

## THE REDISCOVERY IN SINGAPORE OF *POLYSTACHYA CONCRETA* (JACQ.) GARAY & H.R.SWEET (ORCHIDACEAE)

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### INTRODUCTION

This paper seeks to document the rediscovery of *Polystachya concreta* (Figs. 1, 2) in Singapore. *Polystachya concreta* belongs to the genus *Polystachya* which was established by Sir William Jackson Hooker in 1825 (Comber, 2001). The genus comprises around 200 species (Cribb & Rasmussen, 2004) and is pantropical, with the majority of its species found in tropical and subtropical Africa, and Madagascar, a few in Central and South America, including the state of Florida in the USA; and with only a single species (*Polystachya concreta*) known from most of Asia (Comber, 1990, 2001; Demissew et al., 2004). The genus was revised by Friedrich Wilhelm Ludwig Kränzlin in 1926, but this revision is largely outdated and the genus needs to be reworked. Current revisions have only been done for certain sections of the genus, and a dedicated monograph has yet to be produced for the entire genus.

In general, *Polystachya* species are sympodial epiphytic plants, but do occasional grow lithophytically and terrestrially in poor soils (Comber, 2001; Falorunso & Jayeola, 2009). They have small pseudobulbs carrying one to many jointed leaves (Comber, 1990). The inflorescences are terminal to the pseudobulbs and may be simple or branched. The flowers are non-resupinate, and have four pollinia with petals and sepals free from each other. The labellum (lip) has distinct side lobes, placed on a long column foot.



Fig. 1. Close-up of *Polystachya concreta* flowers. Scale bar = 1 mm. (Photograph by: Peter O'Bryne).



Fig. 2. Plant with dried inflorescence growing on the branches of a *Cratoxylum formosum* tree just outside the SAF Nee Soon Range I. Scale bar = 5 cm. (Photograph by: Alvin Francis Lok Siew Loon).



Table 1. Previous Singapore collections of *Polystachya concreta* (Jacq.) Garay & H.R.Sweet deposited in the Herbarium, Singapore Botanic Gardens (SING).

S/No.	Accession/Bar Code No.	Herbarium	Collector	Collector's No.	Date	Locality
1.	0047252	SING	Ridley, H.N.	s.n.	1891	–
2.	0010933	SING	Cantley, N.	274	–	–
3.	0010934	SING	Mat	s.n.	1896	Sungei Loyang

### PAST AND PRESENT RECORDS

*Polystachya concreta* derived its specific epithet from the Latin word ‘concreasco’, which means ‘to grow together’, referring to the adnation of the lateral sepals to the full length of the column foot (Cootes, 2001). This taxon was first described by Jacquin under the name *Epidendrum concretum* from plants collected from the West Indies (Cootes, 2001). Later in 1824, Sir William Jackson Hooker then named this species *Polystachya concreta* in his book, *Exotic Flora*. In 1974, Leslie Garay and Herman R. Sweet did a study on distribution and found that many of the then accepted names were merely synonyms of this widely distributed orchid. In this publication in *Orquideologia*, they listed 54 synonyms for this taxon (Cootes, 2001), some of which included *Cranichis luteola* Sw., *Epidendrum concretum* Jacq., *Onuchium flavescens* Bl., *Polystachya flavescens* (Bl.) J. J. Sm., *Polystachya luteola* (Sw.) Hook., *Polystachya penangensis* Ridl., *Polystachya siamensis* Ridl., and *Polystachya singaporensis* Ridl. (Comber, 1990; Seidenfaden & Wood, 1992).

*Polystachya concreta* is extremely widely distributed and is found pantropically throughout much of the subtropical and tropical areas of the world, including Mexico, Guyana, Surinam, Brazil, West Indies, Florida in the United States, subtropical and tropical Africa, Madagascar, Mauritius, and across much of Asia (Cootes, 2001). In Asia, *Polystachya concreta* is distributed in Sri Lanka, from the southern half of Deccan (India) to the Nicobar Islands, north-eastern India, Laos, Vietnam, Indonesia, and east to the Philippines (Seidenfaden & Wood, 1992). It is also found in all parts of Peninsular Malaysia from Langkawi and south towards Singapore, although it is more widespread and common in the north.

