus*	3.4	1.5	1	0.5	-
Garrett 61 (K)	*tentaculatus*	2.8	1.3	0.5	0.7	0.3
Garrett 61 (K)	*tentaculatus*	3	1.4	0.6	0.4	0.7
Larsen & al 46277 (AAU)	*tentaculatus*	3.4	2	0.5	0.8	-
Larsen & al 46277 (SING)	*tentaculatus*	2.9	1.9	0.4	0.7	0.5
Larsen & al 46684 (AAU)	*tentaculatus*	3	1.8--2	0.8	0.6	0.1
Maxwell 00-386 (L)	*tentaculatus*	3.7	1.8	1	0.8	0.05
Maxwell 74-776 (L)	?	3.3	2	0.8	0.7	0.3
Maxwell 74-776 (L)	?	3.3	2.1	0.5	0.8	0.3
Maxwell 74-776 (L)	?	3.2	2.7	0.5	0.7	0.4
Maxwell 74-776 (AAU)	?	3	1.8	0.6	0.7	0.2
Maxwell 74-776 (AAU)	?	2.9	1.6	0.8	0.7	0.3
Pumicong 392 (SING)	*tentaculatus*	2.6	2.1	0.4	0.6	0.6
Pumicong 392 (SING)	*tentaculatus*	2.7	1.9	0.5	0.7	0.6
Pumicong 392 (SING)	*tentaculatus*	2.3	1.5	0.7	0.4	0.2
Seidenfaden & Smitinand 2676 (Seidenf. 1977)	*garrettii*	3.75	1.75	0.75	0.75	0
Seidenfaden & Smitinand 2676 (Seidenf. 1977)	*tipuliferus*	3.2	-	0.8	-	0.2
Seidenfaden & Smitinand 3036 (Seidenf. 1977)	*tentaculatus*	3.3	ca. 1.6	0.5	ca. 0.5	ca. 0.16
Smitinand & Sleumer 8337 (L)	*tentaculatus*	4	1.8	0.4	0.6	0.3
Smitinand & Sleumer 8337 (L)	*tentaculatus*	3.6	1.9	0.5	0.8	0.2
Sorensen & al. 4728 (C)	*tipuliferus*	3.7	2.2	0.5	0.8	0.3
Sorensen & al. 4857 (C)	*tipuliferus*	3.3	2	0.8	0.7	0.3
Sorensen & al. 4871 (AAU))	*tentaculatus*	3	2	1	0.8	-
Sorensen & al. 5109 (C)	*tipuliferus*	3	2.2	0.6	0.6	0
Sorensen & al. 5109 (C)	*tipuliferus*	3.5	2.2	0.7	0.7	0.1
Sorensen & al. 5109 (C)	*tipuliferus*	3	1.7	0.7	0.6	0.3
Watthana & Wongnak 2153 (SING)	?	4	2.8	0.3	0.8	0.3
Watthana & Wongnak 2153 (SING)	?	3.8	2.7	0.5	0.8	-
Watthana & Wongnak 2153 (SING)	?	3.9	3	0.5	0.8	0.6

