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Short Notes

A Note on *Selliguea murudensis* (C. Chr.) Parris (Polypodiaceae), a New Record of Fern for Mount Alab, Crocker Range Park, Sabah

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Abstract
A rare fern species, *Selliguea murudensis* was found in the lower montane forest of Mount Alab. The species was previously observed in several localities, on Mount Kinabalu in Sabah and on Mount Mulu and Mount Murud in Sarawak. Mount Alab is the second locality of *Selliguea murudensis* to be recorded in Sabah, making it a new record for Mount Alab. Coincidentally, this was also the first record of the species to occur in higher altitude at 1,725 - 1900 m asl. The species is an epiphytic fern and was found growing on the trunk of a fallen tree. A single elongated fertile frond was observed with one series of sori on either side of the midvein. It thrives in cool, moist and shaded environment with air temperature and relative humidity of 15.5 ± 0.6 ^{o}C and 99.0 ± 2.1 %, respectively. The fern is believed to occur in abundance at Mount Alab and in the other localities of its limited distribution.

Keywords: *Selliguea murudensis*, Polypodiaceae, new record, Mount Alab, Crocker Range Park

Introduction
Polypodiaceae is a widely distributed family that occurs throughout the world extending from the tropics to the northern and southern latitudes. *Selliguea*, a fern member of the Polypodiaceae family has a pantropical distribution, occurring mostly in Asia, from India eastward to Japan and southward to New Guinea (Kramer & Green 1990). To date, there are about 78 taxa in the Malesian region (data obtained from http://portal.cybertaxonomy.org/flora-malesiana/), of which nearly all species are epiphytes. A montane species, *Selliguea murudensis* is endemic to Borneo and was first collected at Mount Murud and Mount Mulu in Sarawak. The species was first described as *Pycnoloma murudense* from a specimen collected from Mount Murud, Sarawak. The collection of this species has been done at these localities since 1931 (Parris et al. 1992). In Sabah, specimen of this species was collected at Mount Kinabalu in a range of altitude between 1200-1600m asl (Beaman & Edwards

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2007). It has limited distribution; however, it may occur in high abundance within the localities of its previous collection. *Selliguea murudensis* commonly inhabits mossy rock, fallen logs or stumps and shaded areas, and may occur as lithophyte and epiphyte in lower montane forests.

This short note presents information on the current distribution of *Selliguea murudensis* in Sabah based on records of herbarium collections as well as specimens collected at Mount Alab, the new locality record. In addition, the microclimate environment of the species in its habitat at Mount Alab is described to add information on its ecology.

Materials and Methods

The specimen was collected at the Minduk Sirung trail in Mount Alab and the voucher specimen was deposited at the Borneensis Herbarium(BORH), Universiti Malaysia Sabah. The duplicate was deposited at Kinabalu Park herbarium. The specimen was compared with six specimens of *Selliguea murudensis* found on Mount Kinabalu as well as other localities in Crocker Range Park (Table 1). The morphology of our specimen (BORH 1549) matched with the morphology exhibited by the *Selliguea murudensis* specimens at Kinabalu Park herbarium.

Table 1. Localities of the examined *Selliguea murudensis* specimens

Collector & ID number	Localities & Habitat	Altitude
Luiza Majuakim & Florina Anthony BORH 1549 26 Feb 2013	Crocker Range Park, Mount Alab, Minduk – Sirung trail. On fallen tree trunk.	1725 m
Hovenkamp, P.H. PH 136 21 Sept. 2012	Crocker Range Park, Mount Alab, Minduk – Sirung trail. On branch of fallen tree.	1900 m
P.S. Shim SNP A 18454 9 May 2010	Km. 32, Kota Kinabalu-Tambunan road.	1580 m
P.S. Shim SNP A 18443 11 April 2010	Crocker Range Park, Alab. Epiphytes in upper montane forest.	Data not available
T. Nakamura, S. Matsumoto, Ebihara, Diwol S., A. Sugawara & Hendry M. BORH 140 2 Feb. 2007	Kinabalu Park, Silau-silau trail. Roadside, on mossy mound, epilithic.	1500 – 1600 m
A. Sugawara AS 245 7 Jan 2006	Crocker Range Park, Mount Alab, forest between Alab substation and Telecom tower. On trunk of liana.	1900 m
Geofarry G. SP No. 08198 7 Aug 1997	Mile 19, Kimanis-Keningau road. In open area, by roadside, on rock.	1100 m
Geofarry G. SP 09704 22 July 1999	Ulu Tikolod river, Tambunan, riverbank forest	850 m

In addition, microclimate of the species was monitored for a period of approximately three weeks at the location where the species was found at Mount Alab. Atmospheric temperature and relative humidity were captured using Hobo data loggers which were installed at the location.

Results and Discussion

Description of specimens collected at Mount Alab

Rhizomes: The rhizomes of this species are long-creeping and the colour is golden brown. The scale is peltate, narrowly lanceolate and long-attenuate and stipes is articulated to rhizome.

