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# REDISCOVERY OF *LINDSAEA DIVERGENS* IN SINGAPORE

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***ABSTRACT.*** — *Lindsaea divergens* Hook. & Grev. (Lindsaeaceae) was reported to be presumed nationally extinct in Singapore, having no sighting and collection since 1892. A small population of the fern was rediscovered at MacRitchie Reservoir Park, Central Catchment Nature Reserve in 2009 and which is still extant today.

***KEY WORDS.*** — *Lindsaea divergens*, Lindsaeaceae, extinct, MacRitchie Reservoir Park, Central Catchment Nature Reserve

## INTRODUCTION

This paper seeks to document the rediscovery and status of *Lindsaea divergens* Hook. & Grev., a fern that was previously presumed nationally extinct in Singapore. *Lindsaea divergens* is a member of the family Lindsaeaceae which consists of eight genera and approximately 200 species worldwide (Smith et al., 2006, 2008; Lehtonen et al., 2010). In general, members of the family are widely distributed in the tropics and some species have extended into the subtropical regions of temperate South America, East Asia, and New Zealand (Kramer, 1957; Lehtonen et al., 2010). In Singapore, Chong et al. (2009) reported 13 *Lindsaea* species and nine are presumed nationally extinct in the wild, including *Lindsaea divergens*.

The generic name *Lindsaea* is derived after John Lindsay (1785–1803), a British surgeon in Jamaica who discovered the role of fern spores in propagation (Stearn, 1996). The specific epithet *divergens* is Latin for diverging or spreading out widely from a central point (Stearn, 1996).

## PAST AND PRESENT RECORDS

*Lindsaea divergens* is a medium-sized terrestrial fern up to 60 cm tall (Fig. 1) (Holttum, 1966; Kramer, 1971). The rhizome is short-creeping and bears a cluster of closely arranged fronds at the tip. The stipes of the fronds are grooved on the upper surface, distinctly black-shiny and usually about 15 cm long. Fronds of the fern are pinnate and about 15–50 by 3–6 cm (Fig. 2). The lamina is oblong-lanceolate and narrowed at both ends, but in a more gradual manner basally. The pinnae are sessile, numerous, and often overlapping basally (Fig. 2). The oblong pinnae are usually 1.5–3 cm by 3–4 mm and the acroscopic side of the pinna base is enlarged to about 6 mm wide. The veins are separate and do not join together. The linear sori are arranged along the pinna margin (Fig. 3). The sporangia are protected by indusia that open toward the pinna margin.

Within Southeast Asia, *Lindsaea divergens* is known to occur naturally from Southern Thailand, Peninsular Malaysia, Singapore, Riau Islands, Lingga Island, Sumatra, Banka, Borneo to the Philippines, and grows on the forest floor, up to 800 m in altitude (Kramer, 1971). In Singapore, the fern was collected from MacRitchie Reservoir Park (Table 1).

Table 1. Recent Singapore collections of *Lindsaea divergens* Hook. & Grev. deposited in the Herbarium, Singapore Botanic Gardens (SING).

| S/No. | Bar Code No. | Collector | Collector's No. | Date | Locality |
|---|---|---|---|---|---|
| 1. | 0147035 | S. Y. Tan | TSY2009-48 | 3 Sep.2009 | MacRitchie Reservoir Park, CCNR |
| 2. | 0147036 | S. Y. Tan | TSY2009-245 | 27 Jan.2010 | MacRitchie Reservoir Park, CCNR |

The first collection of *Lindsaea divergens* in Singapore was probably that by H. N. Ridley from the Bukit Timah area in 1892 (The Herbarium Catalogue, 2006 onwards). Subsequently, Holttum (1966) reported that the species was found from Singapore northwards to Kedah of Peninsular Malaysia, and was seemingly abundant in the south. However previous collections of the species from Singapore could not be found in both SING and the Herbarium, Raffles Museum of Biodiversity Research, National University of Singapore (SINU). Chong et al. (2009) reported *Lindsaea divergens* to be presumed nationally extinct in the wild. On 3 Sep.2009, TSY encountered a small population of *Lindsaea divergens* growing along the Petaling Trail of MacRitchie Reservoir Park, Central Catchment Nature Reserve. The group of approximately 15 individuals was growing among a rather thick layer of leaf litter and under the shade of several unidentified trees. A specimen was collected for identification purpose. Later on 27 Jan.2010, another specimen was obtained from the same population. TSY and YCK revisited the site on 27 Jul.2012 to photograph the plant.

Fig. 1. A *Lindsaea divergens* plant growing in thick leaf litter. Scale bar = 10 cm. (Photograph by: Tan Siu Yueh).

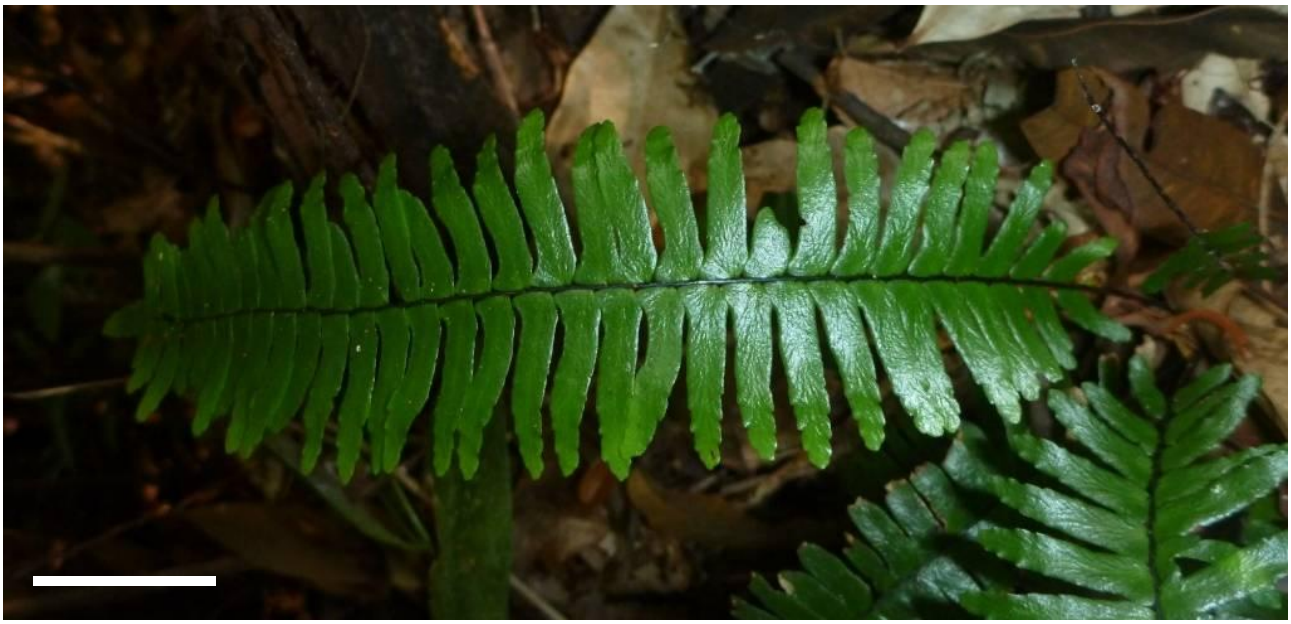

Fig. 2. Close up of the fronds. Scale bar = 2 cm. (Photograph by: Yeo Chow Khoon).

Fig. 3. Lower surface of several fertile pinnae. The sori are protected by the membranous indusia and are arranged along the margin of the pinna (arrowed). Scale bar = 5 mm. (Photograph by: Yeo Chow Khoon).

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