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PO BOX 4009

Kingsway West NSW 2208 (Australia)

Meeting are held on the second Friday of each month

Time: 7.30 p.m.—10.00 p.m.

Venue: Woodstock Community Centre

Church St, Burwood

Ph. (02) 4684 3478

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Front Cover: *Nepenthes tenax* and its hybrids often form large stands in a narrow band of peaty soil between the wettest parts of the swamp and the well drained sandy banks.

Back Cover: *Drosera petiolaris* growing with *U. chrysantha* in a seep by the Moran River, Western Australia. **Photo by Dan Clark.**

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UPCOMING SPEAKERS AND EVENTS

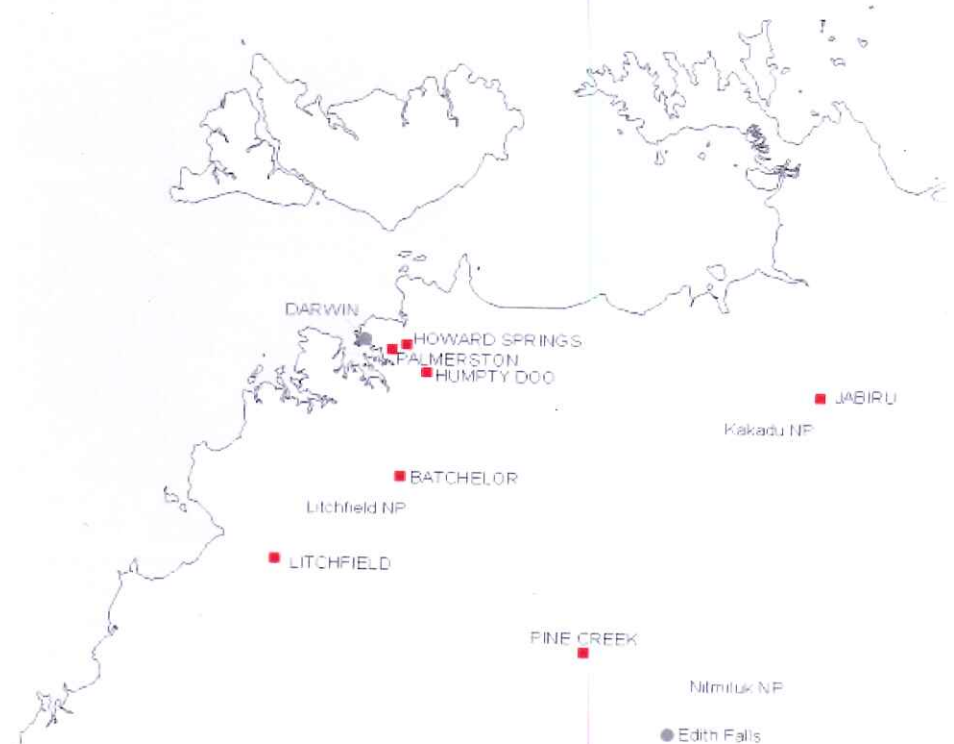
Date	Subject	Speaker(s)
12 th September 2008	Heliamphora	Stuart McPherson
25 th —30 th September 2008	International Carnivorous plant conferece	Numerous from around the world
10 th October 2008	Open discussion	Everyone
14 th November 2008	Rare plant auction Conference report	Retailers & members Greg Bourke
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12 th December 2008	Trivia Night	
9 th January 2009	Sarracenia	TBC
13 th February 2009	AGM	Everyone
13 th March 2009	<i>Nepenthes</i> Hybrids	Greg Bourke
February 2009 (TBC)	Mt. Tomah Display	

Committee 2008

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Travels in the Top End of the Northern Territory, Australia, 14 – 20 May 2008

Dr. Robert Gibson
Newcastle, Australia



Location map of the North Western part of the 'Top End'. Towns visited are indicated here.

The 'Top End' of the Northern Territory has a tropical climate with long warm and dry winters (the 'Dry Season') and a humid summer of torrential rain falls (the 'Wet Season'). About 60 native species of carnivorous plants call the Top End home (Taylor 1989, Kerrigan and Albrecht 2007).

Most of the native species there

grow to their peak in the Wet Season. A majority of species also flourish into the Dry Season. Before flying out I read up on locations and checked a number of sites on the Internet, such as 'Australia's Virtual Herbarium' (2008), for clues where to look.

I flew to Darwin on 14 May 2008 and after arriving I drove a hire car to

Howard Springs and Humpty Doo. They have some well-known carnivorous plant sites, such as Girraween Lagoon and McMinns Lagoon (e.g. Taylor 1989). I also found many other readily accessible carnivorous plant sites in the area.

Next I headed east to Jabiru on the Arnhem Land Highway, stopping at Fogg Dam en route. After a brief look around north eastern Kakadu National Park I drove south west on the Kakadu Highway to Pine Creek then to Edith Falls. With no time to try for Katherine Gorge, instead I headed north and had a day at Litchfield National Park.

During my travels I saw 20 different carnivorous plants.

BYBLIDACEAE

Four annual species of *Byblis*, or "Rainbow Plant" (Erickson 1978, p. 53) are native to the Northern Territory: *B. aquatica*, *B. liniflora*, *B. filifolia* and *B. rorida* (Lowrie and Conran 1998a, Kerrigan and Albrecht 2007, Australia's Virtual Herbarium 2008).

