



VICTORIAN CARNIVOROUS

PLANT SOCIETY Inc.

December 2006

No. 82



Nepenthes tentaculata



Nepenthes macrovulgaris



Nepenthes villosa



Heliamphora pulchella



Brocchinia reducta



Heliamphora minor



Heliamphora chimantensis



Nepenthes rajah

Annual Subscriptions

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AUSTRALIA

Journal articles, in MS-Word, ready for publication, may be Emailed to the Editor or Secretary.

Meetings

Most VCPS meetings are held in the hall at the rear of the Pilgrim Uniting Church on the corner of Bayview Road and Montague Street, Yarraville – Melway map reference 41K7. These meetings are on the fourth Wednesday of the month at 8 PM.

However, some meetings may be at the home of members during a weekend. Details of meeting dates and topics are listed in each journal.

If unsure of the location or date of any meeting, please ring a committee person for details.

The VCPS Annual General Meeting, usually held at Yarraville in June, provides substantial benefits for each and every member able to attend.

Issue No. 82

December 2006

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Seed Bank

We now have a huge collection of NEW fresh CP seed available, and our seed list has become quite extensive.

With over 250 varieties of CP's, we are now providing the list in PDF format on our website, www.vcps.au.com.

The new seed consists of over 200 types of *Sarracenia* species and hybrids, *Darlingtonia* seed obtained from the US and *Drosophyllum*.

Seed was collected from plants late 2006, so be quick, while stocks last. For inquiries or to order seeds, please contact our Seedbank Officer.

The articles that are found within are copyright but can be copied freely if the author and source are acknowledged. The views are of the authors and are open to review and debate. Please send all material to the editor for consideration to be included in our quarterly journal.



FRONT COVER:

Nepenthes rajah lower pitcher from Mt Kinabalu National Park.

Photo: Justin Thong.

BACK COVER:

Clockwise from top left:

■ *Nepenthes tentaculata*, Borneo Photo: Justin Thong.

■ *Nepenthes macrovulgaris*, Borneo Photo: Justin Thong.

■ *Nepenthes villosa*, Borneo Photo: Justin Thong.

■ *Brocchinia reducta* "Pitcher Plants of the Americas" Photo: Stewart McPherson.

■ *Heliamphora chimantensis* "Pitcher Plants of the Americas" Photo: Stewart McPherson.

■ *Heliamphora minor* "Pitcher Plants of the Americas" Photo: Stewart McPherson.

■ *Heliamphora pulchella* "Pitcher Plants of the Americas" Photo: Stewart McPherson.

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MEETING TOPICS & DATES for 2007

VICTORIAN CARNIVOROUS PLANT SOCIETY

This year we have scheduled the following discussion topics, and events:

January	(14th)	New Year BBQ, <i>Darlingtonia</i> , <i>Dionaea</i> .
February	(22nd)	<i>Sarracenia</i> species and hybrids, beginners night.
March	(28nd)	<i>Nepenthes</i> and <i>Heliamphora</i> .
April	(25th)	<i>Drosera</i> , video and information night.
May	(23rd)	Growing conditions, pygmy <i>Drosera</i> gemmae collection, 'best' and 'worst' plants.
June	(27th)	AGM, plant give-away, any CPs.
July	(25th)	Seed growing and tissue culture, potting demonstration, any CPs.
August	(TBA)	Tuberous/Winter growing <i>Drosera</i> , show preparation, displays, and companion planting.
September	(26th)	<i>Cephalotus</i> , <i>Brocchinia</i> , <i>Catopsis</i> and swap night.
October	(TBA)	Field trip to Triffid Park TBA, any CP's.
November	(28nd)	<i>Byblis</i> , pygmy <i>Drosera</i> , <i>Drosophyllum</i> , <i>Genlisea</i> , <i>Pinguicula</i> , <i>Roridula</i> , <i>Utricularia</i> .
December	(TBA)	Annual show at Collectors Corner.

Please note: All meetings, other than those where a specific venue is given, will be on the FOURTH WEDNESDAY of the month in the hall of the Pilgrim Uniting Church in Yarraville – corner Bayview Road and Montague Street, Melway Map Reference 41K7.



Mt Kinabalu summit trail.

Photos: Justin Thong

Travels around North Borneo – Part 2

JUSTIN THONG

Marai Parai 1500m
(6°03'N, 116°26'E)

THIS plateau area at 1500m on the North Western side of Mt Kinabalu is reached via a small village near the main road to the Park Headquarters, and requires permission from the Park prior to visiting due to its variety of rare flora. It takes about 3–4 hours of hard climbing to reach this pristine location. Several rivers must be crossed, and many leeches of different varieties must be removed from one's body.

