

THE DISTRIBUTION AND STATUS IN SINGAPORE OF *BULBOPHYLLUM SESSILE* (KOEN.) J. J. SM. (ORCHIDACEAE)

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INTRODUCTION

Bulbophyllum sessile belongs to *Bulbophyllum* section *Oxysepalum* which is a very widespread section ranging from northern Thailand to the Pacific islands, although this species is the only member of the section in Peninsular Malaysia (Seidenfaden & Wood, 1992). This species has a long, sympodial, slender, hanging rhizome which is highly branched (Fig. 1). The internodes are 3–4 mm long, along which ovoid, 2.5–3.0 mm long pseudobulbs are appressed. The fleshy leaves are 1.8–2.3 by 0.6–0.8 cm with a rounded apex, and a very minute tip, and also narrow base with a very short stalk (to 2 mm long) (Fig. 1). The flowers are solitary and borne at all nodes along the rhizome, and arising from conspicuous sheaths. The flowers appear sessile but are actually borne on very short, 1–2 mm long pedicels. The sepals are pale yellow at the tip, cream at the base and are 3–5 mm long, including a narrow three-angled tip 2.5 mm long. The petals are cream and are 1.0–1.4 mm long. The yellow green lip is similar in length to the petals. This species is distributed from the Andaman Islands, Thailand, through Indochina, Indonesia and New Guinea as well as the Pacific islands. In Peninsular Malaysia, this species is widespread throughout the country in more open situations, such as along forest roads in the lowlands, fruit tree orchards and forest regrowth, where they can be found in considerable masses.

In Singapore it is currently classified as nationally critically endangered (Tan et al., 2008), and is probably now found only in the Bukit Timah Nature Reserve (BTNR), and Central Catchment Nature Reserve (CCNR). It was recently observed on abandoned fruit trees in the Lim Chu Kang area on Singapore Island and Pulau Tekong, mainly on durian (*Durio zibethinus*) and mango (*Mangifera indica*) trees at Kampong Permatang and Kampong Salabin. The last collection of this species was in Jun.1955 from MacRitchie Reservoir (Table 1) and has not been collected since. It was recently discovered growing together with *Bulbophyllum vaginatum* on a tree fall along the Nee Soon Pipeline on 28 Feb.2009 (Fig. 2).

Table 1. Previous Singapore collections of *Bulbophyllum sessile* (Koen.) J. J. Sm. deposited in the Herbarium, Singapore Botanic Gardens (SING).

S/No.	Bar Code No.	Collector	Collector's No.	Year	Locality
1.	0010557	H. N. Ridley	s.n.	1889	Kranji
2.	0010551	J. S. Goodenough	s.n.	1890	Sungei Murai
3.	0010556	H. N. Ridley	s.n.	1892	Chan Chu Kang
4.	0010555	I. H. Burkill, I.H.	s.n.	1917	Botanic Gardens
5.	0010554	M. R. Henderson	s.n.	1930	Botanic Gardens
6.	0010553	J. Sinclair	40232	1954	MacRitchie Reservoir
7.	0010552	J. Sinclair	40642	1955	MacRitchie Reservoir

DETAILS OF COLLECTION

On 28 Feb.2009, a fallen tree was discovered along the Nee Soon pipeline (Fig. 2). Initially, the tree's epiphytes were identified as *Bulbophyllum vaginatum* but upon closer examination, we found the smaller pseudobulbs of *Bulbophyllum sessile* growing interspersed with *Bulbophyllum vaginatum*. As the fallen tree's crown was dried up with its dead leaves strewn all over the ground, and portions of the bark were flaking away, we were unable to identify the tree upon which *Bulbophyllum sessile* was growing on. However, the tree's trunk diameter at breast height was 50 cm, indicating that it was a relatively old tree that grew along the forest edge, near the pipeline.



Fig. 1. *Bulbophyllum sessile* plants. (a) Growing with *Bulbophyllum vaginatum* on a tree fall at Nee Soon Swamp Forest. (b) Close up of a flowering stem. (Photographs by: Alvin Francis Lok Siew Loon).

DISCUSSION

Bulbophyllum sessile is one of the seven remaining species of *Bulbophyllum* in Singapore, five species of which (including this) are classified as nationally critically endangered (Tan et al., 2008). This comes as no surprise because the past 90 years of urban development have claimed more than 90% of the primary vegetation in Singapore (Corlett, 1992). It was estimated that 82% of Singapore's landscape [44,200 ha (442 km²)] was once covered with lowland rainforests (Corlett, 1991). Unfortunately, what is left of that once vast forest area about 279 ha (2.79 km²) of primary forests (Corlett, 1991; 1997). Still, various remnant patches of primary and secondary forests are scattered across the island with little or no connectivity (Turner, 1997). Forest fragments are known to support smaller populations of species and are thus highly susceptible to extinction (Kattan et al., 1992; Leigh et al., 1993; Turner et al., 1993; Brook et al., 2003).

