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Abstract, line 3 corrected from "known from a single locality" to "known from two localities" in a separate corrigendum, dated 11 May 2012. See http://rmbr.nus.edu.sg/nis/bulletin2012/2012nis117-122-corrigendum.pdf

REDISCOVERY OF *FREYCINETIA JAVANICA* BLUME (PANDANACEAE) IN SINGAPORE

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ABSTRACT. — *Freycinetia javanica* Blume, previously thought to be extinct in Singapore, was rediscovered in Nee Soon Swamp Forest. It is newly assigned the national conservation status of "Critically Endangered" as it is currently only known from two localities in the Republic.

KEY WORDS. — Pandanaceae, *Freycinetia javanica*, Nee Soon Swamp Forest, rediscovery

INTRODUCTION

This paper documents the rediscovery and status of *Freycinetia javanica* Blume (Fig. 1) in Singapore. *Freycinetia*, which belongs to the family Pandanaceae, is a relatively large genus of about 300 species, distributed from Sri Lanka, throughout Southeast Asia to the Ryuku Islands, New Guinea, Australia, New Zealand, and the Pacific (Govaerts, 2012). Out of the 88 Southeast Asian species, only five species are recorded in Singapore (Keng et al., 1998; Chong et al., 2009; Govaerts, 2012). *Freycinetia sumatrana* is the most common species in Singapore among the five, followed by the rarer *Freycinetia angustifolia* which is listed as nationally critically endangered in Singapore. The other three species, *Freycinetia coneri*, *Freycinetia confusa*, and *Freycinetia javanica* are presumed to be nationally extinct in the wild, having not been recorded or collected over the past 30 years (Tan et al., 2008; Chong et al., 2009).

The genus *Freycinetia* is named in honour of Admiral Louis Claude de Saulces de Freycinet (1779–1842), a French circumnavigator (Stearn 2002; Gledhill, 2008). The specific epithet *javanica* means "from Java", referring to the original discovery location of the species (Stearn 2002; Gledhill, 2008).

PAST AND PRESENT RECORDS

Freycinetia javanica is a dioecious, woody climber with stems up to 11 mm in diameter (Stone, 1970). The plant usually climbs up trees (Fig. 2) or scrambles on the forest floor (Fig. 1) and produces numerous adventitious roots along the stem that helps anchor itself to trees or the ground substrate. The leaves have leaf blades that are elliptic, slightly lanceolate or oblanceolate, with sharply pointed tips, rarely tapering into a long tip, and narrowed at the base (Figs. 3, 4). Lowland plants are said to have unusually wide leaves compared to montane populations which have short and narrow leaves that are usually 3–6.5 cm long and 1 cm wide. The lowland plants have leaves that are about 10–15 cm long and 2.5–5 cm wide. The leaves are slightly thick and leathery, almost spineless along the leaf margins except at the leaf tip and occasionally slightly toothed at the base margin (Fig. 5). The leaf auricles are thin and membranous, colourless and translucent when fresh or in the young leaves, tapering or rounded towards the tip, margins smooth or slightly toothed, 3–6.5 cm long by 1 cm wide (Fig. 6). The inflorescence is terminal and umbellate, with the unisexual flowers are borne on an oblong cephalium (a compound flowering or fruiting head in the family Pandanaceae), about 2.5–5 cm long, usually arranged in a whorl. The pistillate spadix have pedicels that are slightly rough to touch, about 10 mm long and 3.5–4.5 mm thick. The staminate cephalia bears numerous whitish stamens. The floral bracts are orange-salmon or yellowish in colour. Each individual berry is 1–1.5 mm long.

Freycinetia javanica is distributed from Thailand, Peninsular Malaysia, Singapore, Sumatra, Java, and Borneo, in humid lowland to montane forests up to 1,800 m altitude, often in pristine forests, valleys and along waterfalls (Stone, 1970). In Singapore, this species was collected from Kranji, Bukit Mandai, Bukit Timah, Seletar (Stone, 1970), and Nee Soon Swamp Forest (Table 1).