Nepenthes rajah is found in a large grassy area of the plateau and

Nepenthes edwardsiana in the forested surrounding areas. *Nepenthes burbidgeae* (900m on Marai Parai Spur), *fuscus* and *tentaculata* can also be found growing in the trees in this area. *Drosera spathulata* also grows in the open areas of the plateau, along with *Paphiopedilum rothschildianum*.

Utricularia striatula and *Nepenthes lowii* are also reported to be present on Marai Parai Spur.

There is a recognised route to the summit of Kinabalu from Marai Parai which follows the ridge through dense forest on the North West side of the mountain eventually leading to the Western basin and up to the West Ghurkha hut beneath the Oyayubi Iwu

peak at 3900m. Low's peak can be seen and reached from this point.

Pig Hill 2000 m
(6°01'N, 116°36'E Pinosuk Plateau)

THIS area is close to the Mesilau Nature Resort on the South East slope of Mt Kinabalu. It is East of the Mesilau Valley on the Pinosok Plateau. *Nepenthes x alisaputrana* (*N. rajah* x *N. burbidgeae*), *Nepenthes rajah*, *Nepenthes tentaculata*, and *N. burbidgeae* (2300m) can be found here. It can be seen from a secondary dirt road on the Pinosok Plateau, and takes roughly 4 hours to reach.

Mt Trus Madi 2642m (8669 ft)
(5°34'0 N, 116°31'0 E)

MALAYSIA's second highest mountain after Mt Kinabalu. The northern route is most commonly used as its approach is from the town of Tambunan which is approximately one hour drive from Kota Kinabalu.

Climbing Mt Trus Madi used to be a three to five day prospect. Today it is much the same as climbing Mt Kinabalu. In two days you can climb and return to Kota Kinabalu. More adventurous tour companies offer trips to this mountain with everything included. There are many bird enthusiasts venturing to Trus Madi these days, with over 60 species present in the area.

The road to Tambunan passes through the Crocker Range National Park and the *Rafflesia* centre at 1830m. Here it is possible to see *Rafflesia pricei*, in fact there are several areas along this road which occasionally have *Rafflesia* in bloom. It's really just a matter of being there at the right time as these parasitic plants flower at any time of the year.

Trus Madi is approached via the Kaingaran road, which turns off the main highway opposite the shops of Pekan



Nepenthes stenophylla

Tambunan. It follows the Kaingaran river towards Mt Trus Madi, passing through an extensive logging concession and two small villages, (Batu and Kaingaran). Several river crossings must be made and during heavy rainfall it may be impossible to proceed.

Guides can be obtained by contacting the District Officer of Tambunan. You drive to a point where the road splits and passes around either side of a ridge (around 1400m) which leads up towards the summit.

The climb is immediately steep as you negotiate the ridge. The ground is wonderfully soft and spongy as you walk on centuries of built up leaf litter. There is a good place to camp overnight at around 1850m called "Taman Bunga" (or the flower garden). It offers a small relatively flat area, perched on the ridge with a hole in the ground which may hold some water. *Nepenthes lowii* (1800 – 2600m) is found around "Taman Bunga" and virtually all the

way to the summit. *Nepenthes tentaculata* (700 – 2400m) is found along the summit track.

The next morning it is possible to reach the summit within 2 hours. As soon as you reach 2200m and the mossy forest, *Nepenthes macrophylla* (2200 – 2400m) can be seen on both sides of the trail and in some places growing over the trail.

N. xtrusmadiensis is found between 2500 – 2600m of summit area, between the two peaks of Trus Madi, which are roughly 20 minutes apart. The first being 8690 ft and the highest at 8669 ft. A survey beacon marks the summit. You pass along a very narrow path on the top of the ridge, where it is possible to see the logging road below. This highlights the danger that this mountain faces as it is not within any National Park boundaries. Given it is the only known habitat of *N. macrophylla* and *N. xtrusmadiensis*, it is important not to damage any of the plants while visiting.

From the summit of Mt Trus Madi, Mt Kinabalu can be seen at a bearing of 50 and Mt Pinosowitan (Crocker Range National Park) at 350. It is possible to return to the road side from the summit in around 4-5 hours.

Mt Api – Mulu National Park

MULU National Park can be reached from Miri in Sarawak or directly from Kota Kinabalu. The climb up Mt Api is quite gruelling as conditions are hot and humid. The trail is rough and very steep, with some locations having aluminium ladders tied in place to allow you to negotiate the sharp and vertical limestone rocks. *Nepenthes faizaliana* (500 – 1500m), is quite common when you reach the appropriate altitude range. Plants can be seen in the trees covering the mountain. The climb involves an overnight stay in the lowland jungle before setting out for the



N. x kinabaluensis

pinnacles early the next morning. You return to the main park area the same day.

