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THE STATUS OF IN SINGAPORE OF *CYSTORCHIS VARIEGATA* BL. (ORCHIDACEAE)

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INTRODUCTION

This paper seeks to document the distribution and status of *Cystorchis variegata* Bl. var. *variegata* (Fig. 1) in Singapore. *Cystorchis variegata* var. *variegata* belongs to the genus *Cystorchis* which was proposed by C. L. Blume in 1858. *Cystorchis* is a small terrestrial orchid genus, comprising 22 species distributed from China, Thailand, Peninsular Malaysia, Borneo, Indonesia and eastwards to the Philippines, New Guinea and Vanuatu (Seidenfaden & Wood, 1992; Comber, 1990). Of the 22 species in the genus, only a single member is saprophytic (*Cystorchis aphylla*), while the remaining 21 species have variegated, green to sometimes purplish leaves (Comber, 1990, 2001). *Cystorchis* is distinct from other genera in the *Goodyera* tribe, and is also the only genus in the subtribe *Goodyerinea* which contains a species that is an obligate saprophyte throughout its life cycle (Comber, 1990). The genus is characterised by terminal inflorescences borne on leafy stems, and having resupinate flowers (flowers that open after a 180° rotation) which do not open widely. The dorsal sepal and petals form a hood over the column, with the lateral sepals surrounding the lip base. The lip has a bilobed sac or spur at the base, with each side having a globular and often warty non-stalked callus. The lip is parallel to the column with margins curled inwards forming a tube. The column is short, bearing a single stigma in the front, with two pollinia.

Fig. 1. A *Cystorchis variegata* var. *variegata* plant growing in small "islands" of drier ground in the Nee Soon Swamp Forest. (Photograph by: Alvin Francis Lok Siew Loon).

PAST AND PRESENT RECORDS

Cystorchis variegata var. *variegata* is a rather small decumbent terrestrial orchid, with stems growing to around 20 cm long (Comber, 1990, 2001; Seidenfaden & Wood, 1992). Each stem bears about six asymmetric to slightly symmetric, elliptic to obliquely ovate, stalked light green leaves reticulated with a dark green network and having a slight undulating margin. All parts of the erect inflorescence are covered in short hairs. The inflorescence has a slender scape measuring to 15 cm long, and bears one to two sterile bracts. The rachis is very much shorter; up to 3 cm in length, and bears 7–12 flowers. The flowers are 7.5 mm long and 4.5 mm broad, and do not open widely. The dorsal sepal is 4.7–5.7 mm long and 2.5 mm broad, with the apex being recurved and obtuse, and pinkish-brown, greenish-yellow at the base. The lateral sepals are 6 mm long and 3 mm broad, being concave at the base, enclosing vesicles of the spur. Petals are white to off-white. The lip is white and orange, similar in length to the sepals, and is straight and fleshy with a central groove, with the sides along the apical half inflexed to form a tube. The spur is short and slightly decurved, projecting from between the lateral sepals, with a swollen vesicle containing a gland on either side. The column is short and thick, 2.5 mm long, and narrow near the base. This species occurs in Peninsular Malaysia, Borneo, Sumatra, Java, and eastwards the Philippines and Vanuatu, and can be found in lowland forest up to around 1200 m altitude in West Sumatra, but always in damp forest.

In Singapore, two varieties of *Cystorchis variegata*, namely *Cystorchis variegata* var. *variegata*, and *Cystorchis variegata* var. *purpurea*, have been collected here. *Cystorchis variegata* var. *variegata* was previously collected from many localities around Singapore, such as Chan Chu Kang [presently the area at the junction of Mandai Road and Sembawang Road (Thulaja, 2003)], Bukit Mandai, Kranji, Seletar, and Nee Soon (presumably Nee Soon Swamp Forest), while *Cystorchis variegata* var. *purpurea* was only collected in a single instance from Chua Chu Kang (present-day Choa Chu Kang) (Table 1). *Cystorchis variegata* var. *variegata*, and *Cystorchis variegata* var. *purpurea* were previously known as *Cystorchis variegata*, and *Cystorchis javanica*, respectively (Ridley, 1924; Comber, 1990, 2001; Seidenfaden & Wood, 1992). These two taxa were on many occasions described as separate species since their initial descriptions by C. L. Blume, who published two separate drawings in 1858. However, in 1896, H. N. Ridley published the proposed name *Cystorchis variegata* var. *purpurea* to replace *Cystorchis javanica*, in light of the fact that the two taxa were only distinguished by leaf colouration, and *Cystorchis javanica* has since been accepted as a variety of *Cystorchis variegata* by most systematists (Comber, 2001). *Cystorchis variegata* var. *purpurea* was found to be similar in all aspects to *Cystorchis variegata* var. *variegata*, except for its leaves, which are velvety red-brown instead of being light green with dark green reticulation.

Table 1. Previous Singapore collections of *Cystorchis variegata* Bl. deposited in the Herbarium, Singapore Botanic Gardens (SING).