Byblis aquatica

An endemic to the western Top End *Byblis aquatica* thrives around Darwin and on the adjacent Tiwi Islands (Australia's Virtual Herbarium 2008) to form floating mats in slow-flowing shallow water (Gilliland 2000), I did not see plants in that condition on my travels though. Instead I saw short, purplish-red erect to semi-erect plants to 10 cm tall with leaves to ca. 3 cm long and small purple flowers. They grew in wet sandy loam amongst other herbs (at Humpty Doo) or in hardpan



Figure 2. *Byblis aquatica* in flower at the type location at Noonamah.

piesolitic laterite, the latter at the Type location for the species (at Noonamah: Figure 2). It seems that the habitats I visited had dried markedly. I observed surface water at the type location disappear in the space of a week. Once I realized how quickly the site was drying and that some *Byblis* plants were literally dying overnight, I quickly made an effort to spot the remains of recently dead plants.

At Noonamah the *Byblis* plants were seen on the edge of the roadside gutter in close proximity to *Drosera indica* and *Utricularia chrysantha*. At Humpty Doo I initially missed seeing the *Byblis* plants, for despite there being flowering plants, the plants were of similar colour to the local soil and shorter than the local sedges and taller *Drosera*.

DROSERACEAE

One can find both *Aldrovanda vesiculosa* and many *Drosera* ssp. in the Top End and adjacent regions. These locations form the centre of di-

versity for the *Drosera petiolaris* complex (*Drosera* subgenus *Drosera* section *Lasiocaulis*) and the *D. indica* complex (*Drosera* subgenus *Drosera* section *Arachnopus*) (Susandarini *et al.* 2002). Of the 14 species currently described in the *D. petiolaris* complex, 12 are native to the Top End and four of these are endemic (*D. brevicornis*, *D. darwinensis*, *D. falconeri* and *D. fulva*) (Lowrie 1999).



Aldrovanda vesiculosa in habitat

The Waterwheel Plant

There are many lakes and waterholes in the western Top End that *Aldrovanda vesiculosa* calls home. This free-floating species forms sparsely branched stems to 30 cm long and about 3 cm diameter. The leaves come in whorls, and the snap-traps have lobes up to 5mm long. Plants thrive in clean, clear water up to 40 cm below the surface. In well-lit conditions the plants here (as indeed appears to be true for all Australian *Aldrovanda*) acquire a deep red colour.

I saw the Waterwheel Plant at Fogg Dam Nature Reserve on the edge

of the lake in flooded *Melaleuca* forest. They also grew in adjacent open water — some specimens appearing to be in fruit. They grew in the company of other aquatic plants including *Utricularia aurea* and *U. gibba*. Fogg Dam would have to rank as one of the easiest places to see *Aldrovanda* in the wild. A raised wooden boardwalk crosses over the eastern edge of the wetlands. Fogg Dam attracts also has a rich and diverse range of waterbirds.

The Sundews (*Drosera*)

Approximately 18 species of sundew come from the Top End - the number is imprecise due to current taxonomic uncertainties in the *Drosera petiolaris* and *D. indica* complexes. In addition to these main sundew groups *D. burmanni* grows in abundance across the Top End whilst *D. peltata* is known from a few sites on the Arnhem Land Escarpment.

The *Drosera petiolaris* complex

One recognizes members of the *D. petiolaris* complex by their small round leaves at the end of long, narrow, often hairy petioles and erect scapes bearing large numbers of flowers (characters not seen in the two annual species: *D. banksii* and *D. subtilis*). However, it is not always possible to identify the species seen in the field because of seasonal variations. Differences mainly exist in the extent and nature of hair development, the reliance of transient features (such as flowers or fruit) and that most members of the complex appear to be highly interfertile and lead to local hybrid

populations (Lowrie 1991).

It was interesting to see plants in the same population can enter dormancy at different times and in different ways. For example plants still actively grow with emerging scapes near plants that have their summer leaves dying away. Some plants may also sprout shorter leaves in the middle of old summer rosette distinctly hairier than older leaves. In some populations plants developing shorter leaves may also send up new scapes — a confusing muddle indeed!

Drosera brevicornis

An evergreen flat rosetted sundew up to 5 cm diameter and endemic to the Top End, *Drosera brevicornis* has oblanceolate petioles up to 3 mm wide and orbicular lamina up to 5 mm diameter. One to four scapes develop on mature plants between March and April, each some 40 cm long and have over 25 flowers. Each bloom has pink, rarely white, petals up to 25 mm across. The specific name comes from one distinctive feature, the horn like projection of each filament that extends over the anthers and curves forward to partially cover them. The pedicels are pendulous in fruit. Dendritic white hairs densely cover most parts of the plant at any time of year. It reportedly grows in gravely soil in intermittent watercourses and around hills (Lowrie 1996). Before being formally published, botanists informally referred to *Drosera brevicornis* as *Drosera petiolaris* aff. “Medium Rosette” (Lowrie 1990, Lowrie 1991).

I saw plants of *D. brevicornis* in



Figure 3. *Drosera brevicornis* rosette in an ephemeral drainage line near Palmerston

seasonal wetlands in hills east of Palmerston and seasonal drainage lines near Humpty Doo. Some plants had the remains of the short scapes still present. Many rosettes had ceased growth entirely. (Figure 3) They grew beside plants sending out shorter leaves for the Dry Season. Some plants near Palmerston were a lovely deep red colour overall. They had leaves about 1 cm across, and appeared to represent hybrids with *D. falconeri*.

Drosera darwinensis

Endemic to the western Top End, this species forms an evergreen flat rosette of up to 3 cm across (Lowrie 1991). The oblanceolate petioles grow up to 3 mm wide. They vary in length between the Wet and Dry Season. The orbicular lamina also reaches up to 3 mm across. One or two scapes emerge per mature plant between December and April, but no plants had any sign of remaining scapes that I saw. They can

grow up to 15 cm long and have up to 24 flowers. Each open flower, about 10 mm diameter, has white or pink petals. The pedicels are sub-horizontal in fruit.