Kota Kinabalu

Nepenthes gracilis (0 – 750m), can be found on Signal Hill, which directly overlooks the city centre. It is also found on just about any hill with suitable growing conditions. *Nepenthes rafflesiana* (0 – 1200m) can be seen within 20 – 30 minutes of the city centre. Exposed areas on hills offer the best chance to find this species. From Kota Kinabalu you can see several television transmission towers at highpoints on the surrounding hills. Following roads to these will inevitably lead you past some *Nepenthes*.

Tenom Agricultural Park

MYR\$30 per person (Non Malaysian)

THE Sabah Agricultural Park, Located at

Lagud Sebrang, covers 1,500 acres and includes the Tenom Orchid Farm, boasting over 1,000 indigenous orchids. The rarely seen *Rafflesia* can also be found within the park, and is part of the tour provided at the park. There is a small *Nepenthes* display, housing *N. truncata*, *N. ampullaria*, *N. rafflesiana*, *N. alata* and several others.

Another location for orchids closer to Kota Kinabalu is 'Orchid De Villa' which is located about 20 kilometres or 30 minutes' drive from the City centre. Here you can see several hundred varieties on display along with a commercial cut flower nursery.

How To Get There – Sabah

Sabah has a population of around 2 million with about 400,000 in Kota Kinabalu and the facilities of any modern city available, including Malaysia's second busiest International airport. Sabah is on the backpacker trail now, so cheap accommodation in Kota Kinabalu is readily available, otherwise there are plenty of 5 star resorts to cater for the sun worshippers.

There are many different routes to Kota Kinabalu, but my favourite is via Malaysia's capital Kuala Lumpur. If you are travelling from Australia, the cheapest options may be Virgin / Jetstar to Darwin, then Tiger Air to Singapore, connecting with Malaysian airlines. Otherwise Malaysian airlines has daily flights from most major Australian cities with multiple connecting flight options from Kuala Lumpur to Kota Kinabalu.

March – April is the dry season, with November and December being the wettest, but you can experience wet or dry periods at any time of the year, so always be prepared for rain. Temperatures range between 20 – 32oC, with much cooler temperatures in the Kinabalu Park areas. Above 11000 ft, the temperature regularly goes



Rafflesia pricei

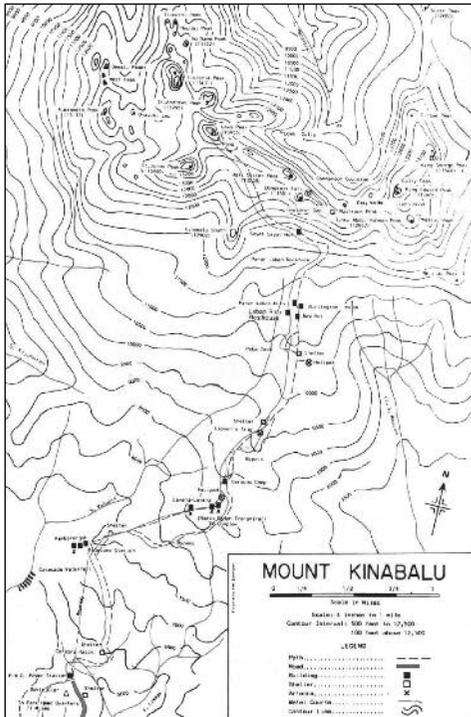
below freezing overnight, and when combined with strong winds and rain, it can be bitterly cold. Due to the large number of Park visitors and climbers, I would recommend climbing only on a week day, and preferably not during the local school holidays. Early to mid week is usually the best time to climb. Climb on a weekend and you will definitely be sharing Low's peak with up to one hundred other climbers.

There are several ways of getting to the Kinabalu National Park including joining a tour, hiring a car, or on long distance bus. Hiring a car, or even better, a four wheel drive will allow much greater freedom to explore the Kinabalu Park and especially its surrounding area. Expect to pay slightly more than Budget or Hertz in Australia, for an equivalent vehicle.

KINABALU PARK FEES (2005)

- Adult RM 15.00 per person
- Below 18 years Non-Malaysian RM 10.00 per person
- Lower fees apply to Malaysian Identity Card holders, as is common in many Asian countries. The climbing fees are also discounted for locals.

