

AN ACCOUNT OF THE *NEPENTHES* SPECIES OF VIETNAM

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Introduction

It is the goal of this paper to provide an account of the *Nepenthes* taxa found in Vietnam and in particular to document the occurrence of *Nepenthes kampotiana* and update the conservation status of *Nepenthes thorelii*. In October 2015, the authors conducted a field trip to Vietnam to establish without doubt the number of taxa found in Vietnam. This paper will give an account of that field trip and also discuss the botanical history, ecology, taxonomy, and conservation status of *Nepenthes* in Vietnam.

In reviewing the current literature, it is apparent that there exists some confusion concerning the legitimacy and taxonomy of the *Nepenthes* of Indochina, and it is hoped this paper will help clear some of this confusion, at least for the taxa found in Vietnam.

For the purposes of this paper, the *Nepenthes* taxa found in Vietnam will be recognized as distinct in keeping with the taxonomy of Mey (2009) and McPherson (2009). This decision is supported by the recognizable morphology of each taxa in the field. It must be noted that there has yet to be a molecular-based study to support these conclusions.

Information about distribution, habitats, and morphological data, is based on examination of digitized images of herbarium specimens, observations of plants *in situ* and in cultivation, as well as extracted from literature (*i.e.*, all sources listed under “References”). Field work was conducted in Vietnam and in accordance with permits issued to visit Lo Go-Xa Mat National Park in Tay Ninh Province and Phuoc Buu National Park in Ba Ria-Vung Tau Province.

Discussion

1. Botanical history

There are currently three recognized *Nepenthes* found in Vietnam: *N. thorelii*, *N. mirabilis*, and *N. smilesii* have been officially recorded, and *N. kampotiana* is thought to have populations in Vietnam (McPherson 2009), although has never been officially recorded. The chronology of the Vietnamese *Nepenthes* species can be summed up as follows: *N. mirabilis* was the first species to be found and the type specimen for this species was collected in the old Cochinchina (now Vietnam) and described by Loureiro in 1790 under the name *Phyllamphora mirabilis*. The earliest publication of the correct binomial, *Nepenthes mirabilis*, was by Druce in 1916. In 1895 Hemsley described *N. smilesii* from Siam (Hemsley 1895). In 1908 Macfarlane described *N. anamensis* based on a Vietnamese type specimen (Macfarlane 1908). In 1909 Lecomte named three taxa: *N. geoffrayi* and *N. kampotiana* based on Cambodian material, and *N. thorelii* based on collections from Vietnam (Lecomte 1909). In 1928 Danser synonymized *N. smilesii* with *N. mirabilis* in his revision of the genus (Danser 1928).

Jebb and Cheek lectotypified the material of *N. thorelii*, and synonymized *N. kampotiana* and *N. geoffrayi* with *N. anamensis* and retained *N. smilesii* as a little known taxon (Jebb & Cheek 1997).

In 2009 McPherson reinstated *N. kampotiana* and synonymized *N. anamensis* with *N. smilesii*, following the interpretation provided to him by Cheek (*pers. comm.*), an interpretation that was previously supported by Mey (2009) and subsequently by Catalano (2010).

In recent years, the interest in cultivating *Nepenthes* has increased across Asia to include a number of Vietnamese enthusiasts. Co-author Chiem Nguyen Anh Vu has extended this interest in cultivation, to understanding and documenting the local *Nepenthes* species, with a key objective of preventing further habitat destruction and conserving populations from poaching. As part of this effort, in 2015 Chiem discovered populations of *N. kampotiana*, confirming McPherson's reported presence of this species in Vietnam.

2. Ecology

Nepenthes mirabilis (Fig. 1), *N. thorelii* (Fig. 2), *N. smilesii* (Fig. 3), and *N. kampotiana* (Fig. 4) share broadly similar habitats, in particular their preference for open, seasonally wet scrublands, where they grow amongst grasses. The wet season occurs from May to October, and the dry season lasts from late November to April. *N. mirabilis* is by far the most widely distributed of these four taxa and appears to be able to adapt to a wider range of habitats.

