

# The pollination of *Habenaria rhodocheila*



A male Great Mormon butterfly  
pollinating *Habenaria rhodocheila*  
in Chae Son National Park, Thailand





Above: habitat of *Habenaria rhodocheila*  
Below: *H. rhodocheila* growing in a boulder crevice

Craig Williams



**CRAIG  
WILLIAMS  
& SANTI  
WATTHANA**  
report on a  
fieldtrip to  
the forests  
of northern  
Thailand to  
witness vibrant  
*Habenaria*  
species in their  
natural habitats



**T**HAILAND IS particularly rich in *Habenaria*, boasting 46 native species. At the beginning of September 2010 I was lucky enough to go on a three-week field trip as part of the Kew Diploma of Horticulture. It was supported by the Royal Botanic Gardens, and partly made possible thanks to an RHS bursary. So we set off from Queen Sirikit Botanic Garden, in Chang Mai, on fieldwork that would lead to some memorable encounters with a fascinating genus.

*Habenaria* is a largely pantropical genus of around 600 species of mainly terrestrial orchids. They have a seasonal growth cycle; the dormant fleshy, often hairy tubers are spurred into growth by the onset of rain or favourable temperatures. Flowering occurs towards the end of the growing season. By this time a replacement tuber, or tubers, will have been initiated, maturing around the same

time as any seedpods set. Shortly after, the top growth dies back.

The genus encompasses a wide range of characteristics; ongoing molecular studies of *Habenariinae* may well lead to some splitting. The leaves are lanceolate, ovate, oblong or elliptic, clustered at the base of the stem with a texture ranging from almost papery to fleshy. Usually a shade of green, some are attractively mottled as in *H. wolongensis* and jewel-like, sumptuously velvety *H. carnea*.

The flowers are usually resupinate, either green or white, or a combination, although a few species have a pink, red, orange or yellow lip. Most species have small flowers but some have large, flamboyant and intricate blooms. All share paired stigmatic processes and most have a nectariferous spur.

Across its range *Habenaria* is found in diverse habitats, from marshes, wet areas on hillsides, and seasonally

flooded grasslands to dry deciduous woodland, grasslands, shallow soil on rocks and even old termite mounds.

### *Habenaria rhodocheila*

As we made our way on foot through the forest, the rangers who guided us opened up the overgrown path with machetes. Glimpses of a breathtaking waterfall from the back of the pack accompanied shouts of excitement ahead. At an elbow in the path, a trunk leant out dramatically into the ravine. Swaying in the force of the waterfall's spray, the scarlet red flowers of *Habenaria rhodocheila* danced before us.

The plants were few-flowered and grew in narrow, shallow pockets of humus along the trunk. On the other side of the falls, more plants appeared to cling to a steeply-sloping rock face, constantly buffeted by the spray. In the open ravine there were some spectacular clumps, most of them positioned where they would be

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Left: a clump of *Habenaria rhodocheila*  
Right: *H. rhodocheila* growing along  
the edge of a path

subject to some degree of full sun. Further down the track, on boulders shaded by a tunnel of vegetation, were several plants growing as lithophytes, their tubers and roots pressed against the rock, but totally exposed (below).

Soil from the boulder crevice was pH 6.19. In the exposed area the light reading around the plant was 77.6 kilolux in full sun and 14.5 kilolux when cloudy. Relative humidity was 90.7 percent at 32°C. In the shadiest location, by a very small plant, the light was 0.14 kilolux when cloudy.

### Pollination of *H. rhodocheila*

In the field, the only thing that tops seeing an orchid flowering is to witness pollination, the drama that explains the species' adaptation and opens a window on its ecology. When we reached Chae Son falls, where the Mae Nam Mon river cascades through six levels, we were treated to a wonderful spectacle.