Guides, Insurance and Climbing Permit are mandatory! (Payable at the National Park)



• Guides and Porters are available on the morning of your climb, normally between 8:30am – 10:30am, no booking required. If you require an English speaking guide it is advisable to request this ahead of your climb, particularly if departing from Mesilau. Visit the Sabah Parks office in Kota Kinabalu first to enquire about guides. This also applies if you require a porter when using the Mesilau route. A good guide is invaluable when looking for Nepenthes, especially if you are not accustomed to seeing them in their natural habitat.

MOUNTAIN GUIDE FEE

(Timpohon Gate / Peak / Timpohon Gate)

Standard Route

- 1-3 Climbers - RM70.00 per trip
- 4-6 Climbers - RM74.00 per trip
- 7-8 Climbers - RM80.00 per trip

MOUNTAIN GUIDE FEE

(Timpohon / Peak / Mesilau Trail)

- * Starting and ending at different point
- 1-3 Climbers - RM80.00 per trip
- 4-6 Climbers - RM86.00 per trip
- 7-8 Climbers - RM92.00 per trip

MOUNTAIN GUIDE FEE

(Mesilau Trail / Peak / Mesilau Trail)

Mesilau route

- 1-3 Climbers - RM84.00 per trip
- 4-6 Climbers - RM90.00 per trip
- 7-8 Climbers - RM100.00 per trip

CLIMBING PERMIT

(Timpohon Gate / Mesilau Gate)

- Malaysian: RM 30.00 per person
- Non-Malaysian: Adult RM 100.00 per person
- Below 18 years : RM 40.00 per person

INSURANCE

RM 3.50 per person

CERTIFICATE

RM 10.00 per person

PORTER FEE (OPTIONAL)

- * Mesilau Trail / Timpohon Gate
- To Laban Rata - RM76.00 / trip (10 Kg)
- To Sayat-Sayat - RM88.00 per trip (10 Kg)
- To Summit - RM100.00 per trip (10 Kg)

* Timpohon Gate / Timpohon Gate

- To Laban Rata - RM66.00 per trip (10 Kg)
- To Sayat-Sayat - RM80.00 per trip (10 Kg)
- To Summit - RM88.00 per trip (10 Kg)

* Mesilau Trail / Mesilau Trail

- To Laban Rata - RM88.00 / trip (10 Kg)
- To Sayat-Sayat - RM100.00 per trip (10 Kg)
- To Summit - RM110.00 per trip (10 Kg)

Transfer to timpohon gate

Less than 5 persons RM 12.50 per way

5 persons & above RM 2.50 per person, per way

Accommodation on Mt Kinabalu

THIS is available at the main Park entrance, Mesilau and on the summit trail. Prices vary according to location and style chosen.

All Park accommodation is booked through Sutera Sanctuary Lodges in Kota Kinabalu.

(see <http://www.suterasanctuarylodges.com> for more details), and must be organised before going to the Park.

The largest building, Laban Rata Resthouse situated at (3272 M) provides, Heated Dormitory Bunk Beds (76 beds), Common Bathroom, Heated Shower / Room Heater, Restaurant Area at a Rate of RM34.00 per person.

Heated water is only available when there is regular rainfall. During dry periods, hot water is turned off to conserve water, and on occasion running water is only available for a few hours in the evening.

Hot food and drinks are available for purchase at Laban Rata. Prices are obviously much higher as everything must be carried up by porters. Expect to pay around MYR\$6 for a small bottle of water, and MYR\$10 for a plate of fried rice. The quality of catering has improved since the Sutera Hotel chain took over management of all Park accommodation.



Mt Kinabalu

What to bring on your climb

CLIMBING from the park headquarters to the 11000 ft overnight rest point is usually a hot and sweaty affair. So shorts, t-shirt, hiking boots, water bottle and some food to eat along the way are the necessities.

Water is available along the summit trail, but it is not treated in any way. I have consumed this water in the past with no ill effects, but it's a personal choice, bearing in mind, you will easily consume 2 litres or more on the way up. It is common for an afternoon downpour higher up on the mountain, so an umbrella and or raincoat is a good idea.

Carnivorous Plants

Allen Lowrie

Drosera, tuberous Drosera, tropical perennial Drosera, pygmy Drosera, Cephalotus, Utricularia, CP seed, Orchids and Trigger plants.

*Tuberous *Drosera* sold when dormant Nov-late March.

*Pygmy *Drosera* sold as gemmae (vegetative buds) over 3 months. May-June.

Allen Lowrie, 6 Glenn Place Duncraig, 6023. Western Australia

Phone: 08 9447 7426 + 61 8 9447 7426 (Overseas) Fax: 08 9246 9335 + 61 8 9246 9335 (Overseas)

Please inquire about Catalogue.

