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REDISCOVERY IN SINGAPORE OF *COELOGYNE ROCHUSSENII* DE VRIESE (ORCHIDACEAE)

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INTRODUCTION

Coelogyne is a large orchid genus of about 190–200 species, distributed from the Himalaya and Southern China, southward to Sri Lanka, most of Southeast Asia and eastwards to the Pacific islands (Comber, 1990; Clayton, 2002; Seidenfaden & Wood, 1992). The name *Coelogyne* is derived from the Greek *Koilos* (hollow cavity) and *gyne* (female), which collectively refers to the deep stigmatic cavity at the front of the column (Clayton, 2002). *Coelogyne* belongs to the subfamily *Epidendroideae*, tribe *Coelogyneae*, and subtribe *Coelogyninae*, which contains genera such as *Dendrochilum*, *Pholidota*, and *Pleione* that are sometimes difficult to differentiate from *Coelogyne* species when present in the vegetative state. *Coelogyne* has also been further divided into 22 sections.

Most *Coelogyne* species are epiphytic, although some are lithophytes, or terrestrial herbs or humus epiphytes (Clayton, 2002; Seidenfaden & Wood, 1992). The plants can be short or tall, usually with crowded pseudobulbs in large clumps or as long spreading plants with widely spaced pseudobulbs. Their roots are slender, branched or unbranched, restricted to the nodes at the psuedobulbs or spread along the rhizome. The pseudobulb shape also varies considerably within the genus, ranging from ovoid, pyriform, conical, fusiform to cylindric, with the base partially enclosed with scales from the rhizomes. Pseudobulbs also vary in the number of leaves they bear. Single-leaved pseudobulbs usually result from an internode, while double-leaved pseudobulbs result from two internodes. Leaves are usually stiffly herbaceous, generally long-lived with subsessile to long channelled petioles, which are almost orbicular in section. The leaf blade varies in shape, from narrow to broad, elliptic to ovate, obovate, oblong to linear-lanceolate, lanceolate, coriaceous orplicate, with few to many main nerves. The inflorescence can be terminal to lateral on mature pseudobulbs, and can be heteranthous, proteranthous, synanthous, or hysteranthous, erect to pendulous with one to many flowers (Clayton, 2002). Flowers are small or large, occurring singly or in masses, opening in succession or simultaneously. The floral bracts attached to the base of the pedicel are deciduous or persistent, lanceolate to ovate or oblong.

PAST AND PRESENT RECORDS

Coelogyne rochussenii was named for J. J. Rochussen; the governor-general of the Dutch East Indies in the mid-19th century for promoting the scientific work of Johannes Elias Teijsmann (1809−1882), and Simon Binnendijik (1821−1883), who described numerous *Coelogyne* species (Cootes, 2001; Clayton, 2002). *Coelogyne rochussenii* (Fig. 1) is one of seven species of *Coelogyne* recorded from Singapore, all of which are now considered nationally extinct (Keng et. al., 1998; Tan et. al., 2008; Chong et. al., 2009). According to herbarium records, *Coelogyne rochussenii* was only collected four times in Singapore and all were in the late 1890s, with the last collection in 1894 by Mat (Table 1).

Table 1. Previous Singapore collections of *Coelogyne rochussenii* de Vriese deposited in the Herbarium, Singapore Botanic Gardens (SING).

S/No.	Bar Code No.	Collector	Collector's No.	Date Collected	Locality
1.	133942	Cantley's Collectors	s.n.	–	–
2.	0010634	H. N. Ridley	s.n.	1890	Seletar
3.	0072286	H. N. Ridley	s.n.	Oct.1890	–
4.	0010633	Mat	s.n.	1894	Jurong

Coelogyne rochussenii has for some time been suspected as extant, after a *Coelogyne* seedling resembling the species was discovered by AFLSL growing on humus which had collected in a crack on the concrete supports of the Public Utilities Board (PUB) pipeline running through the area, during a guided visit to the Nee Soon Swamp Forest (NSSF)

Fig. 1. Cultivated *Coelogyne rochussenii* plant mass blooming. Scale bar = 5 cm. (Photograph by: Alvin Francis Lok Siew Loon).