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*Impatiens violaeiflora* favours the same habitat as *Habenaria rhodocheila*



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The exposed tubers of a healthy flowering *H. rhodocheila* growing on a rock



Santi Weithana

Above: close-up of *Habenaria lucida*.  
Below: *H. lucida* in flower in its natural habitat



Santi Weithana

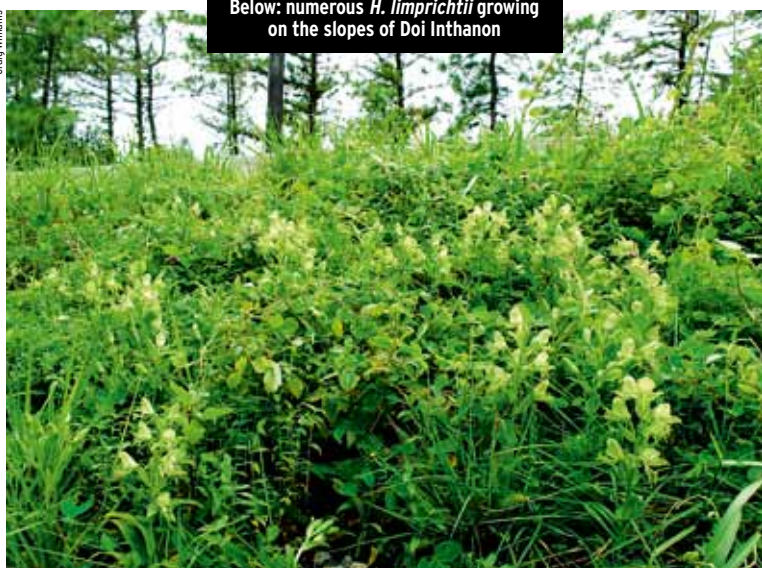


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Above: *Habenaria limprichtii*.  
Below: numerous *H. limprichtii* growing  
on the slopes of Doi Inthanon

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As we made our way along the river we saw *H. rhodocheila* growing in cracks and crevices. Nowhere did we see it growing in open ground (or far from a waterfall for that matter), but shallow humus pockets in granite boulders, crevices in rock faces, nooks in old tree stumps and even cracks in a concrete bridge walkway were all resplendent with bright red bouquets.

While there are also yellow, orange and Cadillac-pink forms, all the plants we saw were scarlet or vermillion. We had suspected that the flower might mimic an *Impatiens* and everywhere we saw it, there were large patches of the pink-flowered *Impatiens violaeiflora* growing nearby. However, there was clearly nectar in the orchid's spur and after a tantalising view of a large black butterfly visiting plants on the other side of the falls, a tatty but glorious male Great Mormon (*Papilio memnon* f. *agenor*) fluttered into view, descended and set to work. It hovered in front of each flower, barely landing. As its proboscis delved deep into the spur, its head brushed the viscidia, adding to its gold necklace of pollinia. (A short video of this can be seen online at [www.rhs.org.uk/orchidreview](http://www.rhs.org.uk/orchidreview)).

A small yellow butterfly that was later observed visiting the flowers appeared too slight to remove any pollinium. The range of *Papilio memnon* f. *agenor* overlaps that of *H. rhodocheila* but the flowers are clearly attractive to other *Lepidoptera* species and further study is needed to tell if the orchid is monogamous.

### ***Habenaria lucida***

In Chae Son National Park in Lampang province, forest rangers accompanied our party. From their jeep, Santi picked out the tall slender stems of *Habenaria lucida* in the bamboo forest gloom (0.5–0.7 kilolux on a sunny morning). This robust species has small, yellow-tinged green flowers, disproportionate to the size

of the leaves but intriguing enough to repay close attention. The slightly clay pH 6.78 soil was very stony, and high in organic matter. The relative humidity was 88.3 percent at 29.7°C.