Moderately to densely barbed hairs cover most plant parts. *Drosera darwinensis* seems to grow in clay-sand in association with the laterite weathering profile (Lowrie 1991). It was informally known as *D. petiolaris* aff. “Mini Rosette” (Lowrie 1990; Lowrie 1991). A few plants of *D. darwinensis* occurred around Humpty Doo and Noonamah. (Figure 4) They tended to grow in very sandy soils associated



Figure 4. Conspicuously hairy and diminutive *D. darwinensis* rosette at Litchfield National Park.

with intermittent drainage lines. Similar looking plants grew near Wangi Falls in Litchfield National Park.

Drosera dilatato-petiolaris

A robust summer-growing perennial sundew, *Drosera dilatato-petiolaris* holds its leaves in a semi-erect rosette, growing in the western Top End and Kimberley Region of

Western Australia. They have leaves up to 10 cm long with a narrowly oblanceolate petiole up to 3 mm wide. Reported to be up to 3 mm in diameter, the small lamina are orbicular in outline (Lowrie 1998b). Over time plants form new growing centres beside the main growing point, which led to large, dense clonal colonies reaching up to 40 cm diameter (Lowrie 1991). Mature plants flower in October in the build up to the Wet Season. Scapes rise up to 20 cm tall and have up to 20 flowers.

The well-spaced flowers up to 14 mm diameter have white or pink petals. Pedicels are erect in fruit. This species grows in seasonally damp sandy to stony soil near rock outcrops or in open woodlands. Appressed white hairs cover most parts of the plant and are generally more abundant on the leaves that grow in drier conditions. The base of the leaves persist to form a bulb-like structure just below the soil surface to which the plant dies down during the Dry Season (Lowrie 1998b).

I saw *Drosera dilatato-petiolaris* as the most commonly encountered member of the *D. petiolaris* complex. Locally common in wetlands around Howard Springs, Palmerston and Noonamah, they also occurred near Jabiru and in Litchfield National Park. Plants formed large semi-erect rosettes to 10 cm across in wet to sodden soil, often in the company of *D. indica* and species of *Utricularia*. No plants had the remains of any scapes.

A vibrant red population grew in a wetland at Howard Springs and a drainage depression near Palmerston. They had lamina up to 8 mm across –



Figure 5. Red *D. dilatato-petiolaris* rosettes near Palmerston. The lamina of 8 mm diameter could indicate hybridisation with *D. falconeri*.

much larger than the size range in the literature. Such plants may represent hybrids with *D. falconeri* - also reported from nearby Palmerston by Lowrie (1990). (Figure 5).

Plants of similar appearance to *D. dilatato-petiolaris* grew in dry sandy soil in woodland adjacent to a small floodplain in the western side of the Kakadu National Park. These unusually hairy plants though formed semi-erect



Figure 6. Semi-erect, hairy rosettes, possibly *D. dilatato-petiolaris* x *D. lanata* in Kakadu National Park.

rosettes to 6 cm, different to other populations seen nearby; perhaps natural hybrids between *D. dilatato-petiolaris* x *D. lanata*? (1991) (Figure 6).

Drosera fulva

A perennial evergreen sundew that varies in leaf hairiness and leaf orientation between the Wet and Dry Seasons, *Drosera fulva* closely resembles *D. dilatato-petiolaris*. It has leaves with an oblanceolate petiole up to 3 mm maximum width and small orbicular lamina to 3 mm diameter. It forms a bulb-like structure of retained leaf bases. In the Wet Season *Drosera fulva* sprouts a prostrate rosette of glabrous leaves. After flowering, which occurs between February and May, the rosettes tend to become semi-erect. Leaves produced as the Dry Season approaches have a thick cover of white dendritic hairs. The scapes are up to 45 cm tall and crowded with up to fifty flowers. Each bloom has pink, rarely white petals up to 2 cm across. The scape is densely covered in short dendritic hairs with short pedicels pendulous in fruit. Endemic to the western Top End, *Drosera fulva* prefers sandy soil on damp flats, seeps and seasonal wetlands (Lowrie 1998b). *Drosera fulva* appears to be very closely allied to *D. brevicornis* and has a minute projection at the apex of each filament (Lowrie 1996). At one location by Howard Springs *D. fulva* grew on a sandy soil bench around the margin of a seasonal wetland. Some plants were going dormant at the time, but most had bedewed glandular leaves - and

some were even sending up new scapes (Figure 7). In contrast to other members of the *D. petiolaris* complex, most of the *D. fulva* plants had the remains of scapes. From the length of the scapes (greater than 20 cm) and the large number of flowers these plants were clearly not *D. dilatato-petiolaris*, which seemed to prefer wetter conditions (Lowrie 1996). Based on morphological characters, could *D. fulva* be a natural hybrid between *D. brevicornis* and *D. dilatato-petiolaris*? Further study is needed to test this hypothesis.



Figure 7. *Drosera fulva* rosette entering dormancy, Howard Springs.

Drosera lanata

Most plant parts of *Drosera lanata*, an evergreen flat rosetted sundew, have a cover of dense, white dendritic hairs to give it an overall pale green colour. The narrow, lanceolate petioles extend up to 1 mm in maximum width and 4 cm length. The sub-orbicular lamina gets up to 2 mm long and 2.5 mm width. Mature plants produce a single inflorescence between



Figure 8. Hairy flat rosettes of *D. lanata* with *D. paradoxa* or *D. derbyensis*, Kakadu National Park.