Freycinetia javanica was first encountered by AFSLL several times in Nee Soon Swamp Forest (NSSF) between 2006–2009. On 29 Mar.2011, WFA, AFSLL, PXN, and CKY collected a specimen from a plant that was growing at the forest

Fig. 1. *Freycinetia javanica* plant scrambling at the edge of Nee Soon Swamp Forest. In Singapore, the leaves of plants scrambling on the forest floor, like those of this plant, were observed to have broader leaf blades than those climbing up trees. (Photograph by: Ang Wee Foong).

Fig. 2. Individual plant that climbed up a tree in the Bukit Timah Nature Reserve, with stems that are free-hanging from the tree trunk. These plants were observed to have smaller and narrower leaves. (Photograph by: Ang Wee Foong).

Fig. 3. Elliptic leaves. Lowland plants such as this rediscovered in Singapore have broader leaves. Scale bar = 1 cm. (Photograph by: Ang Wee Foong).

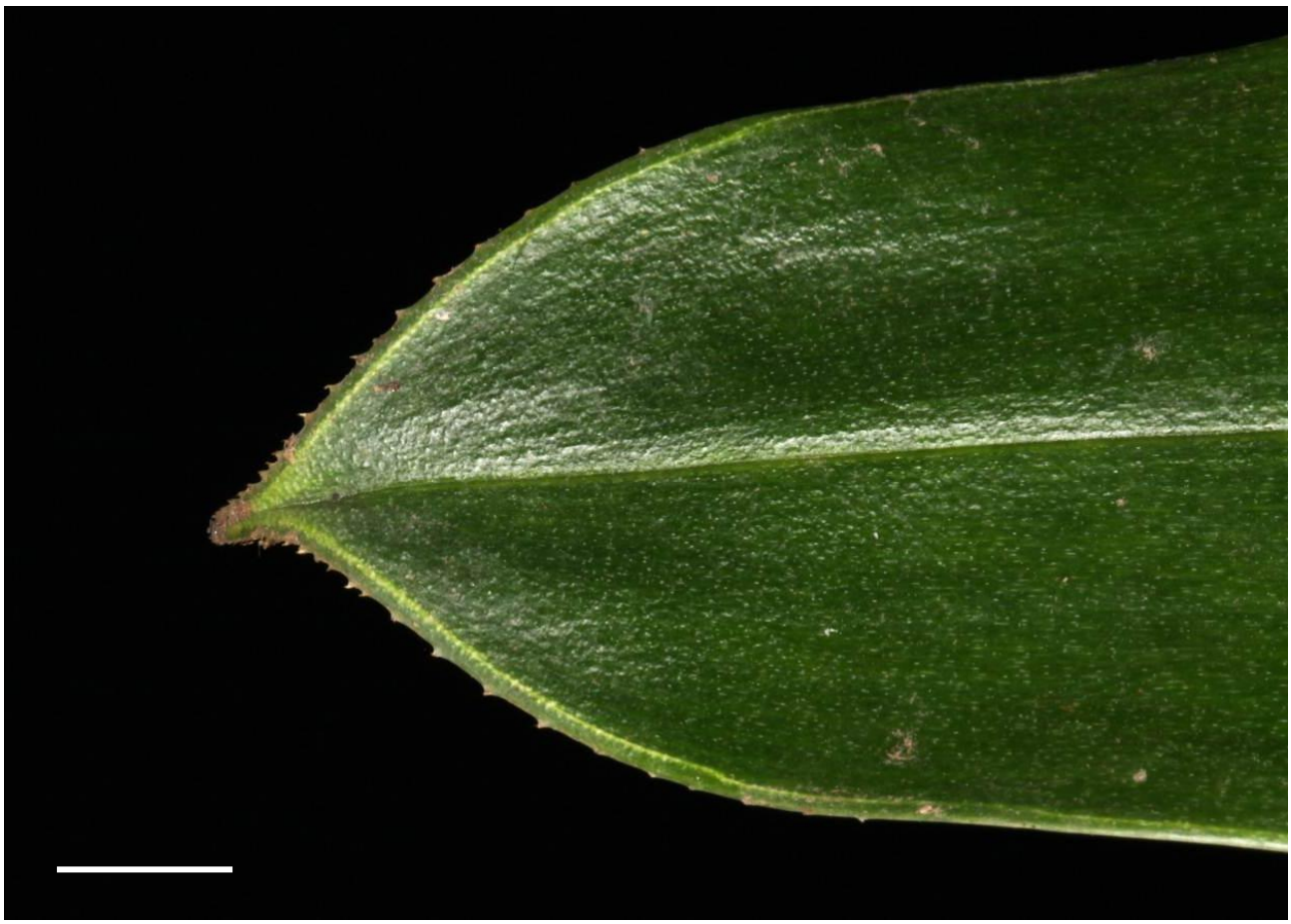

Fig. 4. Short, sparsely toothed leaf blade tip. Scale bar = 1 cm. (Photograph by: Alvin Francis Lok Siew Loon).