S/No.	Species	Bar Code No.	Collector	Collector's No.	Date Collected	Locality
1	*Cystorchis variegata*	0010655	H. N. Ridley	s.n.	30 Oct.1889	Chan Chu Kang
2	*Cystorchis variegata*	0010650	H. N. Ridley	s.n.	9 Dec.1889	Chan Chu Kang
3	*Cystorchis variegata*	0010657	J. S. Goodenough	371	21 Dec.1889	Chan Chu Kang
4	*Cystorchis variegata*	0010654	H. N. Ridley	s.n.	Jan.1890	Bukit Mandai
5	*Cystorchis variegata*	0010653	H. N. Ridley	s.n.	8 Jan.1890	Kranji
6	*Cystorchis variegata*	0010648	H. N. Ridley	s.n.	1892	Seletar
7	*Cystorchis variegata*	0010651	H. N. Ridley	s.n.	1892	Bukit Timah
8	*Cystorchis variegata*	0010652	H. N. Ridley	s.n.	1892	Seletar
9	*Cystorchis variegata* var. *purpurea*	0047117 (syntype)	H. N. Ridley	s.n.	Jul.1892	Chua Chu Kang
10	*Cystorchis variegata*	0010649	H. N. Ridley	s.n.	1894	Chan Chu Kang
11	*Cystorchis variegata*	0010656	Mat	s.n.	1894	Kranji
12	*Cystorchis variegata*	0010658	J. Sinclair	40277	8 May.1954	Nee Soon

In the 1st edition of the Singapore Red Data Book, *Cystorchis variegata* was categorised as nationally endangered, while there was no mention of *Cystorchis variegata* var. *purpurea* (Turner et al., 1994), although a syntype for this variety was collected from Chua Chu Kang by Ridley in 1892 (Wood & Cribb, 1994). Later in the 2nd edition, the two varieties were mentioned, with *Cystorchis variegata* var. *variegata* listed as nationally extinct, while *Cystorchis variegata* var. *purpurea* was listed as nationally critically endangered (Tan et al., 2008). The conservation status categories assigned to the two varieties were, however, most likely to be erroneous, as *Cystorchis variegata* var. *variegata* was collected at Nee Soon Swamp Forest and photographed in 1993 by HTWT, while no records of *Cystorchis variegata* var. *purpurea* have ever been made since discovery by Ridley in 1892.

Fig. 2. Habitat of *Cystorchis variegata* var. *variegata* at Nee Soon Swamp Forest. (Photograph by: Alvin Francis Lok Siew Loon).

Fig. 3. A group of plants displaying the typical leaf reticulation. (Photograph by: Alvin Francis Lok Siew Loon).

Fig. 4. An individual plant lacking the typical leaf reticulation, which could have led to a mistaken identity. (Photograph by: Alvin Francis Lok Siew Loon).

The latest record of *Cystorchis variegata* var. *variegata* was on 10 Mar.2010, when it was once again collected at Nee Soon Swamp Forest (Fig. 2), like those previously photographed by HTWT in 1993. At this locality, *Cystorchis variegata* var. *variegata* was found growing in small colonies on 'islands' of drier ground interspersed among patches of soggy ground and pools of stagnant water. Interestingly, plants observed at this locality varied somewhat in leaf colour. While most individuals had leaves that were typical of *Cystorchis variegata* var. *variegata* (Fig. 3), showing distinctive leaf reticulation, other individuals observed had leaves that lacked such leaf reticulation (Fig. 4), and these plants could have been superficially mistaken for *Cystorchis variegata* var. *purpurea* under the poor light conditions of the swamp forest undergrowth. On closer inspection, these plants were found to have the light green adaxial leaf surfaces of *Cystorchis variegata* var. *variegata*, and not pale reddish-purple adaxial leaf surfaces that would be indicative of *Cystorchis variegata* var. *purpurea.*

CONCLUSIONS

From our observations, we propose that the conservation statuses of the two varieties should be reversed, i.e., with *Cystorchis variegata* var. *variegata* being listed as nationally critically endangered, and *Cystorchis variegata* var. *purpurea* listed as nationally extinct since it has not been collected for more than 100 years. Both species declined probably because of massive forest clearance in Singapore mostly in the 19th century, and *Cystorchis variegata* var. *variegata* is now only found in freshwater swamp forest, an atypical habitat since it has been recorded to be from damp lowland forests to montane forests (Comber, 1990; Wood & Cribb, 1994). *Cystorchis variegata* var. *purpurea* has only been recorded from streamside forests and peat swamp forests (Chan et al., 1994; Wood & Cribb, 1994). Presently, the last stronghold for *Cystorchis variegata* var. *variegata*, and also many of our other native orchid species, lies within Singapore's last tract of primary freshwater swamp forest in Nee Soon Swamp Forest, which covers a mere 87 ha (Turner et al., 1996), compared to the estimated freshwater swamp forest area of 27.2 km^2 in primeval Singapore (Corlett, 1991; Turner et al., 1994). A very significant factor that could jeopardize the future of *Cystorchis variegata* var. *variegata* in its last stronghold is the increasing population of wild boars (*Sus scrofa*) within the Central Catchment Nature Reserve, especially in the Nee Soon Swamp Forest area. The locality was observed to be extensively strewn with wild boar tracks and damaged undergrowth. It is not known what could have triggered the recent increase of the population. Because of the feeding habit of these animals and their affinity for rhizomes, roots and tubers, the populations of *Cystorchis variegata* var. *variegata* could easily be destroyed in an instant by a single foraging animal.

Ex situ conservation together with in vivo propagation programmes should also be put in place to preserve the native genotype of this species.

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