January and March up to 25 cm long and holds up to 30 flowers in a crowded raceme. The white petalled flowers reach 12 mm in diameter. The pedicels on the scapes are pendulous in fruit. *Drosera lanata* grows in well-drained sandy soil in bare areas within open woodland on high ground above flood level of adjacent rivers (Lowrie 1991). The soil dries out quickly at the end of the Wet Season when the plants start to produce progressively shorter leaves (Lowrie 1999). In the Wet Season the petioles become longer and the leaves rise to semi-erect. Mature plants produce side shoots. This spreading ultimately leads to the formation of large compact clonal clusters.

I saw plants of *D. lanata* the sandy floodplain of a creek near Jabiru in a Speargrass (*Austrostipa* species) Grassland (Figure 8). The plants had no old flower scapes and showed signs of entering dormancy. They grew in the company of *D. paradoxa*/ *D. derbyensis*. There plants of intermediate form appeared to represent hybrids.

Drosera paradoxa (or *D. derbyensis*)

A unique feature of *Drosera paradoxa* plants is the development of stems of up to 30 cm tall, however these are only formed when plants grow in optimum conditions. These evergreen plants form a semi-erect rosette up to 10 cm diameter (Lowrie 1991). Leaves have linear petioles to about 4 cm long. Plants produces one to five scapes in the flowering season up to 40 cm long with as many as 70 flowers. Flowers have white or pink petals that can get 25 mm in diameter.

Hairs that are sparsely to moderately barbed cover most parts of the plant. *Drosera paradoxa* is reported to grow in skeletal sandy soil over bedrock, either beside creeks or in the beds of ephemeral streams. It has been found that in this habitat plants may be totally removed by Wet Season floods, but the habitat is recolonised by a new batch of seedlings (Lowrie 1997). Before this species was described it was informally known as *D. petiolaris* aff. "Erect" (Lowrie 1990, Lowrie 1991).

A visit to a sandy floodplain near Jabiru led to a discovery of an attractive member of the *D. petiolaris* complex. It had long, very hairy linear petioles up to 6 cm long that ended in small orbicular leaves. The leaves were erect to semi-erect so the rosettes therefore formed balls of leaves. There were no signs of any scapes on any plants. Only three members of the complex are so far known to have linear petioles: *D. petiolaris*, *D. paradoxa* and *D. derbyensis*. The site appeared too dry for *D. petiolaris*. *D. paradoxa* is supposed to be hairier than *D. petiolaris*, in the



Figure 9. Large plants of *D. paradoxa* or *D. derbyensis* growing with a putative hybrid with *D. lanata* in the Kakadu NP.

Dry Season especially. The amount of hair on these plants seemed excessive – more like *D. derbyensis*, a species from much further inland (Australian Virtual Herbarium 2008). Scape details would help to differentiate between these species. So for now it remains a mystery, and these plants are tentatively referred to as *D. paradoxa* with reservations. These plants grew in the company of *D. lanata* and of a putative hybrid of intermediate characters between both taxa (Figure 9).

Drosera petiolaris

The most widespread member of the complex of the same name, *Drosera petiolaris* grows across northern Australia and in southern New Guinea. It favours seasonally shallowly-flooded habits. This species forms semi-erect rosettes. The leaves have linear petioles up to 0.8 mm long

by up to 6 cm long at flowering, and up to 8 cm long outside the flowering season (Lowrie 1991). The lamina are suborbicular and are up to 2.5 mm long by 3.5 mm wide and have remarkably long-stalked marginal retentive glands compared to other members of the genus (Lowrie 1990).



Figure 10. Domes of *D. petiolaris* at Noonamah, growing with *U. chrysantha* and *U. odorata*.

Mature plants eventually form a very short stem. The 20 cm scapes produced from October to April bear many pink or white flowers in a crowded 1-sided raceme. The flowers get up to 15 mm across with pendulous pedicels when in fruit. Most parts of the leaves have a sparse cover of short simple and dendritic hairs produced in the Wet Season, but leaves produced in the Dry Season can have a dense cover of hairs (Lowrie 1998b, Lowrie 1999).

Seen at Noonamah and Howard Springs and possibly also at Litchfield National Park, the best site was Noonamah (Figure 10). By May the rapidly drying soil were causing the balls of *D. petiolaris* to show signs of dormancy.

Drosera subgenus *Drosera* section *Thelocalyx*

Drosera burmanni

A widespread flat rosetted sundew that reaches from Australia to Japan and extends west through China to India, *Drosera burmanni* also occurs on most places in between. Burman's sundew is usually an annual. The petiole uniformly widens from its base to obovate-spathulate leaves stretching out. A translucent multiply-divided stipule occurs at the base of each leaf. Rosettes, usually around 4 cm diameter, can reach up to about 6 cm in some populations. Several slender racemes up to 20 cm tall arise from the centre of mature plants bearing many flowers. Up to 1 cm across, each bloom has white, rarely pink petals. Similar to of *Aldrovanda vesiculosa* in structure, each flower once pollinated produces many very fine seed. Typically green with white petals, scattered populations red leaved plants may have pink petals. One notable characteristic of this species, the marginal glands at the leaf apex move rapidly.

I saw this distinctive sundew at many locations in my travels, including a red rosette form near Jabiru, growing beside fully green plants. All plants encountered though had white flowers. The flowers were open from around

8.00 a.m. to 10.00 a.m.

Drosera subgenus *Drosera* section *Arachnopus*

The Indian Sundew (*Drosera indica*)

An annual species, *Drosera indica* occurs widely in the Old World Tropics, from India, Africa, eastern Asia, South East Asia to Australia. It generally has an erect to trailing single stem up to 20 cm tall from which linear leaves emerge up to 10 cm long, initially erect before becoming horizontal or reflexed. Scapes generally form within a few weeks of germination and keep sprouting until the soil begins to dry out and the plants start to die (Lowrie 1998b).

