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Nepenthes species of the Hose Mountains in sarawak, Borneo

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Abstract. This report summarizes the observations made during several field trips to the Hose Mountains of Sarawak between October 2000 and December 2001. Eight species of Nepenthes were found in this region: *N. ephippiata* (a new record for Sarawak), *N. fusca, N. hirsuta, N. reinwardtiana, N. tentaculata, N. veitchii, N. sp. 'A'*, and *N. sp. 'B'*. The latter two species may represent new and undescribed taxa.

Introduction

The Hose Mountains is a remote mountain range located in central Sarawak between the watersheds of Sungai Baleh and Sungai Balui (see Figs. 1 and 2). The region has been poorly explored botanically in the past century largely due to difficulty of access. Because of its high altitude and relative isolation, this area was targeted for this project due the potentially high diversity of *Nepenthes* species occurring there.

Prior research at the Sarawak Herbarium revealed several unusual *Nepenthes* specimens which had been collected in the Hose Mountains. Most notably S. 19023 which had been collected on an expedition to Bukit Temedu in March 1964. This plant was labelled as *N. lowii*, but clearly showed differences from this species in the form of the pitcher. Another specimen, S. 21114 from Bukit Lumit, Ulu Sungai Mujong, which was labelled as *N. pilosa* showed some important differences with that species upon closer examination.

Topography within the Hose Mountains is extremely rugged, and this is largely why the region has remained untouched by logging activities. The range itself is composed of dacite and related rocks which frequently form vertical or near-vertical cliff faces. This formation is surrounded by foothills composed of sandstone, shale, mudstone, lignite, and siltstone.

The highest elevation in the range is Bukit Batu at 2028 meters and there are at least four other peaks which reach over 1800 meters. The nearest mountain range of a similar altitude is Bukit Batu Tiban (elevation 1920 meters) situated on the Sarawak-Kalimantan border. Between these two ranges stretches approximately 110 km of lower elevation forest not exceeding 1300 meters in elevation, and generally below 800 m. Because of this, the Hose Mountains represent a relatively isolated range, and therefore would have a high potential for endemism of montane plant species.

Materials and Methods

A series of field trips were made to the Hose Mountain region between October 2000 and June 2001. During each trip photographs were taken of plants and information recorded on habitat and altitudinal distribution. Collecting permits were obtained through the Sarawak

Biodiversity Centre and the Sarawak Forestry Department. This allowed for collection of seeds as well as voucher specimens for deposition at the Sarawak Herbarium.

In October 2000, a preliminary reconnaissance expedition was made to Gunung Gelanggang (Ulu Sungai Betun) at the southern end of the mountain range. This trip was unsuccessful in reaching the summit and was forced to retreat at 1200 m due to vertical cliff faces preventing further ascent.

In June 2001, a more fully equipped expedition was made to Bukit Batu (Ulu Sungai Mujong) in the northern end of the range. A base camp was established at 1200 m on the west flank of the mountain from which day excursions were launched. Here also vertical cliff faces along the ridge hindered ascent, making progress above 1400 m extremely difficult. The party reached a maximum elevation of 1700 m before retreat was necessary.

A follow up expedition to Bukit Batu in December 2001 was focused primarily on exploring vegetation on the lower slopes of the mountain. Several smaller summits (elevation less than 1400 m) which were easily accessed were explored in greater detail.

Results

In total, eight taxa of *Nepenthes* were found on the expeditions (see Table 1). These are summarized below:

N. ephippiata Danser

This species was found growing in mossy ridge top vegetation above 1600 m. Most plants were epiphytic, and their large pitchers were conspicuous in the short canopy. This represents a new record for Sarawak, since this species has only previously been recorded from Central Kalimantan. The plants differ from the more widespread *N. lowii* in having only short tubercles (rather than hair-like growths) and a more pronounced peristome. Unlike specimens of *N. ephippiata* collected from Central Kalimantan, these plants did not exhibit the decurrent petiole base. Plants observed in the wild correlated with specimen S. 19023 from the Sarawak Herbarium.