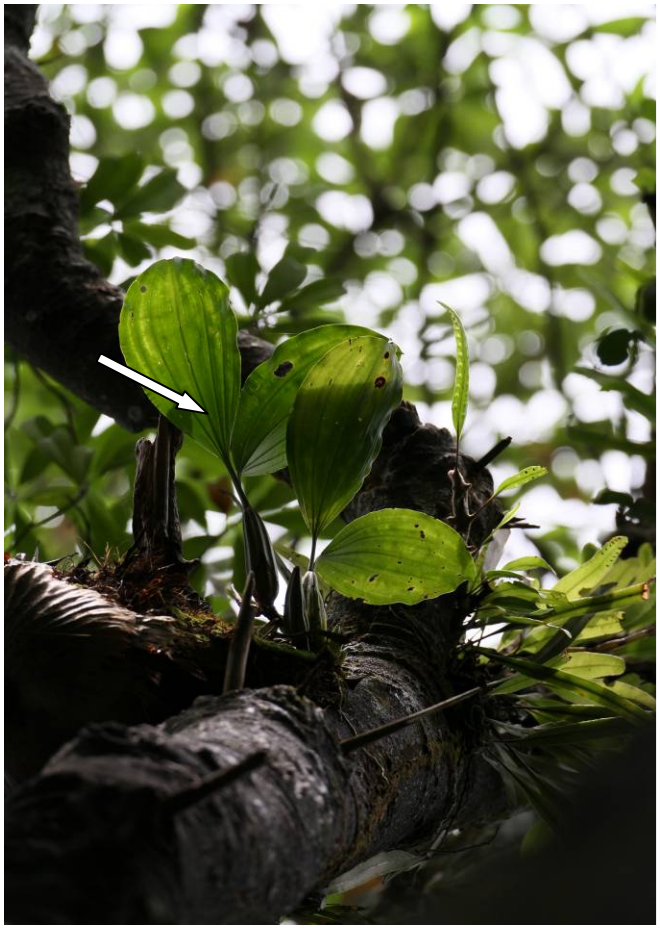

Fig. 2. *Coelogyne rochussenii* growing *in-situ* at Nee Soon Swamp Forest with *Lecanopteris sinuosa* (Photograph by: Alvin Francis Lok Siew Loon).

Fig. 3. Close-up of *Coelogyne rochussenii* pseudobulbs and rhizome. (Photograph by: Peter O'Byrne).

for Dr. Yaacob Ibrahim (Minister for the Environment and Water Resources) in mid-2009. Sadly, shortly after this visit, the seedling was no longer at the spot it was first observed, and all subsequent visits to the NSSF to search for this plant which had eluded botanists for more than a century were futile. This species was also reported to spontaneously grow from tree fern slabs in gardens in the Bukit Timah area without this species present, suggesting that a wild source may occur in the nearby forest of Bukit Timah Nature Reserve (P. O'Byrne, pers. comm.). After more than a year later, on 22 Nov.2010, during a botanical survey of the NSSF, an adult specimen was encountered deep in the swamp forest accessible only from the butt area of the firing range by AFSLL, CKY, KYC, and WFA growing with *Lecanopteris sinuosa* some 20–25 m up, past a fork in the branches close to the main trunk of an unidentified species (Fig. 2).