At its only known locality (Fig. 5), *Nepenthes thorelii* grows terrestrially on acidic, riverine silt at 10–20 m above sea level (Mey 2011). Plants occur singly or in small scattered groups across open and semi-open seasonal swamp land amongst *Melaleuca* scrub and grasses, occupying wet areas in full sun to part-shade.

The population of *N. smilesii* and *N. kampotiana* surveyed was located in a fairly dry environment, close to the coast, at or just above sea level (Fig. 6). The substrate in this open grassy scrub-



Figure 1: Upper pitcher of *Nepenthes mirabilis*, Binh Chau, southern Vietnam. Photo by Richard Nunn



Figure 2: Lower pitcher of *Nepenthes thorelii*, Lo Go-Xa Mat National Park, Vietnam – Cambodia border. Photo by Richard Nunn.



Figure 3: Lower pitcher of *Nepenthes smilesii*, Binh Chau, southern Vietnam. Photo by Richard Nunn.



Figure 4: Lower pitcher of *Nepenthes kampfotiana*, Binh Chau, southern Vietnam. Photo by Richard Nunn.



Figure 5: The only known location of *Nepenthes thorelii* at Lo Go-Xa Mat National Park in Tay Ninh Province. Photo by Richard Nunn.



Figure 6: Typical habitat of *Nepenthes smilesii* and *N. kampotiana* at Phuoc Buu National Park in Ba Ria-Vung Tau Province. Photo by Richard Nunn.

land consisted of a much higher sand content than the *Nepenthes thorelii* site, not surprising given its proximity to the coast.

These three taxa are all clearly closely related and are superficially easy to confuse in the field. They do not generally form climbing stems, but rather a robust rosette with several growth points. Stems can be produced in the wet season, but these are desiccated during the dry season. Seasonal extremes have resulted in the need for adaptations to survive the arid conditions experienced during the dry season and the possibility of fire, with each of these taxa producing a lignotuber from which multiple growth points occur. Another interesting feature of these taxa is the production of rather long inflorescences, when compared to the stature of the rosettes, probably to keep the flowers above the surrounding grasses.

Nepenthes mirabilis is not part of the *N. thorelii* aggregate and has different growth characteristics, forming longer scrambling stems. This taxon was observed at two sites in Binh Chau (Fig. 7), growing in what appeared to be continually wet swamps in a coastal dune system. The substrate had a high sand content and *N. mirabilis* enjoyed the wetter parts of the swamp, with some plants found growing in shallow ponds.

The growth habit and ecological characteristics of *N. smilesii*, *N. kampotiana*, and *N. thorelii* have striking similarities to the *Nepenthes* species of northern Australia. Distinct wet and dry seasons are also prevalent in northern Australia and at least two of the taxa found there, *N. rowaniae* and *N. tenax*, also produce lignotubers to survive the harsh dry seasons.



Figure 7: A swamp in coastal dunes, near Binh Chau. This location hosts populations of *Nepenthes mirabilis*, *Drosera burmannii*, and at least four species of *Utricularia*. Photo by Richard Nunn.

3. Taxonomy

It is not the purpose of this paper to debate the taxonomic integrity of these four taxa, as both authors support the current accepted interpretation. The fieldwork conducted further strengthened our support of this concept, in particular the continued separation of *N. kamptiana* and *N. smilesii*. The key below outlines some of the morphological differences. However in the field, the three taxa in the *N. thorelii* aggregate, although superficially similar, are easy to identify by their pitcher morphology, which are distinct and immediately recognizable. Through the literature review and Internet searches, it appears that some images of *N. kamptiana* and *N. smilesii* have been incorrectly labeled and this has further added to the confusion.

Key to the Vietnamese *Nepenthes* species

- 1a. Leaves petiolate, margins of lower leaves fimbriate *N. mirabilis*
- 1b. Leaves linear to lanceolate..... 2
- 2a. Short hairs on all vegetative parts..... 3
- 2b. Stem and leaves glabrous (pitcher and tendril excluded) *N. kamptiana*
- 3a. Lower pitchers globose *N. thorelii*
- 3b. Lower pitchers ovate to narrowly ovate *N. smilesii*

The presence of large numbers of simple and complex hybrids made identifying the true parent species confusing at times and it took some time to understand what was really happening in the



Figure 8: Putative hybrid of *Nepenthes mirabilis* and *N. thorelii*, Lo Go-Xa Mat National Park, Vietnam – Cambodia border. Photo by Chiem Nguyen Anh Vu.