Several taxa in the *D. indica* complex occur, the centre of diversity being the Top End and Kimberley regions. The taxonomic limits and status of many entities have yet to be fully assessed. Recognised just recently, some plants of the complex have small glands at the leaf base. They do not appear to digest prey, their exact function(s) still unknown (McPherson 2008, p. 113). The morphology of these glands, amongst other characters, were used to describe *D. hartmeyerorum* of the Kimberley region as a separate species (Schlauer 2001). Here are the different taxa seen:

Drosera indica “Typical”

The most common taxon I encountered, it grows to about 40 cm tall and has relatively narrow leaves. The plants had an overall pale green colour. It has a relatively tall stature and leaves lacking long-stalked insect-trapping hairs at the base (‘petiolate leaves’)



Figure 11. Typical form of *D. indica* seen in the Top End. This plant was photographed at Howard Springs.

(Figure 11). The leaves, stems, and peduncles have a dense cover of red to colourless, short (<0.2 mm tall) bifid (“T”- shaped, sometimes “Y”-shaped) glands. Multi-flowered scapes extend beyond the range of the leaves and have pink or white flowers 2 cm across. This taxon appears to be the most widespread of the complex, occurring from Cairns through South East Asia to tropical India and Africa (Diels 1906).

I saw this form in local abundance at Howard Springs, Noonamah and Kakadu National Park. The plants grew in wet grassland/ herbland, often with other taxa of *D. indica*, *D. burmanni* and a range of *Utricularia*. Plants commonly had three or more flower scapes.

Large sessile-leaved taxon

This taxon seems similar in size and colour to the typical taxon but has stalked retentive glands along the entire sessile leaf length, which are also generally broader and more strongly reflexed with age (Figure 12). Similar

small bifid glands cover most plant parts like in the petiolate-leaf form. The inflorescences emerge horizontally and then weakly ascend. They bear



Figure 12. A large plant of sessile-leaved *D. indica* in a wetland at Howard Springs.

small pale pink, rarely white petalled flowers. This taxon occurs widely in Australia, reaching into temperate latitudes and also appears to extend into South East Asia. Plants in Queensland of similar appearance to this taxon have been described as “*D. indica* forma *robusta*” by Bailey (1913).

I saw this taxon in wet grassland around, locally common around Howard Springs and Noonamah, many in flower with pale pink petals.

Drosera indica aff. “Darwin” (sensu

Lowrie 1998)

This diminutive taxon of *D. indica* comes from the Darwin region and produces sessile leaves up to 2 cm long. It has few-flowered scapes with tiny white, rarely pink petalled flowers (Lowrie 1991, Lowrie 1998b, Susandarini *et al.*, 2002). It seems to be a mini version of the former sessile leaved taxon, differentiated only by plant and flower size (Lowrie 1991).

I saw plants up to 10 cm tall at Noonamah and Howard Springs that had scapes to 10 cm long with small (<1 cm diameter) pink petalled flowers



Figure 13. A diminutive flowering plant of *D. indica* — *D. indica* sp. aff. “Darwin”? Photographed at Noonamah.

(Figure 13). I am not sure if such plants fit this taxon or were simply depauperate plants of the typical sessile leaved form? *Drosera indica* plants with sessile leaves and pink flowers of a range of sizes grew at both sites and I really couldn’t find a difference.

‘Hooded stamen’ taxon

The most exciting and dramatic taxon of *D. indica*, the ‘Hooded Sta-

men Form' (Lowrie 1998) appears to be restricted to the Top End and adjacent Kimberley Region of Western Australia (Susandarini *et al.* 2002). This taxon grows to 40 cm tall with narrow petiolate leaves to 10 cm long. Unlike the others it has a short cover of minute clavate (shortly, incipiently bifid) glands over most of the surface. Mature plants produce multiple horizontal to weakly ascending scapes with white or pink petalled flowers. It's key diagnostic feature is the large red stamens that have a wedge-shaped fila-



Figure 14. Flower of *D. indica* "hooded stamen form" with red, dilated stamens. Photographed at Noonamah.

ment with widely separated anthers (Lowrie 1998) (Figure 14). The typical seed surface pattern of members of the *D. indica* complex is a cellular ("foveolate") pattern of the testa. However, in the 'Hooded Stamen' taxon the surface of the seeds have deep furrows (Lowrie 1998, Susandarini *et al.* 2002).

I saw them at Humpty Doo and Noonamah growing in wet grassland. Flowering plants all had lovely dark pink-red petals, some even had a darker red base. Although Susandarini *et al.* (2002) described this taxon to have also a dark red stripe along the back of each leaf, I saw none there and then.

LENTIBULARIACEAE

The Top End is one of the 'hot spots' for diversity for the genus *Utricularia* (Taylor 1989). Ten of these species are endemic (Kerrigan and Albrecht 2008, Lowrie *et al.* 2008). Taxonomically the native species occur in nine sections within subgenus *Utricularia* (Taylor 1989, Lowrie *et al.* 2008).

During my travels in the Top End I saw ten species.

Section NIGRESCENTES

Utricularia caerulea

A widespread and variable bladderwort, *Utricularia caerulea* has spoon shaped leaves are up to 1 cm long by 2 mm wide. Its traps come in two sizes — small traps between 0.25 and 0.5 mm long and longer traps between 1 and 1.5 mm long. All traps have a characteristic beak as well as distinctive glandular hairs around the mouth. The scapes may be between 2 and 50 cm long. They may be single flowered or have over 20 flowers in multi-flowered, glabrous scapes clustered towards the apex. It has scattered bracts along its length fixed to the scape at around the midpoint. The white or purple flowers open between 0.2 and 1.2 cm long. The erect upper

petal is usually oblong or obovate, yet the broadly ovate lower petal has a domed base. Sometimes it has a yellow pigment at the hairy palate. The pedicels are reflexed in fruit. It grows in a range of wetlands, from swamps to seepages, and flowers most of the year (Taylor 1989).