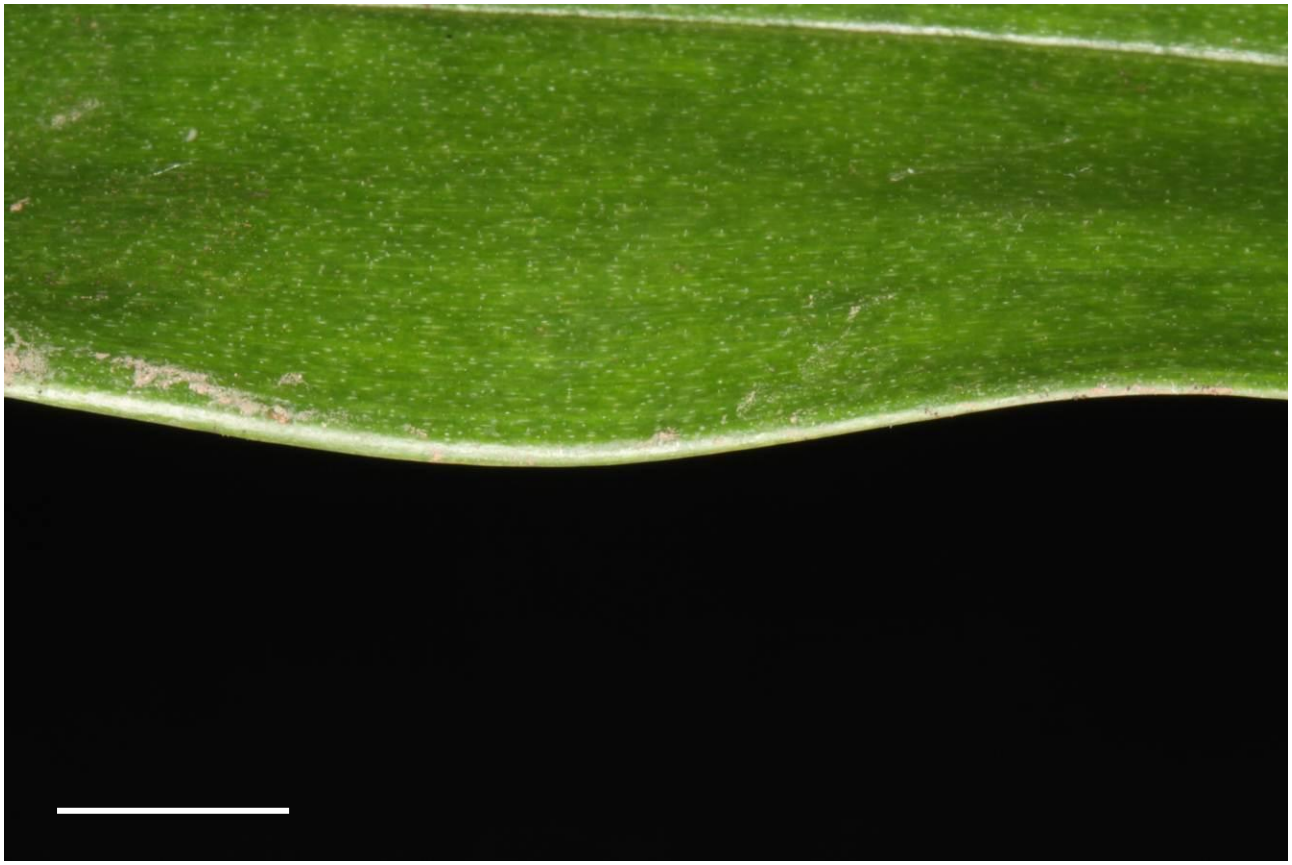

Fig. 5. Smooth margin of the leaf blade. Scale bar = 1 cm. (Photograph by: Alvin Francis Lok Siew Loon).

Fig. 6. The characteristic membranous, colourless, translucent and tapered auricle (arrowed). Scale bar = 5 mm. (Photograph by: Ang Wee Foong).

Table 1. Previous Singapore collections of *Freycinetia javanica* Blume deposited in the Herbarium, Singapore Botanic Gardens (SING).

S/No.	Bar Code No.	Collector	Collector's No.	Date Collected	Locality
1.	0019838	H. N. Ridley	4618	1892	—
2.	0019839	J. Sinclair	39616	9 May 1953	—
3.	0019840	H. N. Ridley	s.n.	1897	—
4.	0019841	J. Lai	236	—	Nee Soon

edge and climbing up trees along the pipeline between Seletar and Upper Peirce reservoirs. The specimen was dried and sent of identity confirmation at the Herbarium, Singapore Botanic Gardens (SING). Another plant was again encountered on 9 Sep.2011 by WFA, AA, and CKY, scrambling along the forest edge and also climbing up trees in the swamp forest between Nee Soon Ranges I and II. The most recent encounter was on 12 Oct.2011, with several individuals scrambling and climbing up trees around a large pond at the Bukit Timah Nature Reserve (BTNR) (Fig. 2). It is also noted that an earlier single collection was made by J. Lai from NSSF but the specimen was undated.