Cameras, extra film or tapes, memory sticks and batteries are probably the next thing you will consider. It is possible to recharge batteries at Laban Rata, but remember to bring a suitable adapter. Malaysia has the same large 3 pin format as Great Britain.

For the climb to the summit you will require warm clothing with a wind proof layer and a torch. Leather gloves are also handy as they will prevent any rope burn on your hands.

What else can I do in Sabah

WITHIN the Kinabalu National Park is Poring Hot springs. These natural springs are a nice place to relax and spend a day. There are numerous jungle walks, a Butterfly enclosure, orchid nursery, and tree top canopy walk with views over the forest.

If you're a scuba diver, you're in luck as Sabah has some of the best diving available in the world. The two top sites would be Layang Layang and Sipadan. You can see everything from hammer head sharks, manta rays to the smallest seahorse. Closer to Kota Kinabalu is the Tunku Abdul Rahman marine park, a 10 minute boat ride from the city port, which is a nice location to spend a day away from the crowds.

Shopping is not fantastic in Sabah, that's best left for Malaysia's capital Kuala Lumpur, however you will find some interesting local crafts, antiques and collectables if you hunt around. Wisma Merdeka is the place to look for these, on the upper floor on the port side.

The Sepilok Orang Utan sanctuary is high on the list of many foreign tourists, and well worth the visit, just be prepared for the crowds, and go early. Also in Sandakan is the Labuk Bay Proboscis monkey reserve. This is one of the best areas in the state to get up close with these interesting animals.

They can also be seen at Sukau on the

Kinabatangan river, which has several specialist nature lodges dedicated to viewing wildlife such as the Asian Elephant and Sumatran Rhinoceros in their natural habitat.

Danum valley and the Borneo Rainforest Lodge is another dedicated nature resort on the East coast of Sabah, it's a heaven for bird watchers.

Palau Tiga was the location of the first "Survivor" TV series, and is located approximately 3 hours from Kota Kinabalu. It is a nice place to get away from the city and relax for a couple of days, and a highlight is a visit to see the sea krait's (snakes).

That's a few of the major attractions, but there are many more including white water rafting, turtle island, historic train rides, museums, golf courses, delicious food, fishing, cultural events centred around the Malay, Chinese and indigenous people of Sabah, and make sure you enjoy the beverage while the sun sets at one of the many locations along the coast of Kota Kinabalu. Enjoy your trip!

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Sabah Parks climbing map, Sabah National Parks.

TRIFFID PARK

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Owned and operated by Colin and Tina Clayton. Managed by Donna ClaytonSmith.

**FOR ALL YOUR CARNIVOROUS PLANT REQUIREMENTS INCLUDING:
PLANTS, POTS, LABELS, BOOKS, SEEDS,
SPHAGNUM MOSS AND PEAT MOSS**

WRITE, PHONE, FAX OR EMAIL TRIFFID PARK FOR A FREE COLOUR
MAIL ORDER CATALOGUE OR VIEW OUR COMPREHENSIVE WEB SITE.

You are most welcome to visit Triffid Park, but please organize this with us first,
as sales and inspection are by appointment ONLY.

NEWS

DUTCH DELIGHT is here!!! A new, stronger, larger version of *Dionaea muscipula* 'Dutch'. This is the best commercially grown fly trap in Holland and has been grown by Triffid Park in tissue culture from seeds collected from a Dutch 2005 crop. This is the first release of these plants in Australia and the Victorian Carnivorous Plant Society is the first to hear about this new venus fly trap that we have for sale at \$5 each.

Here at Triffid Park we are having great success in growing *Drosera regia*. We have a tremendous crop available at \$25 each. Jason recommends a mix of 50% sphagnum peat moss and 50% propagating sand and keep them moist. Grow them in tall pots as they have very long roots, and don't allow them to get too hot, but they do like a bright position.