Locally known only from the Botanic Gardens, BTNR, CCNR (Nee Soon Swamp Forest or Chan Chu Kang), Kranji, Lim Chu Kang, MacRitchie Reservoir, Pulau Tekong, Sungei Murai and the Western Catchment Area (Table 1; our observations), this critically endangered native orchid was collected a mere seven times from past herbarium records. All collections were made from now unconnected forest fragments in Singapore. With only small populations of and high degree of isolation among populations, *Bulbophyllum sessile* faces possible local extinctions in the forest fragments if appropriate conservation measures are not taken.

At present, the National Parks Board (NParks) has been collecting and propagating selected native orchid species for reintroduction back to forest reserves, urban parks, and streetscapes (Yam, 1992; Yam & Thame, 2005). However, semi-ex situ conservation of orchids is beset with problems because it might lead to lower diversity in the gene pool through in-breeding by means of selfing or vegetative propagation, and relaxed natural selection of desirable genes (because most sowed seeds survive under sterile conditions) (Koopowitz, 2001). Therefore, in situ conservation of this fragile orchid in existing forest patches in Singapore should still take utmost priority.

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Fig. 2. Forest edge along Nee Soon Pipeline where *Bulbophyllum sessile* was found on a tree fall. (Photograph by: Alvin Francis Lok Siew Loon).

LITERATURE CITED

- Brook, B., W., Sodhi, N. S. & Ng, P. K. L., 2003. Catastrophic extinctions follow deforestation in Singapore. *Nature*, **424**(6947): 420–426.
- Corlett, R. T., 1991. Vegetation. In: Chia, L. S., A. Rahman & D. B. H. Tay (eds.) *The Biophysical Environment of Singapore*. Singapore University Press, Singapore. Pp. 134–154.
- Corlett, R. T., 1992. The ecological transformation of Singapore, 1819–1990. *Journal of Biogeography*, **19**(4): 411–420.
- Corlett, R. T. 1997. The vegetation in the nature reserves of Singapore. *Gardens' Bulletin Singapore*, **49**(2):147–159.
- Kattan, G. H., H. Alvarez-López, & M. Giraldo, 1994. Forest fragmentation and bird extinctions: San Antonio eighty years later. *Conservation Biology*, **8**(1): 138–146.
- Koopowitz, H., 2001. Ex situ conservation. In: *Orchids and Their Conservation*. Timber Press, Inc., Oregon. Pp. 92–102.
- Leigh, E. G., S. J. Wright, E. A. Herre & F. E. Putz, 1993. The decline of tree diversity on newly isolated tropical islands: a test of a null hypothesis and some implications. *Evolutionary Ecology*, **7**(1): 76–102.
- Seidenfaden, G. & J. J. Wood. 1992. *The Orchids of Peninsular Malaysia and Singapore*. Olsen & Olsen, Fredensborg, Denmark. 778 pp.
- Tan, H. T. W., K.-x. Tan, Ali bin Ibrahim, P. T. Chew, K. S. Chua, H. Duistermaat, S. K. Ganesan, M. W. K. Goh, A. T. Gwee, R. Kiew, S. M. L. Lee, P. Leong, J. Lim, A. F. S. L. Lok, A. H. B. Loo, S. K. Y. Lum, T. Morgany, Saifuddin bin Suran, S. Sim, Haji Samsuri bin Haji Ahmad, Y. C. Wee, K. F. Yap, C. K. Yeo & J. W. H. Yong, 2008. Checklists of threatened species — seed plants. In: Davison, G. W. H., P. K. L. Ng & H. C. Ho (eds.), *The Singapore Red Data Book. 2nd Edition*. The Nature Society (Singapore), Singapore. Pp. 213–244.
- Turner, I. M., 1997. Singapore: A case-study for tropical rain forest fragmentation and biodiversity loss. In: Abe, T., S. A. Levin & M. Higashi (eds.), *Biodiversity: An Ecological Perspective*. Springer-Verlag, New York. Pp. 249–257.
- Turner, I. M., H. T. W. Tan, Y. C. Wee, Ali bin Ibrahim, P. T. Chew & R. T. Corlett, 1994. A study of plant species extinction in Singapore: Lessons for the conservation of tropical biodiversity. *Conservation Biology*, **8**(3): 705–712.
- Yam, T. W., 1992. Native orchids of Singapore and their conservation: 1. Epiphytes. *Malayan Orchid Review*, **26**: 60–70.
- Yam, T. W. & A. Thame, 2005. Conservation and reintroduction of the native orchids of Singapore. *Selbyana*, **26**: 75–80.