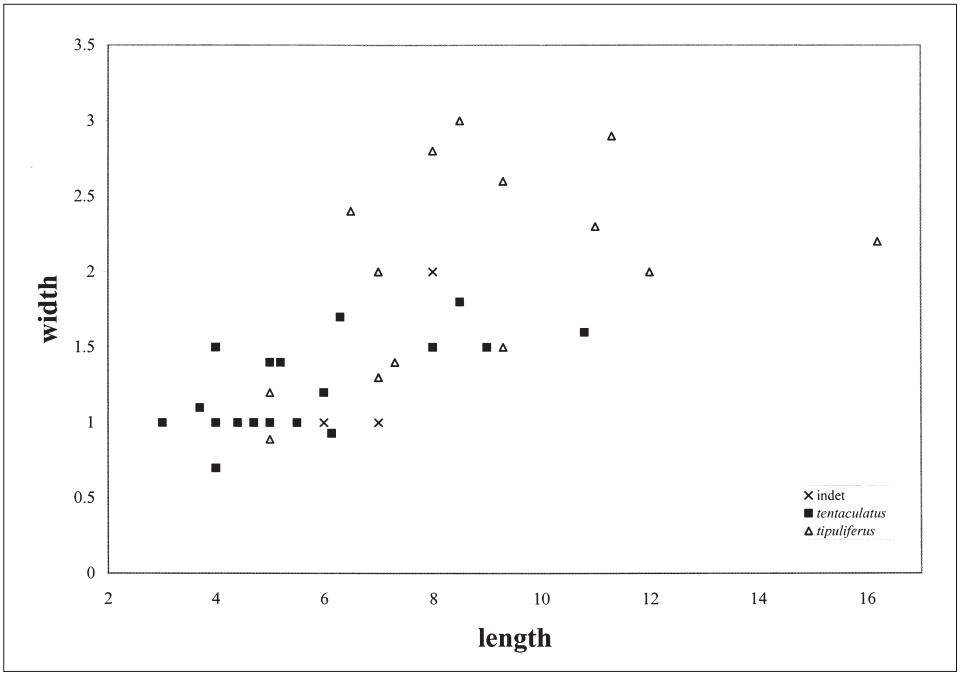

Figure 1. Diagram showing the relationship of leaf length and width in two of the taxa previously recognised in the *Peristylus tentaculatus* complex, namely *P. tentaculatus* and *P. tipuliferus*, and in specimens previously not named ('indet'). All measurements in centimetres.

Floral characters: Also an examination of the flowers of the *Peristylus tentaculatus*-complex did not reveal any characters which would allow a distinction of separate taxa. This is largely in agreement with the view of Seidenfaden (1977) who was unable to find any differences between the species in their flower structure except in their spur width.

A feature of particular importance is the shape of the lip spur (Table 2). It ranges from 2.3 to 4 mm in total length and has generally a short stalk measuring 0.3-1 × 0.4-0.8 mm. A wide range of variation was found in the total width of the spur when seen from the side, ranging from 1.2 to 2.2(-3) mm; there is also slight variation within the same collection. Both observations suggest that also the spur width cannot be used to recognise taxa within the complex. This is in contrast to Seidenfaden's (1977, p. 44) observation who found that the spur diameter is critical, with *P. tentaculatus s.s.* having spur diameters of about 2 mm, as opposed to 1-1.5 mm in *P. tipuliferus*.

In a short taxonomic note *Peristylus garrettii* was separated from *P. tentaculatus* on account of its bifid spur apex (Ormerod, 2003: p. 141). The

basionym, *Habenaria garrettii*, had been reduced to synonymy by Seidenfaden (1977, p. 41), but Ormerod resurrected the species based on the examination of one Chinese and several Thai and Burmese specimens. However, in the Thai material examined here a wide range of variation from clearly bifid spurs, slightly bifid spurs to spurs with entire apex, could be observed, with the apical spur incision ranging from none to 0.6(-0.7) mm (Table 2). The species is therefore considered as conspecific with *P. tentaculatus*. Also the observation that clearly bifid, slightly bifid and entire spurs are occasionally also found in other species of the genus *Peristylus* (sometimes even within the same inflorescence) raises doubt about its usefulness in the *P. tentaculatus*-complex.

Peristylus tentaculatus (Lindl.) J.J.Sm.
Orch. Java (1905) 35; Seidenf., Dansk Bot. Ark. 31 (1977) 41. – *Glossula tentaculata* Lindl., Bot. Reg. 10 (1824) t. 862. – *Habenaria tentaculata* (Lindl.) Rchb.f., Otia Bot. Hamburg. (1878) 34. Type from S China.
Peristylus chloranthus auct. non Lindl.: Seidenfaden & Smitinand, Orchids Thail. 1 (1959) 47, p.p.
Habenaria garrettii Rolfe ex Downie, Bull. Misc. Inform. Kew 1925 (1925) 418. – *Peristylus garrettii* (Rolfe ex Downie) J.J.Wood & Ormerod, Taiwania 48 (2003) 141, *syn. nov*. – **Typus:** Thailand, Chiang Mai Province, Doi Suthep, *Kerr 118* (holo, K).
Peristylus tipuliferus (C.S.P.Parish & Rchb.f.) Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21 (1953) 153; Seidenf., Dansk Bot. Ark. 31 (1977) 41. – *Habenaria tipulifera* C.S.P.Parish & Rchb.f., Trans. Linn. Soc. London 30 (1874) 139, *syn. nov.* Type from Myanmar. **Figs. 2 & 3.**

Terrestrial **herbs**, entirely glabrous, (15-)25-70 cm tall. Basal sheaths 2-3, tubular, enveloping the basal part of the stem up to 3 cm high; uppermost sometimes with a sheath to 1.5 × 1.5 cm. **Leaves** 2-5, basal, clustered or scattered in the lower half of the stem, lanceolate-oblong, acute, mucronate, 5.2-17 × 1.2-2.9 cm, margins entire or papillose. Sterile bracts (1-)2-6, suberect or spreading, oblong-lanceolate, acute or acuminate, 0.9-2.3(-3) × 0.2-0.35(-0.5) cm, sheathing or not, margins entire or papillose. **Inflorescence** lax or semi-dense, 7- to many-flowered; rachis (5-)8-24(-30) cm long; bracts broadly ovate-lanceolate, acuminate, 4.5-10 × 1.5-3 mm, margins entire. **Flowers** green or yellow-green, also reported as whitish. Sepals obtuse, 1-veined; median sepal erect, broadly elliptic-oblong, 3.2-5 × 1.5-2.2 mm; lateral sepals oblong-elliptic, reflexed, sometimes partly rolled-in, 3.2-5.2 × 1-1.6 mm. Petals erect, forming a hood with the median