Figure 9: Putative hybrid of *Nepenthes smilesii* and *N. kampotiana*, Binh Chau, southern Vietnam. Photo by Richard Nunn.

swamp with the distribution of parent species and hybrids. This phenomenon was apparent at the *N. thorelii* site, where the number of hybrids with *N. mirabilis* (Fig. 8) outnumbered the parent species, at least in the area we surveyed, and also at the location for *N. kampotiana* and *N. smilesii* (Fig. 9). Again, superficial similarities exist with the swamps of Cape York in northern Australia, where the parent species seem to be in the minority and large simple and complex hybrid swarms form.

4. Distribution

The *Nepenthes* of Vietnam have not been conclusively studied and this paper is by no means a complete account of every location, as there is still much fieldwork to be done in this country. The map below is representative of the authors combined knowledge, and accounts in literature, of *Nepenthes* sites that are still viable.

5. Conservation status

Vietnam is no different from any developing economy in the Asian region, and habitat destruction through logging, agriculture, and property and infrastructure development is a major threat to its biodiversity. Southern Vietnam, where Vietnam's *Nepenthes* are concentrated, has also been subject to war and the extensive use of defoliants, which destroyed large areas of natural vegetation. Poaching is also increasingly an issue in the region, fueled by a growing local interest in *Nepenthes* and unscrupulous western markets for wild collected plants.



Fieldwork conducted for this paper and discussions with local *Nepenthes* experts suggests that *N. mirabilis*, *N. kampotiana*, and *N. smilesii* are widespread and not under serious threat in Vietnam, many populations occur in well-managed National Parks or areas that are unlikely to be developed. *Nepenthes thorelii* is endemic to Vietnam and extant at only a single, small site of less than 1 km² located in Lo Go-Xa Mat National Park, Tay Ninh Province, Vietnam – adjacent to the type locality (Mey 2010). This population appears to be healthy and well protected from poachers by Park Rangers and entering this site is no easy process, with expensive permits required and passing through two park check points and a military check point.

Conclusions

Three conclusions can be drawn as a result of the fieldwork and literature review on the *Nepenthes* of Vietnam:

1. There are four distinct species of *Nepenthes* in Vietnam, and *N. kampotiana* is present as predicted by Mey (2009) and McPherson (2009). Our fieldwork, although limited to a small number of locations, supported the current taxonomic treatment, and the four taxa present exhibited strong and stable morphological differences.
2. In a phenomenon that is also seen in the swamps of northern Australia, hybrid swarms are present and this makes identification of the true species difficult. Northern Australia and southern Vietnam are both at the extreme ends of the range for *Nepenthes* and they have similar and distinct wet and dry seasons and the genus has developed similar survival strategies to deal with the latter.
3. The only known population of *N. thorelii* at Lo Go-Xa Mat National Park is healthy and well protected from poachers and habitat destruction. Park rangers are aware of the plants and their importance, and they are making an effort to ensure the site is well managed and infrequently visited.

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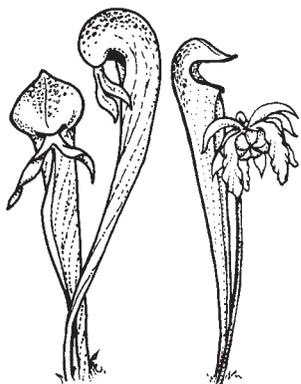
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Front Cover: Two lower pitchers of the recently rediscovered and critically endangered *Nepenthes thorelii* at its only known location in Lo Go-Xa Mat National Park on the Vietnam-Cambodia border. Photo by Richard Nunn. Article on page 93.

Back Cover: Paulo Gonella holding a large specimen of *Drosera magnifica* collected for botanical studies. Notice the long stem, the bifurcated apex, and the plantlet emerging from the base of the stem. Also notice the single candelabra-shaped inflorescence per plant, with multiple flowers. Photo Fernando Rivadavia. Article on page 107.

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