

## THE REDISCOVERY OF THE GROUND ORCHID *Dienia ophyrydis* (J. KÖNIG) SEIDENF. (ORCHIDACEAE) IN SINGAPORE

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### INTRODUCTION

This paper documents the rediscovery of the terrestrial orchid *Dienia ophyrydis* (J. König) Seidenf. in Singapore (see Fig. 1). According to the World Checklist of Selected Plant Families (Govaerts et al., 2001), this species was previously recorded under 38 synonyms, of which the most commonly used was *Malaxis latifolia* Sm. The genus *Malaxis* is polyphyletic (Cameron, 2005) and has been segregated into various genera, namely, *Crepidium* Bl, *Dienia* Lindl., *Oberonioides* Szlach., etc. Szlachetko (1995) proposed the re-introduction of *Dienia* Lindl., first established by Lindley in 1824 (Lindley, 1824) based on a specimen, *Dienia congesta* (now recognised as a synonym), collected by Wallich in Nepal. Seidenfaden, in 1997, after a careful study of type-species and protogues, and with the assistance of P. Omerod and L. Garay, concluded that *Malaxis latifolia* Sm. and the older *Epidendrum ophyrydis* J. König are actually identical plants. This species is not recognised under the genus *Epidendrum*, and the combination *Dienia ophyrydis* (J. König) Seidenf. was proposed (Margońska et al., 2008).

The World Checklist of Selected Plant Families (Govaerts et al., 2001) recognises six *Dienia* species. Other than the widespread *Dienia ophyrydis*, the remaining species are distributed from the Himalayas to Tibet, Philippines, Sumatra, Sulawesi, and New Guinea. All species of *Dienia* have creeping rhizomes. The erect shoots are in clusters—nodded, somewhat fleshy with fusiform or elongated pseudobulbs, and are usually completely covered by leaf bases and basal scales. Leaves of *Dienia* species are plicate when young, appearing flat in maturity, and are usually gathered at the apical half of the pseudobulbs. The connective between the anther locules is narrow, the locules are close to each other and the column has two finger-like projections on each side of the anther. A further feature very characteristic for *Dienia* is that the lip has three lobes at its apex, with a characteristic transverse basal callus (Seidenfaden, 1997).

### PAST COLLECTIONS

*Dienia ophyrydis* is widely distributed and can be found from India, Nepal, China, Japan, Indochina, Malaysia, Singapore, Philippines, Indonesia, and Australia, to Southwest Pacific Islands. The species can be found amidst forest litter in shady wooded areas (Isaac-Williams, 1988), or in secondary forest, grassy roadside, and banks (Comber, 1990) from sea level to about 1,350 m.

It is a terrestrial herb with close, erect, swollen stems. A typical plant measures about 12 cm high and has four to five leaves. The petiole is about 3 cm long with a sheathing leaf base; leaf-blade is 11–17 cm long and 3–5 cm wide, bright green in colour, thin, with slightly undulating margins, unequally ovate at the base. Inflorescence is terminal, racemose, about 30 cm long, with a 12.5 cm green rachis bearing greenish-yellow suffused with purple small flowers, each subtended by a small green reflex bract of about 5 mm long (Fig. 2). The flowers are non-resupinate, closely arranged, with a characteristic three-lobed lip pointing upwards; the middle lobe being longer and narrower than the two side lobes (Fig. 3). The labellum (lip) has no auricles. The sepals and petals are curved forward. There are four pollinia to each flower. The flowers of this species vary widely, ranging from yellow green, green, buff, orange-red, scarlet, pinkish purple, to deeper colours such as liver-red, dark purple, reddish, to purplish black. In most specimens, the perianths are of the same colour, but bi-colour flowers do occur. The flowers also aged to a deeper colour. A plant brought back from the site for cultivation exhibited an inflorescence with yellow-green flowers that turned pale reddish purple after a week (Fig. 2). On some inflorescences the flowers change colour a second time before they abscise. The ovary similarly ranges from green to buff, to deeper colours with purple stripes at the rib and towards the pedicel. Infructescence is a capsule that is somewhat oblong-obconic (Fig. 4).



Fig. 1. The 'presumed nationally extinct' orchid, *Dienia ophrydis*. This plant was rediscovered and collected from a mature secondary forest of Holland Woods off Clementi Road. (Photograph by: Paul K. F. Leong).



Fig. 2. Close-up of the inflorescence of *Dienia ophrydis*. A, freshly collected from Holland Woods; B, flowers of a cultivated plant collected from site, showing an inflorescence with flowers turning initially yellow-green, to pale reddish purple after a week in bloom. (Photographs by: Paul K. F. Leong).