Coelogyne rochussenii belongs to the section *Tomentosae* which has a distribution through Southern Thailand, Peninsular Malaysia, Singapore, Borneo, most of Sumatra, Java, the northern tip of Sulawesi, Moluccas as well as Palawan in the Philippines (Clayton, 2002). *Coelogyne rochussenii* has rather close narrowly conical, ribbed pseudobulbs on a creeping rhizome, 3–5 cm apart (Fig. 3). The pseudobulbs bear two ovate leaves, with a rounded but slightly acuminate apex. The leaves usually possess 5–7 main nerves and are around 20–28 cm long and 10–15 cm wide, with the widest part in the apical half, narrowing gradually to the base and petiole, which is 5–8cm long. The inflorescence is heteranthous (when the vegetative shoot from which the inflorescence emerges, it never develops a leaf and the terminal internode never enlarges into a pseudobulb), with the inflorescence stalk enclosed in the scales of the shoot, the rachis is curved initially then pendulous, up to about 60–70 cm long, bearing as many as 25–35 flowers. The flowers are 5.0–5.2 cm across, with pale yellow green sepals and petals (Fig. 4). The side-lobes of the labellum (lip) are dark- to light-brown with whitish veins on the inside. The dorsal sepal is narrowly elliptic, acute, 5–9-nerved, 2–3 cm long and 0.4–0.8 cm wide. The lateral sepals are oblique, narrowly ovate, acute 5–9-nerved, 1.5–3.1 cm long and 0.3–0.7 cm wide. The petals are narrowly elliptic, acute, 5–9-nerved, 1.8–3.1 cm long and 0.15–0.5 cm wide. The labellum is 3-lobed, with the side-lobes relatively low, front broadly rounded and the mid-lobe narrowly attached, convex, slender-ovate, with an erose, reflexed margin, which is curved upwards.

Coelogyne rochussenii is quite widely distributed, ranging from Southern Thailand, Peninsular Malaysia, Sumatra, Java, Borneo, the Philippines (Luzon and Mindanao Islands) and Sulawesi (Minahassa), with large altitudinal amplitude

Fig. 4. Close-up of a *Coelogyne rochussenii* flower. Scale bar = 1 cm. (Photograph by: Peter O'Byrne).

ranging from sea level to 1500 m (Comber, 1990; Comber, 2001; Clayton 2002; Seidenfaden & Wood, 1992; Cootes, 2001). *Coelogyne rochussenii* is also found in a wide range of habitats and is usually found growing epiphytically, but also sometimes as a lithophyte in riverine and hill forest, freshwater and peat swamps, as well as in podzolic dipterocarp forest on very wet sandy soils (Clayton, 2002). This species flowers year-round, with the flowers usually opening the widest in the morning, closing partially in the evening, with the whole process repeating the next day. Widest opening times also coincide with the strongest fragrance given off by the flowers, which is a light, musky, jasmine scent, usually attracting small bees as well as certain species of flies.

This species is quite easy to cultivate, and is a spectacle to behold when mass-blooming, making it a top candidate for reintroduction on park and street trees. It is best grown under 50–60% shade, misted regularly, but the medium must be allowed to dry out in between waterings. Because *Coelogyne rochussenii* usually grows in a very humid environment, it is important that its phorophyte (support tree, if planted on roadside trees) be chosen wisely, to prevent its root system from drying out too quickly. It is recommended that *Coelogyne rochussenii* be grown on trees with deeply fissured and flaky bark, such as *Albizia saman* (rain tree), or *Swietenia macrophylla* (broad-leaved mahogany), so as to allow the roots to penetrate beneath the bark layer for moisture retention and also to prevent them from drying out in Singapore's hot, windy, roadside conditions. Cultivation of *Coelogyne rochussenii* on the almost horizontal branches of rain trees would also best display the long hanging inflorescence of this species.

CONCLUSIONS

To date, many orchid taxa thought to be nationally extinct have been rediscovered at the NSSF in the Central Catchment Nature Reserve (CCNR). Amongst these rediscoveries were *Bulbophyllum singaporeanum* (Yam et. al., 2010), *Dendrobium aloifoium* (Ang et al., 2010), *Liparis barbata* (Lok et. al., 2010), and *Polystachya concreta* (Lok et al., 2011), probably making the NSSF the most important habitat for native orchid species. Sadly most of these orchids are found nowhere else in Singapore and it is probably the high humidity this habitat affords that allows these species to thrive where they have been lost elsewhere. Today, the freshwater swamp forest at Nee Soon covers less than 5 km^2 (Ng & Lim, 1992), a huge reduction from the original estimated 27.2 km^2 (Corlett, 1991; Turner et al., 1994). Unfortunately, the dire situation of this habitat is exacerbated by drainage works carried out around the CCNR, which seems to cause the forest to dry out.

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