N. fusca Danser

This species was observed at numerous locations in the Hose Mountains at 700-1200 m. Plants occurred most commonly as epiphytes in large trees in lower montane forest, but were also occasionally found on roadside embankments where they grew among ferns and grasses. Plants were typical in form of the species, but exhibited some variation in color ranging from red to purple spotted lower pitchers, and spotted to pure orange upper pitchers.

N. hirsuta Hook. f.

Plants of this species were found growing in sub-montane sandy heath forest on a plateau at approximately 800 m, sympatric with *N. veitchii*. Most plants grew terrestrially in full shade, but some were observed growing in full sun on road embankments. Pitchers were pure light green sometimes with faint purple spotting.

N. reinwardtiana Miq.

This species was the only *Nepenthes* encountered below 800 m. Although primarily an epiphyte in lowland forest, it was found in great abundance along logging roads between 300 and 700 m where it grew in full sunlight. Pitcher coloration was most commonly green, but also occurred in red and purple forms.

N. tentaculata Hook. f.

This species was found to be common in mossy forest above 1500 m. Occasionally plants were observed growing imbedded in moss on shady vertical rock cliffs or beneath grass on steep slopes. Lower pitchers exhibited an unusual peristome in that the inner teeth were extended into a fine comb-like ridge. Otherwise plants were of a form typical for this species in Sarawak.

N. veitchii Hook. f.

Plants of this species were found growing epiphytically in sub-montane heath forest at an altitude of 800 m. Occasionally plants also occurred as terrestrials growing on road embankments up to 1200 m. Pitcher color was light green with yellow to red-striped peristomes.

N. sp. 'A'

This species was found growing terrestrially in mossy forest ridge top vegetation at an altitude above 1500 m. In general form, these plants were very similar to *N. pilosa*, with broad petiolate elliptic leaves and a dense indumentum. They differed in having broadly infundibuliform pitchers which lacked any appendages on the lower surface of the lid (unlike the hooked appendage found in *N. pilosa*). In addition, the stems, leaf bases, and pitchers were covered in a dense abundance of large black nectar glands. Pitcher color was pale green with light red spotting. Plants observed correlated well with specimen S. 21114 in the Sarawak Herbarium.

N. sp. 'B'

Plants of this species were observed growing on steep slopes of *Dipteris* and *Dicranopteris* ferns at an altitude of 900-1300 m. The unusual pitcher morphology made it apparent that this represents a new and undescribed taxa. The most unusual feature was the peristome of the upper pitchers which was flattened and very broad (to 3 cm wide), with no apparent ribs typical of other *Nepenthes*. Upper pitchers measured up to 15 cm in length and were broadly infundibular in shape. Lower pitchers resembled those of *N. fusca* but with a wider more flared peristome.

N. fusca x veitchii

A single plant of this hybrid was found growing on a roadside embankment at approximately 1000 m. Pitcher form was intermediate between the parent species.

N. sp. 'B' x fusca ?

Three plants representing what may be this hybrid were found growing on roadside embankments at approximately 1200 m.

Discussion

With eight recorded taxa, the Hose Mountains represents a very diverse region for *Nepenthes*. Two species, *N. sp. 'A'* and *N. sp. 'B'* are possible endemics to the mountain range. It can be assumed that the species observed during this field work occur throughout the Hose Mountains at similar habitats and elevations as those recorded. Montane species such as *N. tentaculata, N. sp. 'A'*, and *N. ephippiata* likely occur at higher elevations than those reached by the expeditions (see Fig. 1).

Due to the lack of thorough exploration, there exists a high probability for additional *Nepenthes* species occurring in the Hose Mountains. Species such as *N. ampullaria, N. mirabilis, N. rafflesiana, N. gracilis* may occur on the lower slopes or in surrounding foothills. Further fieldwork on the summit of the mountains may reveal additional montane species such as *N. stenophylla* or new taxa.