In Singapore, *Dienia ophrydis* was known to occur in ‘dry woods’ in Bukit Timah and Kranji (Ridley, 1924). Past records from The Herbarium, Singapore Botanic Gardens (SING) indicated that they were rather widespread in Singapore with the last collection made by H. N. Ridley in 1897 (see Table 1).

#### RECENT REDISCOVERY AND CONSERVATION STATUS

With the last collection made in the late 19<sup>th</sup> century, this species was consequently listed in Singapore as ‘presumed nationally extinct’ (Tan et al., 2008; Chong et al., 2009). However, in Jan.2011, a healthy but small population of *Dienia ophrydis* was chanced upon during a floristic survey of a mature secondary forest of Holland Woods off Clementi Road. The recent re-discovery was located in a valley, beside a clear-water stream in humid conditions with bright but indirect sunlight amidst a wooded area that is abounded with introduced plants like rubber trees and oil palms. There were possibly less than 50 mature individuals seen at site, although there could be seedlings or saplings that were not observed. This population consists of several flowering and fruiting individuals, all growing on well-drained soil and gravel. The whole population was found within an estimated area of 60 m<sup>2</sup> in a habitat that was relatively undisturbed, with little undergrowth and under a thin forest canopy. It is highly unlikely that this population was an escape from any nearby introduced cultivation, as it is not known to be an ornamental species, and the locality, being obscure and away from any nearby human population, does not seem to support it being an escape.



Fig. 3. A closer look at the non-resupinate flowers of the collected plant showing the distinctive three-lobed lips (red arrows). (Photograph by: Yam Tim Wing).



Fig. 4. Fruits (capsules) of *Dienia ophrydis* collected from Holland Woods. (Photograph by: Yam Tim Wing).

Table 1. Past collections of *Dienia ophrydis* (J. König) Seidenf. as deposited in the Herbarium, Singapore Botanic Gardens (SING).

S/No.	Bar Code No.	Collector	Collector's No.	Date collected	Locality
1	0025695	Ridley, H. N.	s.n.	—	Seletar
2	0010862	Ridley, H. N.	11648	—	Woodlands
3	0010870	Goodenough, J. S.	s.n.	Sep.1890	Seletar
4	0010871	Goodenough, J. S.	s.n.	1890	Seletar
5	0010868	Goodenough, J. S.	s.n.	1891	Kranji
6	0010869	Goodenough, J. S.	s.n.	1891	Kranji
7	0010861	Ridley, H. N.	s.n.	1892	Teban
8	0010864	Ridley, H. N.	s.n.	1892	Pandan
9	0010866	Ridley, H. N.	s.n.	1892	Bukit Timah
10	0010867	Ridley, H. N.	3922	1892	Chan Chu Kang FR
11	0010863	Ridley, H. N.	s.n.	1893	Bukit Timah
12	0010865	Ridley, H. N.	s.n.	Feb.1894	Tampines
13	0010860	Ridley, H. N.	s.n.	1897	Chua Chu Kang

In nature, as all flowers tend to form fruits (see Fig. 5), it is conceivable that this orchid species self-pollinates. As it was not possible to observe this at the site, a close examination of an inflorescence preserved as a spirit specimen and lodged at SING (SING Herbarium, Nr. 6667, medium bottle) was made (Figs. 6, 7). This inflorescence was from a plant collected from its natural habitat and flowered under cultivation. It is unlikely that any natural pollinator was in the vicinity of the enclosed environment where the plant was cultivated. Examination of freshly opened flowers indicated that their pollinia were already out of the anther caps, with some samples even having the pollinia bent down towards the stigma. A dissection of some flowers with swollen ovaries revealed some yellow residue—most likely old pollinia, that were left on the stigma (Fig. 7). These observations indicate that the species does self-pollinate and possibly explains why a number of seed capsules was formed naturally. This phenomenon is also observed in other orchids which self-pollinate, such as *Spathoglottis plicata*, *Galeola nudifolia*, and *Cattleya aurantiaca*. Plants that were removed from the same population at the site and cultivated within the confines of an office developed inflorescences, and subsequently infructescences (pers. obs. by HI). No pollinators were observed and it is again possible that self-pollination took place.



Fig. 5. A mature plant bearing an infructescence in its natural habitat, within the population on the site, next to a stream and amidst leaf litter and gravel. (Height of plant including infructescence is approximately 45 cm). (Photograph by: Paul K. F. Leong).