I saw this species in flower in wet grassland at Howard Springs. It displayed the diagnostic horizontal spur. *Utricularia caerulea* grew with *U. chrysantha*, *U. odorata*, members of the *D. indica* complex and *Byblis aquatica*.

Section ENSKIDE

The two yellow flowered terrestrial bladderworts, *U. chrysantha* and *U. fulva* are widespread and charismatic carnivorous plants of the Top End and adjacent parts of far northern Australia.

Utricularia chrysantha

This annual species has linear to narrowly obovate leaves up to 3 cm long. The circular traps only grow between 0.35 to 0.6 mm long. The scapes reach some 60 cm tall with scattered bracts along their length, mostly multi-flowered too, with over 20 flowers from 0.8 to 1.5 cm long. Often they open simultaneously ranging from pale to deep yellow. A variable amount of red pigmentation happens on the palate and petal undersurface. Surprisingly I found that the pale yellow flowers tended to a red undersurface whilst bright yellow flowers had white instead. Flower have a vertical oblong upper petal and a larger lower petal

with a typically four-lobed apex. A conspicuous vertical spur projects below the lower petal. (Taylor 1989, Denton 1992).

One of the most widespread and frequently encountered carnivorous plant species encountered during my travels its five-lobed lower petals on flowers held on wiry scapes readily identified it. *U. chrysantha* (Figure 15). tended to grow in wet grasslands and



Figure 15. Bright yellow *Utricularia chrysantha* with morning dew, Kakadu National Park.

swamplands, including ephemeral areas and commonly in the company of *U. odorata*, *D. indica* and *D. burmanni*.

Utricularia fulva

Utricularia fulva has pale orange flowers, which are variably red-dotted. The upper bifurcated petal has each rounded lobe diverging from the other. The lower semi-circular petal has either three or four lobes. The subhorizontal spur develops an upcurved apex to project beyond the lower petal. Endemic to the Northern Territory, it occurs primarily on the Arnhem Land and grows along the margins of streams, flower-

ing between March and September (Taylor 1989).

I was looking forward to see it yet had to wait until nearly the end of my trip at Edith Falls and Litchfield National Park. The plants grew in thin sandy soil on quartzite beside creeks. Somehow plants avoid getting washed away during the wet season. Their large, showy and distinctive flowers, helped by their gregarious and floribund nature made them easy to spot (Figure 16). *Utricularia fulva* commonly grew with *D. burmanni*.

Section *OLIGOCISTA*

Utricularia section *Oligocista* has plants in it characterised by flowers with a prominent swelling on the lower petal. Six species of this section occur in the Top End and includes the only three local bladderwort species with twinning scapes (*U. involens*, *U. circumvoluta* and *U. foveolata*).



Figure 16. The large, distinctive and attractive flower of *U. fulva*, photographed at Edith Falls.

Utricularia odorata

Commonly seen in my travels. *Utricularia odorata* has branching scapes holding many open flowers at once (Figure 17). In Noonamah (Lowrie 1991) *U. odorata* flowers imparted a sweet fragrance to the area. The scapes reached 55 cm with a congested raceme of yellow flowers. Up to 1.5 cm long each flower has two sepals that surround it, enlarging conspicuously once in fruit. Recorded



Figure 17. A cluster of *U. odorata* flowers which have a sweet smell, photographed at Howard Springs.

from the Darwin area to the Arnhem Land escarpment from around Oenpelli to near Katherine, it grows in wet grasslands and flowers for most of the year (Taylor 1989).

Utricularia uliginosa

Utricularia uliginosa commonly grows beside creeks and can tolerate the floor of clear shallow pools, up to a metre deep. In these conditions the leaves can reach up to 10 cm long. The

erect scapes rise 30 cm tall at best, sometimes with ten flowers 5 mm to 8 mm long uniformly scattered along the upper half. The flowers vary from pale to deep purple in colour. They grow through most of the year. The pedicels are erect in fruit (Taylor 1989).

I saw this species beside creeks at above Edith Falls and Florence Falls, the latter in Litchfield National Park. In both places plants grew in alluvium on creek banks firmly secured by roots, a habitat protected from washing away in Wet Season floods.



Figure 18. The undersurface of *U. leptoplectra* flowers can be a lovely yellow colour as seen here in flowers at Girraween Lagoon.

Section *NELIPUS*

There are three species in section all of which occur in Australia, all growing on the floor of shallow lakes and ponds. They send up pinnately divided leaves into the water body from stolons affixed in the lake floor. The tall and robust scapes bear a raceme of purple flowers characterised by a strongly bilobed lower petal.

Utricularia leptoplectra

A beautiful, robust and distinctive bladderwort endemic to northern Australia *Utricularia leptoplectra* flowers have a deeply divided lower petal, with narrowly oblong lobes between 1 and 2.5 cm long. The upper ovate petal rises over the bulbous palate. The nectary spur reaches at least 1.5 cm long. Typically the dark purple petals have either a pale yellow, orange or white undersurface (Simmons 1991: Figure 18). The pedicels are semi-erect to horizontal in fruit. Recorded from the Darwin area to the Arnhem Land escarpment, it reaches as far south as Katherine. Plants usually flower at the end of the wet season (Taylor 1989).

Some reports exist of *U. leptoplectra* from Noonamah with white petalled flowers of half the typical size (Lowrie 1991) and of another atypical form *U. leptoplectra* in the Daly River Region. These small, slender plants in comparison with *U. leptoplectra* have significantly lower petal lobes and a shorter and broader spur (Taylor 1989).