*Polystachya concreta* has a large altitudinal amplitude and can be found growing from sea level to about 1500 m (Comber, 1990 & 2001; Seidenfaden & Wood, 1992; Cootes, 2001; Chen et al., 2009). Because of its extremely wide distribution, it can be found in a myriad of habitats, growing as an epiphyte on tree trunks and branches in lowland tropical forest, in montane forest (Seidenfaden & Wood, 1992; Cootes, 2001), in cultivated teak forest in moist areas of Java (Comber, 1990), in open woodlands (Demissew et al., 2004), in cypress swamps, in hammocks and mangroves in Florida (Romero-González et al., 2003), and in thickets in South Yunnan (Chen et al., 2009). *Polystachya concreta* is also sometimes found growing terrestrially on podosolic soils under *Leptospermum* trees and *Baeckia* shrubs in North Sumatra (Comber, 1990, 2001), and lithophytically (Cootes, 2001).

This species is rather variable in plant size (Comber, 2001). This large variation appears to be greatly dependent on nutrient levels. Low nutrient levels result in small plants with few flowers on unbranched inflorescences, while high nutrient levels result in large plants bearing hundreds of flowers on branched inflorescences. Other than plant size, the flower colour and details in the labellum also vary from locality to locality. Even with these variations, many still regard these as a single species with large intraspecific variation (Seidenfaden & Wood, 1992). Flowers of *Polystachya concreta* vary from greenish-yellow, yellow, to light brown with a pinkish tinge (Comber, 2001; pers. obs.) (Fig. 1).

Specimens seen in Peninsular Malaysia, and Singapore are rather small. The following morphological description is based on specimens collected in Singapore. *Polystachya concreta* has closely spaced pseudobulbs, usually 1 cm apart and are tufted, short, and somewhat flattened. Each pseudobulb is 2–6 cm long and 1–2 cm wide, bearing 2–6 leaves which get increasingly larger towards the terminal end. Leaves are generally lanceolate and acute, but are highly variable in size, 6–25 cm long and 1–4.2 cm wide. Inflorescences are terminal and erect, 10–20 cm long and unbranched. Flowers are small, 5–7 mm long and wide, pale greenish-yellow, and close together and usually do not open widely. The dorsal sepal is 4 mm long, forming a ‘hood’ over the flower, and the lateral sepals are broadly triangular. The petals, in contrast, are narrow and incurved. The labellum (lip) is pale yellow, with short triangular and erect side lobes, broad, blunt midlobe with a downturned end and a textured inner surface.

In Singapore, this species was last collected in 1896 by Mat at Sungei Loyang (Table 1), and was thought to have been extinct (Tan et al., 2008) for more than a hundred years until its recent rediscovery. Today, this species is found growing on a single *Cratoxylum formosum* tree outside the SAF Nee Soon firing range (Fig. 3), with the common epiphytic fern *Platyserium coronarium* (Fig. 4) as well as with other native orchid taxa which includes the endangered *Bulbophyllum vaginatum* (Fig. 5) and the critically endangered *Bulbophyllum sessile*, and *Pomatocalpa diffusum* (Fig.





Fig. 3. *Polystachya concreta* growing in situ with other epiphytes on a *Cratoxylum formosum* tree. (Photograph by: Alvin Francis Lok Siew Loon).





Fig. 4. The (a) *Polystachya concreta* growing with (b) *Platycerium coronarium* sporelings. (Photograph by: Alvin Francis Lok Siew Loon).

Fig. 5. (a) *Polystachya concreta* growing with (b) *Bulbophyllum vaginatum*. (Photograph by: Alvin Francis Lok Siew Loon).



Fig. 6. (a) *Polystachya concreta* growing with (b) *Pomatocalpa diffusum*. (Photograph by: Alvin Francis Lok Siew Loon).

6). This species was only recently observed by us in Feb.2010, but it has come to our understanding that the colony was previously discovered at the same locality on 21 Jul.2007 (P. O’Byrne, pers. comm.).

Interestingly, *Polystachya concreta* together with *Pomatocalpa diffusum* have since only been found on this single *Cratoxylum formosum* tree festooned with a wealth of epiphytes (Lok et al., 2010). The exact reason for this phorophyte preference is unknown, but it is possible that a majority of our orchid taxa that have been previously believed to be nationally extinct could still persist in the canopy of suitable phorophytes, such as *Cratoxylum formosum*, in the relatively under-studied Nee Soon Swamp Forest. This unique yet precarious scenario of many rare epiphytic orchid species growing on a single tree also demonstrates the fragility of epiphytic orchids and the importance of conserving large mature native tree species around Singapore.

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