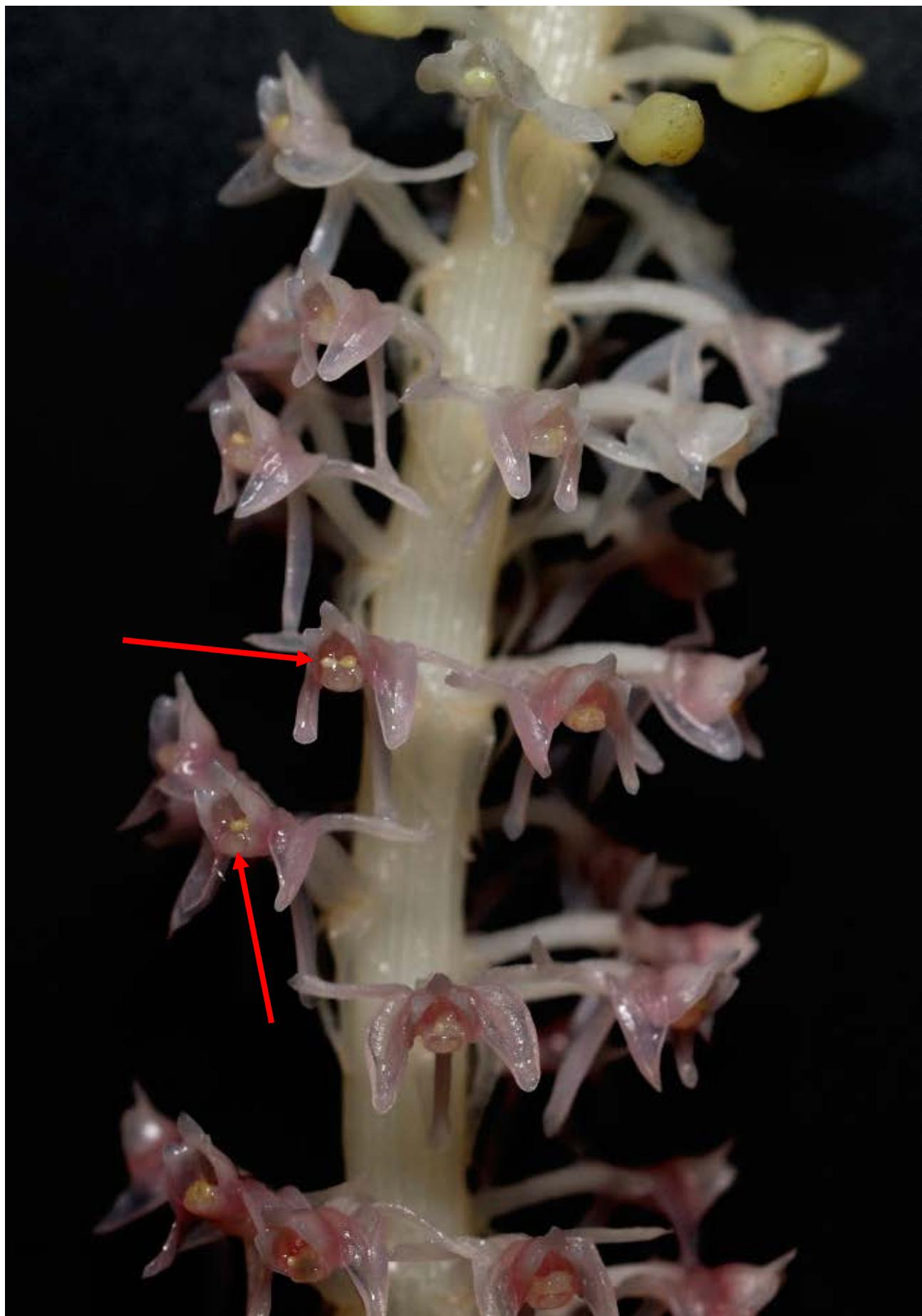


Fig. 6. Spirit specimen of an inflorescence (Nr. 6667, SING Herbarium) showing the pollinia on most of the opened flowers (red arrows). (Photograph by: Yam Tim Wing).