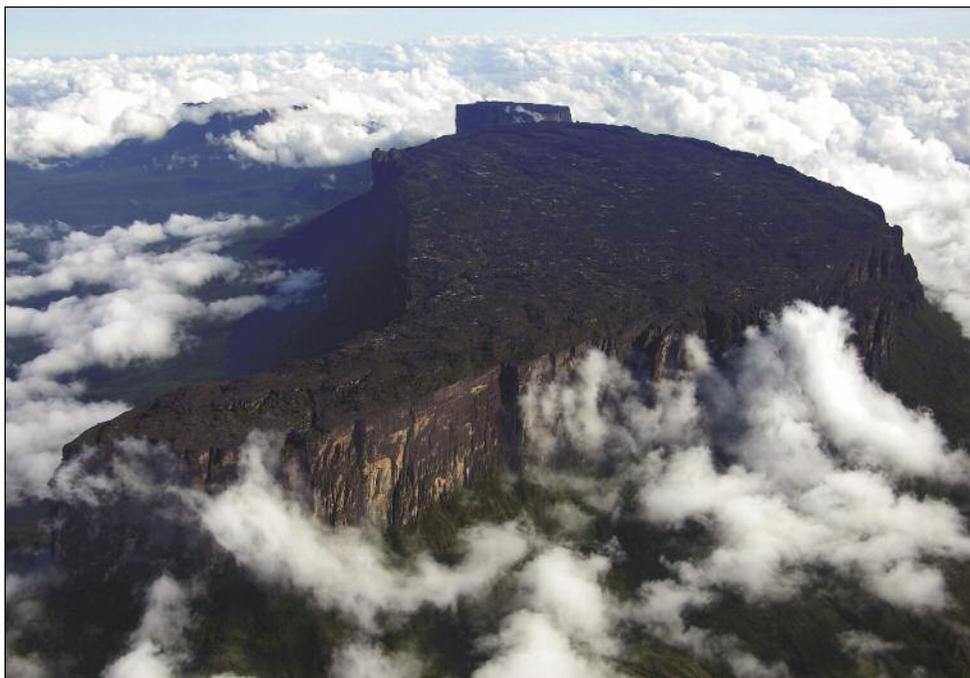
The King Sundew will grow to 50cm tall in optimal conditions.

Colin's project at the moment is growing *Cephalotus follicularis* and studying the growing habits of them, along with the different colorings in them. He has clearly identified *Cephalotus follicularis* f. green and *Cephalotus follicularis* f. red. We have lovely sized plants of both varieties available at \$40 each. The red plants need to be kept in high light for the traps to color up, but the green variety kept in the same conditions will always stay green.

Colin recommends growing the green varieties in sphagnum moss and TE-EM sphagnum peat moss for the red varieties. Overseas growers are having great success growing

Cephalotus using drip irrigation.

HOT TIP: Even though we are in water restrictions, if you have your carnivorous plants sitting in trays of water, don't forget to flush the trays out occasionally to stop the salt building up.



Mount Roraima

Photo: Stewart McPherson

Diversity of the *Heliamphora*

STEWART MCPHERSON

During 1838 and 1839, the celebrated German cartographer Robert Schomburgk was dispatched by the British Government to travel to the remote interior of the colony of British Guyana (now Guyana) to map the remote borders of the province and to survey the topography and geology of the territory. During the early 19th century, the colonial government's understanding of the interior of British Guyana was imprecise. Several explorers had traveled through the area during the previous three centuries and returned with reports of a mysterious

country dominated by towering mountains and pinnacles but the information that existed was vague and often difficult to believe. In 1595 Sir Walter Raleigh had reported an immense spire that resembled a 'white church tower' and in 1780 Capuchin Mariano (a Spanish missionary) described looming mountains that resembled 'enormous towers and castles'.

For seven months, Schomburgk journeyed through the jungles and savannahs of British Guyana towards the remote heart of the Guyana Highlands. From afar, he beheld Mount Roraima an immense vertical sided plateau on the

border of what is now Venezuela, Guyana and Brazil. In his journal he recorded 'I remained amazed looking at the gigantic thick wall and dominated by a sensation of almost grievous oppression ... looking at this giddy height, the rocky mass seemed savage and tremendous'.

Intrigued, Schomburgk traveled closer towards the great Mountain and eventually approached the base of the gigantic plateau where, in the shadow of the mountain's cliff sides, he discovered a vast marshy swamp that was home to a multitude of new plant and animal species. So bewildered by the richness of new species, he named the swamp a 'botanical El Dorado' and amidst the wealth of new species, he discovered a pitcher plant – the first to be recorded in South America.

In his 1840 work 'Journey from Fort San Joaquim, on the Rio Branco, and Thence to Roraima,' Schomburgk records the pitcher plant with fascination; 'Another plant of great interest, the *Heliamphora nutans*, resembles the pitcher plant, which are similar to those of *Sarracenia variolaris*; (now named *S. minor*) but there was a great deviation in the flower; as in the present genus there are several flowers, and the seed are winged'.