Stipes: c. 1.5 – 4 cm long on sterile fronds, and much longer to 9 cm on fertile fronds. Fronds erect, simple, glabrous, ovate-spathulate and strongly dimorphic. The lamina of the sterile frond is 1.5 – 3 cm long and 1.5 – 2 cm wide. Sterile fronds have 4 – 9 conspicuous lateral veins and margin inconspicuously notched. Veins are distinctly raised on the upper surface, forked once near the margin. The lamina in fertile fronds is linear with 8 cm long and 0.3 cm wide.

Sori: Elongate, forming a series of parallel band on either side of midvein, and superficial.

Ecology and distribution

The distribution of *Selliguea murudensis* is restricted to the northern part of Borneo (Hovenkamp, 1998); this species was observed on Mount Mulu and Mount Murud in Sarawak, and on Mount Kinabalu and Mount Alab in Sabah. This species may be found in other areas that share similar ecological features as the localities in which this species was found in Borneo. There have been no official reports of the species in Kalimantan and Brunei. Several collections of *Selliguea murudensis* have been made in Kinabalu Park and Crocker Range Park at various localities (Table 1). Our specimen was the third collection of this species to be made at Mount Alab. Previous collections were done in 2006 and 2012, but the findings were not officially reported. Hovenkamp (1998) reported the species to be distributed at an altitude from 150 m to 1700 m asl. However, based on the localities of the examined specimens, no collection of this species was ever made or reported below 850 m asl in Sabah or Sarawak. The lowest altitude recorded was at 850 m asl when the specimen was collected in riverbank forest growing as epiphytes. The distribution of this species is confined to lower montane forest zone in Sabah and Sarawak. At this altitude, the forest at Mount Alab is persistently covered with cloud from mid-

day until night-time, and often throughout the day. The presence of cloud enhances moisture retention in the atmosphere and promotes the growth of mosses in abundance on the ground and vegetation. Because of such conditions, Mount Alab has been referred to as mossy forest.

The specimen collected from Mount Alab was present in a closed canopy environment and growing on fallen tree trunk, using accumulated decaying organic matter on the tree trunk as substrate. There was minimal daily fluctuation of the microclimate measurements of the habitat of *Selliguea mururdensis* in Mount Alab (Figure 1). The air temperature fluctuated between a minimum of 14.3 ^{o}C to 16.3 ^{o}C. The mean air temperature and relative humidity of the habitat were 15.5 ± 0.6 ^{o}C and 99.0 ± 2.1 %.

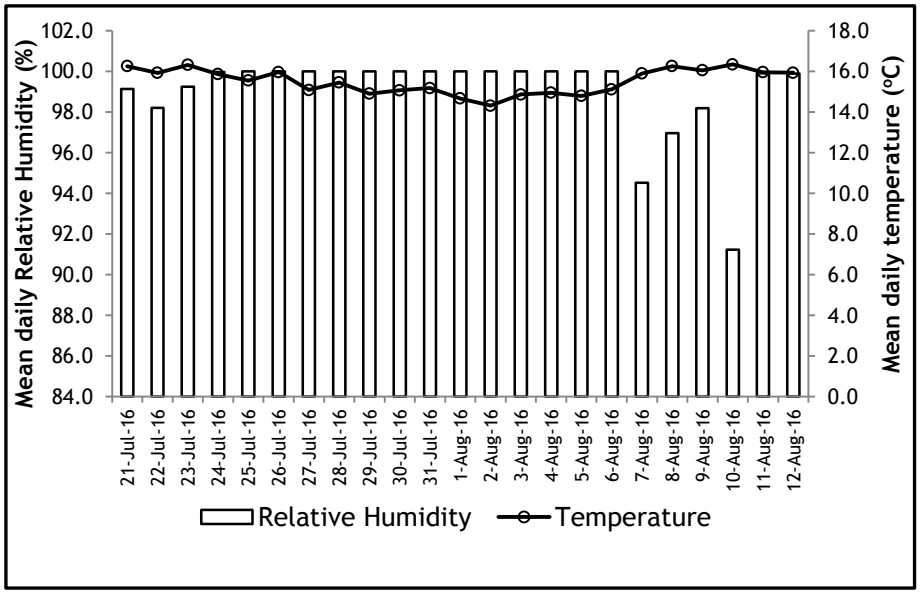

Figure 1. Daily microclimate measurements recorded at Mount Alab locality of *Selliguea murudensis*

The species of *Selliguea murudensis* occurred in both epiphytic and terrestrial habitats. *Selliguea murudensis* was observed growing on fallen tree trunks and branches, lianas, mossy rocks and on trunks of standing trees. On several occasions, we observed the unfertile individuals of this species growing on mossy rocks at Mount Alab. *Selliguea murudensis* grows in shady, cool and moist habitat. Although specimens of the species were collected mostly from high moisture and cool habitat, at one instance, it was found in an exposed habitat as evidenced by the specimen collected at the roadside along the Kimanis – Keningau road (SP No. 08198; Table 1). It probably benefited from some form of shade and moisture from the forest nearby, and at such altitude, clouds may occasionally cover the area.

Selliguea murudensis may be a versatile species that can cope with higher temperatures and thus desiccation, unlike the filmy fern, Hymenophyllaceae. With the current emerging signs of climate change, this species may provide insights on the impact of a changing climate on its population dynamics and adaptability.

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