I saw these beautiful plants growing at the margins of lakes, on the bank and bed of creeks and even on asphalt in creek crossings.

Utricularia limosa

Utricularia limosa has scapes to 35 cm tall with up to 20 purple, rarely white flowers. The lower petal of each flower is bilobed for about half the total length into two broad triangular lobes up to 6 mm long. The vertical conical spur is similarly short and stout. Another characteristic of this species is that the pedicels are erect in fruit. The most widespread member of this section, it extends from northern Australia to Indochina. This species grows in swamps and the margins of pools between Darwin and Katherine. It is known to flower during and just after the wet season (Taylor 1989).

Despite the accounts I was still surprised how small the flowers compare to other members of this section (*U. leptoplectra* and *U. biloba*). Even though it's widespread, I only saw it at Litchfield National Park, growing in abundance in mud beside a creek next to *D. burmanni* in the shade.

Section UTRICULARIA

Section *Utricularia* comprises thirty-four species, mostly free-floating suspended aquatic bladderworts the Top End harbouring five species and one presumed natural hybrid (Taylor 1989). Do be cautious when looking for aquatic bladderworts though. Salt-water Crocodiles also lurk in the same areas!

Utricularia gibba

One of the most widespread carnivorous plants on the planet, *Utricularia gibba* is a short-leaved species. The stolons are usually up to 20 cm

long and to 1 mm thick. They bear leaves with two primary sparsely divided segments up to 1.5 cm long with traps up to 2.5 mm long. Flowers arise from slender scapes that never form whorls of inflated supports. (Figure 19) The bright yellow flowers have an upper petal and lower petal similar in size and shape. *Utricularia gibba* grows in lakes, streams and wet soil and can flower any time of year (Taylor 1989).

I saw it in many places and plants even flowered when stranded in mud risking imminent desiccation in a roadside gutter at Humpty Doo. Typical of the species, the yellow flowers had upper and lower petals of similar size and shape arching out from bulbous palates.



Figure 19. *Utricularia gibba* in flower in a drying roadside gutter, Humpty Doo.

Utricularia aurea

A robust aquatic species, *Utricularia aurea* has pinnately divided leaves to 8 cm long that grow between three and eight primary segments on stolons to 1 m long. The scapes sometimes produce a whorl of narrowly ovoid flotation stolons at the base and

pale yellow, variably hairy flowers. It is a widespread species across the tropics of Asia and Australia (Taylor 1989). Literature reports plants of hybridogenic origin between *U. aurea* and *U. muelleri* near Darwin (Anonymous, 1989) but I did not see any plants to match the descriptions.

I saw plants that appeared to be *U. aurea* at Fogg Dam and at Magela Creek of Kakadu NP — in both cases with luxurious leaves, scapes, and flowers pendulous in fruit. I did not venture close enough to peer through the surrounding algae and other water plants to key out other plants.

Utricularia stellaris

The largest of the free-floating bladderworts in the Top End, *Utricularia stellaris* has stolons to one metre

long and up to 1.5 mm thick. With leaves up to 6 cm long, divided into three to six primary segments, they have traps up to 3 mm long. The peduncles have a whorl of sessile, shortly ovoid spongy floats produced about their midpoint. (Figure 20) The yellow and finely hairy flowers form throughout most of the year. The sepals enlarge in spectacular style in fruit and the pedicel becomes sharply deflexed. This species occurs in lakes and wetlands near Darwin (Taylor 1989).

I saw this species only at McMinns Lagoon near the lake edge in the company of *U. gibba* and other plants. The few scapes present all had a lovely rosette of floats just below the water's surface. The aerial parts of the scapes were short, with a congested raceme of small yellow flowers. I



Figure 20. *Utricularia stellaris* in flower at McMinns lagoon, near Howard Springs.

measured the water surface at this site at between 25° and 30°C on two separate days.

Some General Comments

Botanising in the Top End has its dangers, mainly crocodiles. The previous Wet Season caused many tracks and roads to close. During my time in the Top End the daily maximum temperature ranged from 31° to 33°C, and the minimum varied from 19° to 24°C. Dew formed on most nights, the only precipitation to fall the whole time there. Fairly windy days made photography challenging at times. The water levels in freshwater lakes at Howard Springs dropped noticeably in the week I was there. I saw *Byblis aquatica* plants alive one day and dead the next.

Most carnivorous plant sites supported a range of other native herbs also in flower. Indeed, the presence of these wildflowers indicated some carnivorous plant locations. The most commonly associated plants were *Eriocaulon cinerum* (Eriocaulaceae), *Stylidium* spp. (Stylidiaceae), *Goodenia purpurea* (Goodeniaceae), *Calandrinia* spp. (Portulacaceae), *Mitrasacme hispida* (Loganiaceae), *Cassytha filiformis* (Lauraceae) and *Xyris* spp. (Xyridaceae).

Some native herbs had flowers superficially resembling those found in bladderworts: *Buchnera linearis* (Scrophulariaceae), *Lobelia* spp. (Campanulaceae) and *Mimulus uvedaliae* var. *lutea* (Scrophulariaceae).

Even on a short trip to the Top End, many carnivorous plants evaded my watchful eye. Next time I visit I

would go closer to the end of the Wet Season to see more species. I'm looking forward to my next visit.