During the 150 years since Robert Schomburgk traveled to Mount Roraima explorers and travelers have discovered over one hundred similar table mountains distributed across Southern Venezuela, Guyana and northern Brazil. On their summits, a further 14 species of *Heliamphora* have been discovered (*H. chimantensis*, *H. elongata*, *H. exappendiculata*, *H. folliculata*, *H. glabra*, *H. heterodoxa*, *H. hispida*, *H. ionasii*, *H. macdonaldae*, *H. minor*, *H. neblinae*, *H. pulchella*, *H. sarracenioides* and *H. tatei*). Indeed it is now clear that *Heliamphora* is the largest genus of all the New World pitcher plants



Heliamphora ionasii

Photos: Stewart McPherson



Heliamphora chimantensis



Heliamphora tatei



Heliamphora glabra Photos: Stewart McPherson

and also that it encompasses some of the largest, most spectacular and most colourful of all carnivorous plants.

Yet despite the remarkable nature of *Heliamphora*, the genus has remained relatively obscure in botanical and horticultural circles – especially in comparison to other genera of carnivorous plants. Even today, only a few species are cultivated widely and our understanding of the systematics and taxonomy of the group has remained unclear until very recently – several species have been repeatedly mis-identified in the field and erroneously reduced or incorrectly merged with other taxa by taxonomists. In particular, much confusion remains over the *H. neblinae*, *H. macdonaldae* and *H. tatei* group.

One of the reasons that explains the obscurity of *Heliamphora* is the inherent remoteness and inaccessibility of the areas

where they naturally occur. The majority of *Heliamphora* sp. are found exclusively on the summits or flanks of the ‘Tepuis’ – the tablelands of the Guiana Highlands (Venezuela, Guyana and northern Brazil) and in many cases, often on just one or two individual mountains. Since the majority of the Tepuis rise hundreds of metres above the surrounding lowlands of Guiana and are surrounded on all sides by vertical cliffs, most are accessible only by helicopter and are visited only very occasionally by researchers and surveyors.

It is however the very ecological isolation of the Tepuis that has driven the astounding diversity of the *Heliamphora*. The Tepuis represent climatically similar yet locally isolated habitats and consequently the biogeography of the Guiana Highlands is akin to that of ocean archipelagos. The fragmentation of plant and animal populations on separate

mountain ‘islands’ has encouraged rapid evolution driving species to better suite slight climatic and ecological differences and so each species has specialized and diversified. Much like Darwin’s Finches or the Galapagos Tortoises, the genus *Heliamphora* has evolved to contain a broad spectrum of species each of which varies in terms of shape, size and colour to suite a specific ecological niche within its habitat.

H. ionasii for example grows exclusively amidst dense vegetation and so produces large, 30 – 45 cm tall, infundibular leaves to avoid being overshadowed and displaced. Since it depends upon attracting insects as a source of nutrients, it produces conspicuous red and orange leaves that contrast conspicuously with surrounding vegetation and invite the attention of potential prey. Since it occurs exclusively within the cloud forest on the flanks of the Ilu-Tramen Massif, it generally traps larger insects than species on the barren plateau summits and as a consequence, it has evolved extremely prominent downwards pointing hairs which help to retain trapped prey.

In contrast, *H. minor* has specialized in the opposite evolutionary direction and grows mainly in inhospitable and extremely barren areas largely devoid of tall vegetation. It has adapted by reducing the size of its leaves and so shelters amidst cracks and depressions in the surface of the rock and amidst other plants where exposure to wind and fluctuations of temperature are reduced. Since it often catches only small insect prey, it does not require long downwards pointing hairs on the interior surface of its leaves and instead possesses only very small hairs.

H. pulchella however frequently occurs in very wet, vegetated habitat and has adapted to its environment by lacking a drainage hole mid way up its leaf (which most other



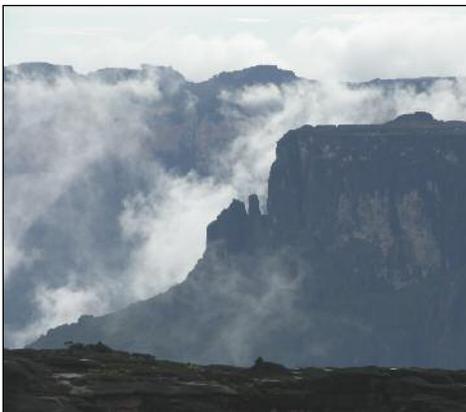
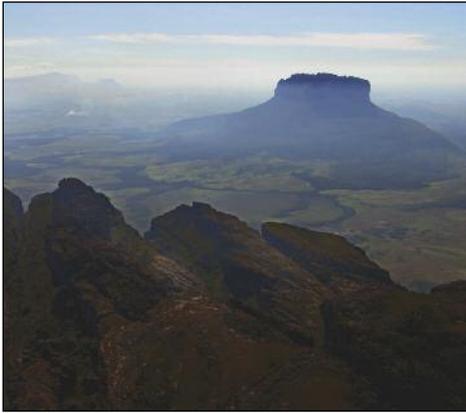
Heliamphora pulchella Photos: Stewart McPherson



Heliamphora exappendiculata



Heliamphora folliculata



Photos taken from inside the helicopter, of the Guyana Highlands.