Although no flowering or fruiting specimen was encountered or collected for this article, *Freycinetia javanica* is easily distinguished from other native *Freycinetia* species through diagnostic vegetative characteristics provided by the late Benjamin C. Stone (1970), an expert in Malesian Pandanaceae. These characteristics include the membranous, colourless and translucent leaf auricles that taper towards the leaf blade tip (Fig. 6), the elliptic to oblanceolate leaf blades (Fig. 3), and smooth leaf blade margins except at the tip (Figs. 4, 5) whereas in the other species the leaf auricles are either lobed, truncate or minutely spinulose-ciliate, and the leaves are linear with spines along the edges (Stone, 1970). It is interesting to note in Singapore that the leaves of plants scrambling on the forest floor are broader than those climbing up trees (Figs 1, 2).

The small city-state of Singapore may have lost over 95% of its original vegetation cover over the past 200 years (Corlett, 1992), the rediscoveries of many presumed nationally extinct plant and species in the recent years shed hope on the condition of our native biodiversity. While we celebrate the "resurrection" of these species in Singapore, we

should not be complacent in our conservation efforts. Current nature reserves should continue to be rendered legal protection from redevelopment and destruction, and we should consider granting protection to other biodiversity-rich areas outside of the reserves. Urban areas could also be enhanced with the use and introduction of more native plant species in the landscape designs so as to preserve indigenous species and also attract and support native fauna.

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