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Table 1. Nepenthes taxa from the Hose Mountains

	Species
1	***N. ephippiata*** Danser
2	***N. fusca*** Danser
3	***N. hirsuta*** Hook. f.
4	***N. reinwardtiana*** Miq.
5	***N. tentaculata*** Hook. f.
6	***N. veitchii*** Hook. f.
7	***N. sp. 'A'***
8	***N. sp. 'B'***
	Hybrids
	N. fusca x veitchii
	N. fusca x sp. 'B' ?

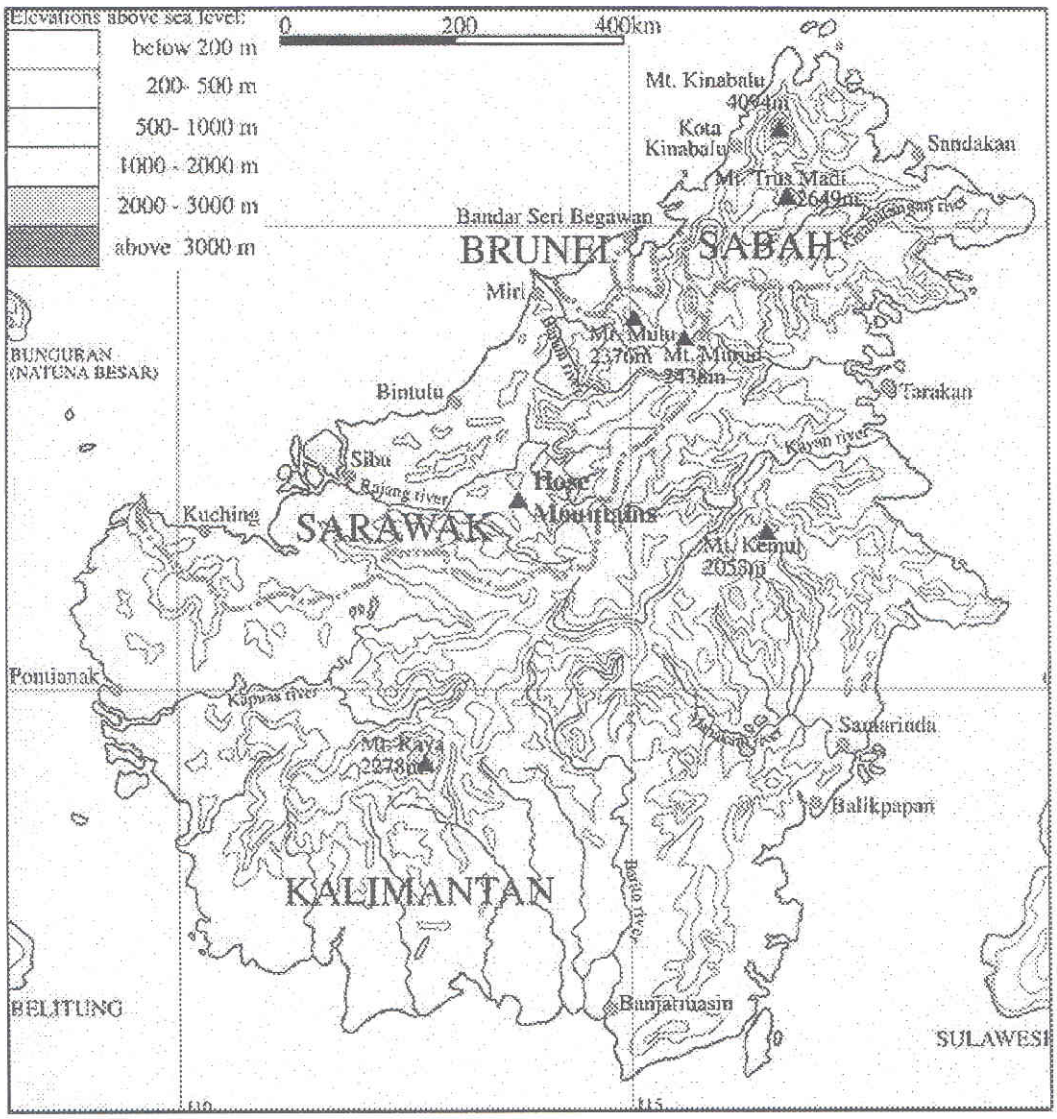

Figure1. Map of Borneo

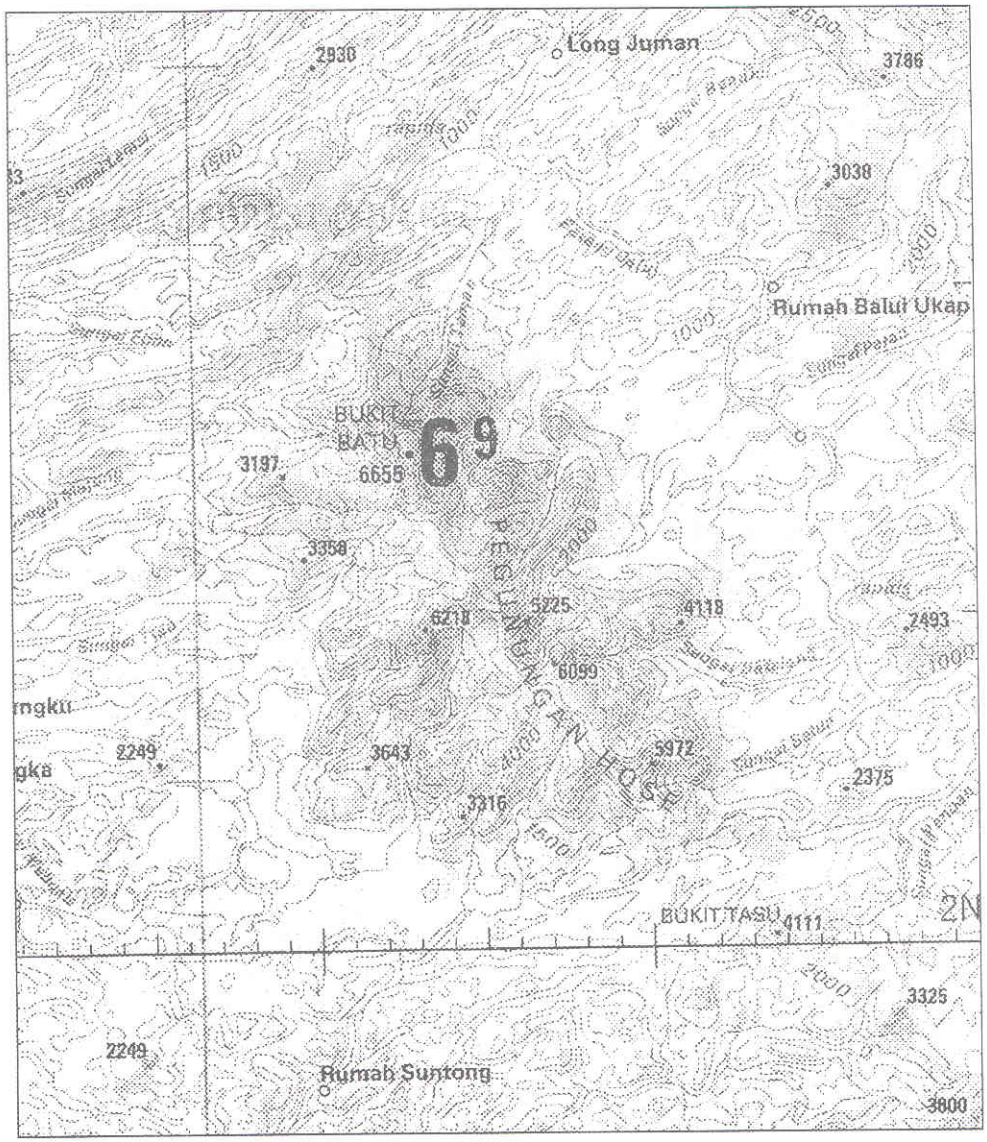

Figure 2. Map of Hose Mountains