Photos: Stewart McPherson

Heliamphora sp. possess). Consequently it can grow in deep water and not loose nutrients from trapped prey contained within its leaves.

The remarkable adaptability within the genus has enabled *Heliamphora* to diverge into an extremely successful group of plants – the combination of the very specific adaptations of each species as well as the inherent ability to access nutrients unavailable to regular non-carnivorous plants, allows *Heliamphora* to perfectly occupy ecological niches within the Tepui summit environment. Consequently *Heliamphora* often are among the most frequently occurring plants on the Tepui summits and paradoxically they often occur most frequently in the most barren and inhospitable habitats where few other plant species are able to survive or compete.

The adaptations of *Heliamphora* as pitcher plants are indeed so successful that they have evolved in parallel in representatives of at least two other plant genera – *Brocchinia* and *Catopsis* – the bromeliad pitcher plants. In these two genera it is the entire leaf rosette which collectively forms a ‘pitcher’ vessel that contains water and traps insect prey – but the carnivorous mechanism which these plants relies in essence on exactly the same morphological structure and pitfall process which typify the carnivorous nature of *Heliamphora*. Even though the diversity of carnivorous species in both genera is relatively restricted, the bromeliad pitcher plants are nevertheless extremely successful and rival the *Heliamphora* for the amount of prey that is caught.

Stewart McPherson’s two new books Pitcher Plants of the Americas and Lost Worlds examine the diversity of the

Heliamphora and the Tepuis in detail – please see a detailed overview and sample images at www.redfernnaturalhistory.com.

Stewart McPherson’s new book Pitcher Plants of the Americas examines the wild ecology and remarkable diversity of all known species of the *Heliamphora*. Stewart is selling copies personally through his online www.redfernnaturalhistory.com to raise money for the Meadowview Biological Station – with the goal of donating 5 to 10 acres of *Sarracenia* habitat for permanent protection – please see www.redfernnaturalhistory.com/conservation.htm.

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Sarracenia thriving in a backyard constructed peat bog.

Photos: David Bond

Growing carnivores in Canberra

DAVID BOND

Most people, when you talk to them about CP's worry about the cold of winter and wonder how they should care for their plants. Many worry that they don't have a glasshouse and that the extreme cold may kill their plants. No matter what you say about the natural conditions of the plants, many people do not believe you. This is an article for the skeptics.

In early spring of 2006 I visited a friend in Canberra who grows mostly *Sarracenia*. She is by no means an expert and her collection contains plants mainly supplied by myself. She has done a terrific job in propagating them and has told me that

she has given many away to her friends.

When I was there in October, the plants were just beginning to flower which at that stage was a little behind the plants in my collection. She had some sitting in shallow water within a long trench lined with plastic. Others had been planted around a pond with a waterfall that had been created on the steep block of land. These plants had been planted in another plastic lined trench filled with a peat mix.

The plants looked stunning! The flowers were beginning to open and the pitchers were just beginning to grow. Most of the plants were hybrids and were looking extremely healthy. There seemed to be little damage caused by the icy

weather experienced during the colder months in Canberra.

My friend told me that she keeps the plants dry over the colder months. The only water they receive during this time is natural precipitation. This year it had been a bit dry and it appeared that this had actually benefited the plants! She also told me that it can be so cold on some mornings that a thin sheet of ice forms on the pond adjacent to the *Sarracenia*.

The area of the yard the plants are located faces west, although they are on the east side of a hill. The house backs on to a nature reserve and the block has many native plants that are shaded by a number of quite large *Eucalyptus* trees. The area was ravaged by bushfires only two years ago where the fires came right up to the back fence.

So then what is the message here? Many carnivores, especially *Sarracenia* are extremely hardy. If you have seen photos of them in the wild you will be aware that they undergo an icy winter. It is a requirement that they receive this "hibernation" that although cold, is fairly dry. Remember that if *Sarracenia* are grown outdoors with no protection in our climate they will be a little slower to get going when spring arrives, but like the plants of my friend, your plants will be strong and healthy even though they may experience a cold winter.



Sarracenia coming into flower in spring.



The most common technique used to grow Sarracenia; in deep trays with the plants sitting in 1-2 inches of water.

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