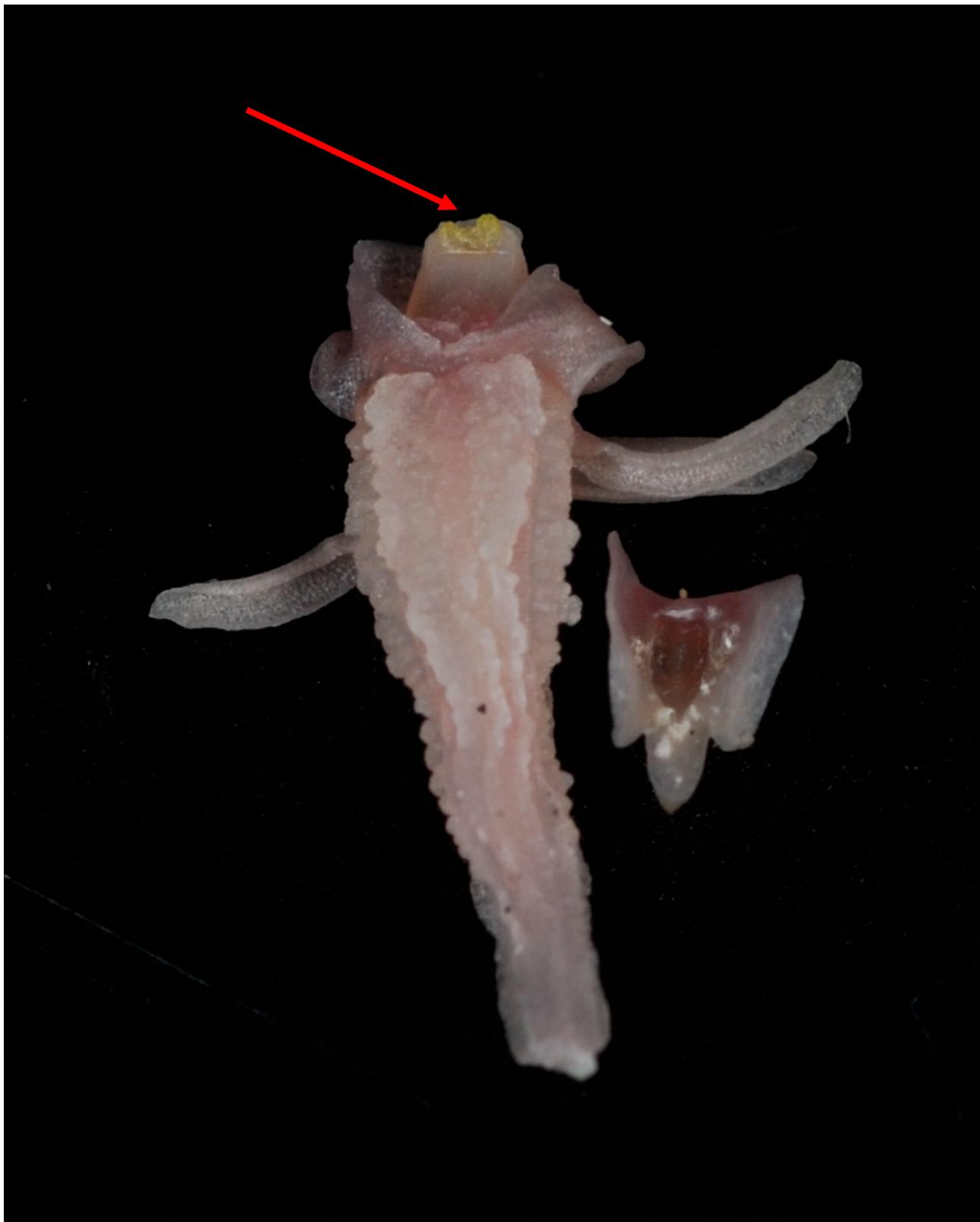


Fig. 7. A flower with a swollen ovary removed from the spirit specimen of the inflorescence (Nr. 6667, SING Herbarium). Some yellow residue, most likely old pollinia, can be found on the stigma (red arrow). (Photograph by: Yam Tim Wing).

An ex situ conservation effort is now underway, whereby mature seed capsules and plants are collected for further propagation. The ex situ propagation will ensure a robust population for future redistribution to comparable and suitable sites. This rediscovery raises the status of this species from presumed nationally extinct to critically endangered. It is also noteworthy to mention that another orchid, *Zeuxine* species, was sighted at the same locality. This small terrestrial orchid in the subtribe Goodyerinae seems to share the same habitat as *Dienia ophrydis*, although its population seems

much larger and more widespread within the area. A conservation programme for this other orchid is also similarly in place.

#### ACKNOWLEDGEMENTS

We would like to express our gratitude to colleagues from the National Biodiversity Centre, National Parks Board, as well as colleagues from the Botanical Branch, Singapore Botanic Gardens, National Parks Board, for any support rendered.

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