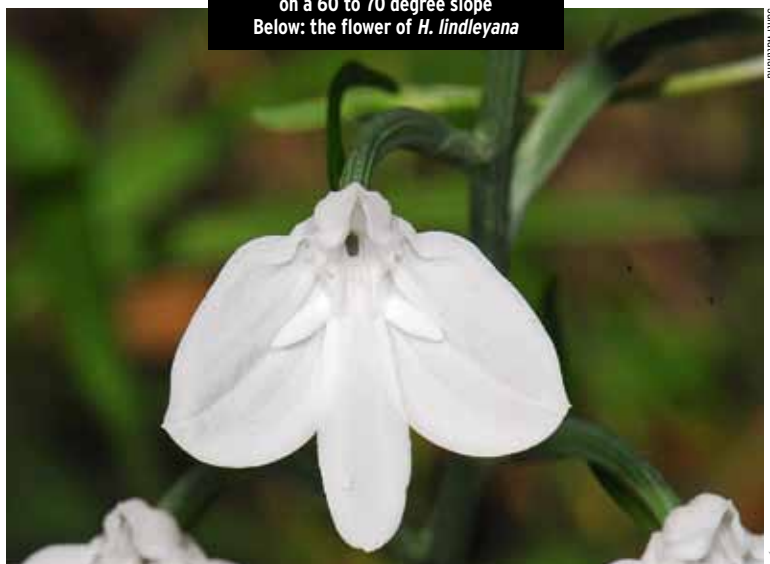
### *Habenaria limprichtii*

A few days later we headed towards the Mae Chaem district. At its heart is Doi Inthanon, at 2,565m Thailand's highest mountain. Its stunted cloud-forest peak is often lightly frosted during winter and, during our visit at least, enveloped in torrential rain. Descending to 2,000m was just enough to leave the rainmaker behind and allowed us to investigate the roadside vegetation. Despite its large charismatic flower *Habenaria limprichtii* is sufficiently subtle in colouration to narrowly avoid being crushed as we strode from the car. A healthy population of more than 50 flowering plants nestled within a straggly collection of grasses, scrambling plants and a *Peristylis* species on the 60-degree sloping verge. They were growing in around 10cm of very loose, pH 6.8, loamy soil that included fibrous roots, 5mm stones and a surface layer of moss. Several collectors' notes mention a granite bedrock and while this is the basis of the mountain, there was tarmac under the soil layer.

A relatively widespread species in northern Thailand, it is also found in China and Vietnam in open grassy pine forest, evergreen forest and open grassland (Kurzweil 2009). This group was at the limit of its 1,100–2,000m altitudinal range and the tail-end of its July to September flowering season. Rarely more than a diminutive 30cm tall (flowering specimens have been recorded from 26–70cm, Kurzweil 2009), the 4.5cm wide flowers seemed impressively oversized. The prominent eye-like pollinia arrangement, large hood and almost crystalline fringes of the



Above: *Habenaria lindleyana* flowering on a 60 to 70 degree slope  
Below: the flower of *H. lindleyana*





labellum side lobes give an endearingly squid-like appearance. However these are incidental to the pale green and white colour and nectiferous spur that attract a nocturnal suitor. Driving down the mountain we passed a Highways Department maintenance team, busy strimming a short back and sides into the verge and wondered if the courtship would be in vain.

### *Habenaria lindleyana*

Staying in the Mae Chaem district, we took a road on which Santi had previously seen *Habenaria lindleyana*, a widespread species in northern Thailand, also found in Laos and Vietnam. Eyes peeled, we scanned the roadside intently but when we

eventually reached the spot, they were unmissable. The flowers of this form were such pure white, they glowed in the sunlight. On either side of the road was a short stretch of scrub and a steep mud bank, leading up to woodland. *Habenaria lindleyana* was flowering on both sides, mainly exposed, with basal clusters of broadly ovate fleshy leaves pressed against the 60 to 70 degree slope, but also sheltered just behind the tree line. The soil was compacted, very stony, pH 8.52 and felt fairly dry. The light measured 1.58 kilolux on the shady side of the street and 5.2 kilolux in full sun. It was 37°C, and 63 percent relative humidity. Despite the sunlight, it was late enough in the day

for Asian tiger mosquitos to be on the wing, and they had not read the Deet label. The conflict of interests between facing this almost angelic species for the first time and hearing the breakfast bell of a swarm of potential dengue fever carriers was horrible.