Figure 2. *Peristylus tentaculatus* in its habitat (*Pumicong 392*).

sepal, 1-veined, elliptic-lorate, subacute or obtuse, 3.5-5 × 1.3-1.7 mm, basally united with the lip. Lip 4-5.5 mm long, three-lobed with a united basal part 1.9-2.5 mm long; midlobe lorate, 1.9-3 × 0.6-1 mm; side lobes thread-like and largely pointing upwards, normally curled, 13-24 mm long; spur a shortly stalked globular sac with an entire or bifid apex, 2.3-3.8(-4) mm long with a thickness of 1.2-2.2(-3) mm. Gynostemium 1-1.5 mm long. Ovary (including pedicel) 5-8 mm long, smooth.

Specimens examined: UNLOCALISED: Khao Yai National Park [comprising parts of the provinces of Nakhon Ratchasima, Saraburi, Prachinburi and Nakhon Nayok], *Cumberlege 610* (K, spirit collection); *without locality and collector* (BCU, spirit collection). NORTHERN: Mae Hong Son Province:

Figure 3. Inflorescence of *Peristylus tentaculatus* (*Pumicong 392*).

Huai Pu Ling, 10 Sep 2006, *Watthana & Wongnak 2153* (QBG, SING); ibid.: Mae Sarieng, 30 Aug 2006, *Pumicong 392* (QBG, SING); Chiang Mai Province, *BCU [5144] p.p*. (BCU, spirit collection); ibid., *Obchant Thaithong 1132* (BCU, spirit collection); ibid., Doi Suthep, 30 Oct 1905, *Kerr 118* (K); ibid., Doi Suthep, 19 Sep 1995, *Larsen & al. 46684* (AAU); ibid., Doi Suthep, 4 Sep 1958, *Sorensen & al. 4728* (BKF, C); ibid., Doi Suthep, 9 Sep 1958, *Sorensen & al. 4857* (BKF, C); ibid., Doi Suthep, 9 Sep 1958, *Sorensen & al. 4871* (C), ibid., Doi Suthep, 18 Sep 1958, *Sorensen & al. 5109* (BKF, C); ibid., Doi Inthanon, 29 Sep 1910, *Garrett 61* (BKF, K); Nan Province, Doi Wao, 10 Sep 1995, *Larsen & al. 46277* (AAU, SING); Tak Province, 10 Oct 1992, *Obchant Thaithong 1262* (BCU, spirit collection). SOUTH WESTERN: Prachuap Khiri Khan Province, *Chanthanaoraphin s.n.* (BCU).

CENTRAL: Nakhon Nayok Province, Khao Yai National Park, Khao Khieo, 11 Aug 1974, *Maxwell 74-776* (AAU, L), ibid.: 14 Aug 2000, *Maxwell 00-386* (L), ibid.: 29 Aug 1963, *Smitinand & Sleumer 8337* (BKF, L). SOUTH-EASTERN: Prachin Buri Province, *Obchant Thaithong 745* (BCU), ibid.: *Obchant Thaithong 1495* (BCU).

Illustrations: Seidenfaden & Smitinand (1959, p. 31): figs. 20a–e, as *Habenaria garrettii*; Seidenfaden (1977, p. 42–43): figs. 17a–g, as *Peristylus tipuliferus*, 18a–e; Chen Singchi & al. (1999, two colour photos on p. 346).

Habitat and flowering time: The species is found in (or on the edge of) evergreen forest, grassy pine forest and oak forest from 100 to 1800 m. There are also reports from rocky marshland. Flowering occurs between August and November.

Distribution: NE India, Nepal, Myanmar, Thailand, southern China, Cambodia, Vietnam.

Acknowledgements

I would like to thank the curators of the herbaria AAU, C, K, L and P for the loan of their specimens, and the staff of the herbaria BKF, BCU, QBG and SING for their assistance while examining their collections. The issuing of a research permit by the National Research Council of Thailand is gratefully acknowledged.

References

Chen, S.-C., Z.-H. Tsi and Y.-B. Luo. 1999. *Native orchids of China in colour.* Science Press, Beijing and New York.

Ormerod, P. 2003. Orchidaceous Additions to the Floras of China and Vietnam. *Taiwania* **48**: 139-146

Seidenfaden, G. 1977. Orchid genera in Thailand V. Orchidoideae. *Dansk Botanisk Arkiv* **31**: 1-149.

Seidenfaden, G. and Smitinand, T. 1959. *The Orchids of Thailand – A preliminary list. Part I.* The Siam Society, Bangkok.