### *Habenaria chlorina*

Our final day included two visits to disturbed dry dipterocarp forest near Chiang Mai. Undeterred by rain, we scoured the vegetation for the rare, statuesque *Habenaria* relative *Pecteilis susannae*. These forests, and adjacent grasslands, burn almost every year, resulting in a very open canopy and a patchy understorey, mainly of tough grasses, sedges and geophytes.

In the sparse, tufted grassland at the forest margins, *Habenaria chlorina* was beginning to bloom. The diminutive plants had narrow, 1cm wide, lanceolate-oblong leaves about 6cm long. The leaves had a pale semi-translucent border, cauline on the lower half of the stem. Crowned with 1cm wide flowers, the green-tipped, acid yellow sepals and tri-lobed, butter-yellow, lip made these plants stand out. Other examples of this species have been reported as having flowers with a red tinge, or greenish with brown spots, or with brown sepals.

Also native to Myanmar and Laos, this species is restricted to north and northeast Thailand, where it also frequents pine and oak woodland, usually on sandy soils. The substrate at the first site was pH 6.2 and almost pure sand. Its grey colour was perhaps indicative of more recent burning than the pH 5.9 tan sand and gravel by the roadside of the second site.

### Conclusion

While all the *Habenaria* species we saw are classed by the IUCN as of 'least concern', continued development is causing natural habitats to decrease in Thailand. Poaching is still

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*Habenaria chlorina*

## OTHER RELATED SPECIES SEEN IN CULTIVATION WHILE VISITING SINGAPORE AND THAILAND

The fieldwork with Queen Sirikit Botanic Garden (QSBG) was the final chapter of a study tour that began in the equatorial cloudforests of the Cameron Highlands in Malaysia, and included a stop in Singapore. As well as focusing on orchids in the wild, I looked at their cultivation at QSBG, the National Orchid Garden in Singapore and at one of its principal suppliers, Woon Leng Nursery.

Woon Leng Nursery has an impressive species collection, including Thai natives *Habenaria dentata*, and the charismatic 'Donald Duck orchid' *Pecteilis hawkesiana* (syn. *Pecteilis sagarikii*), from a genus formerly included in *Habenaria*. Both were growing in local multipurpose compost. The breath-taking *H. medusa* (considered by some as synonymous with *H. myriotricha*), was flowering well, growing in pure coconut husk.

#### Species seen in Thailand

At QSBG, *H. malintana* was enjoying the disturbed soil of a narrow bank and the company of weedy *Arundina graminifolia*. In the nursery, terrestrials are grown in local soil, under 50 percent shade cloth. Some species had a tendency to succumb to rots, while others were liable to be eaten by various pests during tuber dormancy. This year the QSBG nursery



*Habenaria medusa*



*Pecteilis hawkesiana*

plans to remove the dormant tubers and store them in paper bags. The QSBG collection included specimens of *Habenaria lucida*, the similarly tall, small green-flowered *H. furcifera* and white-flowered *H. lindleyana*. A highlight of the collection was horned *H. vidua*, with its labellum side lobes swept upwards, outstretched stigmatic arms and long green nectar spur. It is usually found on exposed rocks or in limestone crevasses, and is resident only in Thailand and neighbouring Myanmar. Pink and orange flowered forms of *H. rhodocheila* were grown in very small pots, reflecting their love of crevices.



*Habenaria vidua*

a problem in protected areas, and the internet has opened up new avenues for the sale of wild harvested orchid tubers. The long-term conservation of *Habenaria* in Thailand relies as much on the plants physical protection as on the continued presence of their

pollinators. Mystery surrounds the pollination biology of many *Habenaria* species. Here, we have documented the pollination of *H. rhodocheila* for the first time. We hope that funds will be made available for future studies of these plants and their pollinators. ■

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