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REFERENCES

- Anonymous (1989) Photos of *Utricularia muelleri* x *U. aurea*. *Bulletin of the Australian Carnivorous Plant Society, Inc.* **8**: 29 - 31.
- Australia's Virtual Herbarium. (2008) [<http://www.rbg.vic.gov.au/avh/>] Accessed 27 May 2008.
- Bailey, F. M. (1913) Contributions to the Flora of Queensland. *Queensland Agricultural Journal* **31**: 115 - 118.
- Diels, L. (1906) Droseraceae. In A. Engler (Ed.) *Das Pflanzenreich* **4** (112 26): 1 - 128.
- Denton, B. (1992) Carnivores and their keepers. *Bulletin of the Australian Carnivorous Plant Society, Inc.* **11**: 4 - 9.
- Erickson, R. (1978) Plants of Prey in Australia. University of Western Australia Press, Perth.
- Gilliland, R. (2000) CP's at Howard Springs NT. *Bulletin of the Australian Carnivorous Plant Society, Inc.* **19**: 10.
- Kerrigan RA and Albrecht, DE (eds) (2007) Checklist of NT Vascular Plant Species [http://www.nt.gov.au/nreta/wildlife/plants/pdf/family_checklist.pdf] Accessed 27 May 2008.
- Lowrie, A. (1999). Some insights into the Australian perennial tropical *Drosera*. *Bulletin of the Australian Carnivorous Plant Society, Inc.* **18**: 12 - 20.
- Lowrie, A. (1997) *Drosera paradoxa* (Droseraceae), a new species from northern Australia. *Nuytsia* **11**: 347-351.

- Lowrie, A. (1996) New species in *Drosera* section *Lasiocephala* (Droseraceae) from tropical northern Australia. *Nuytsia* **11**: 55-69.
- Lowrie, A. (1991) A trip to Darwin and Kununurra for C.P. *Carnivorous Plant Newsletter* **20**: 114-123.
- Lowrie, A. (1990) The *Drosera petiolaris* complex. *Carnivorous Plant Newsletter* **19**: 65 - 72.
- Lowrie, A., Cowie, I. D. and Conran, J. G. (2007) A new species and section of *Utricularia* (Lentibulariaceae) from northern Australia. *Telopea* **12**: 31-46.
- Lowrie, A. and Conran, J. G. (1998a). A taxonomic revision of the genus *Byblis* (Byblidaceae) in northern Australia. *Nuytsia* **12**: 59 - 74.
- Lowrie, A. (1998b) 'Carnivorous Plants of Australia: Volume 3.' University of Western Australia Press, Perth.
- McPherson, S. (2008) 'Glistening Carnivores, The Sticky-Leaved Insect-Eating Plants.' Redfern Natural History Productions, Poole, England.
- Schlauer, J (2001). *Drosera hartmey-erorum* spec. nov. (Droseraceae) a New Sundew in sect. *Arachnopus* from North Australia. *Carnivorous Plant Newsletter*, **30**:104-106.
- Simmons, P. (1991) *Utricularia* of the Top End. *Bulletin of the Australian Carnivorous Plant Society, Inc.* **10**: 12 - 14.
- Susandarini, R.; Collins, G. G.; Lowrie, A. and Conran J. G. (2002) Morphological variation within the *Drosera indica* (Droseraceae) complex in northern Australia. *Aust. J. Bot.* **50**: 207-214.
- Taylor, P. (1989) Kew Bulletin Additional Series XIV: The genus *Utricularia* - a taxonomic monograph. HMSO, London.

ICPS Conference Sydney September 25-30 2008

A First for the Southern Hemisphere, the 2008 International Carnivorous Plant Society Conference will be held in Sydney, Australia at the Royal Botanic Gardens on September 25th through to the 28th, 2008. The conference will include a number of lectures, demonstrations, and some optional field trips to the Blue Mountains and Mt Tomah Botanic Gardens, just a 3 hours drive from Sydney. There will be provisions for a field trip to see *Cephalotus*, pygmy sundews and tuberous sundews in South Western Australia for conference attendees able to attend after the 30th. Contact us at icps08@hotmail.com! See you there.



Nepenthes of Cape York

Greg Bourke

Wollongong, Australia

Email: sydneycarnivorous@hotmail.com

Since I first read F. M. Bailey's descriptions of 10 *Nepenthes* species of Australia (Queensland Flora 1901) I became fascinated with them. At this stage (Late 90's) all species had been reduced to synonyms of *N. mirabilis* by Danser. In 2001 I met Rod Kruger south of Cairns who had a small *Nepenthes* collection and had seen a few of these *N. mirabilis* forms in the wild.



Figure 1. *Nepenthes rowanae* with mantis



Figure 2. The diminutive pitcher of *Nepenthes tenax*

After viewing some of Rod's images later the same year I was convinced that some of the plants required further investigation so I introduced Rod to Dr Charles Clarke. At the time, Charles was living and working in Hong Kong but soon after moved to Cairns. While based in Cairns, Charles was able to assist Rod with field studies and subsequent reinstatement of *Nepenthes rowanae* (Figure 1) and the

description of *Nepenthes tenax* (Figure 2).

It wasn't until May of 2008 before I would be able to get up to Cape York (known as "The Cape" locally) to see some of the interesting plants described by F. M. Bailey. I had previously only seen *N. mirabilis* south of Cairns at Babinda which is the most southern location for *Nepenthes* in Australia. Here plants were not dissimilar to the *N. mirabilis* I had seen along the North west coast of Borneo.



Figure 3. *Nepenthes mirabilis* growing on the banks of the Jardine River

Armed with some good maps, location details and good friend Stewart McPherson I headed out of Weipa some 250km south of the top of Australia. From here *Nepenthes* are locally



Figure 4. Like beacons drawing in insects under the rainforest canopy, papery thin pitchers of *Nepenthes mirabilis* are green on the outside but the mottled red inside and glow as sun streams through pitchers.

common in and around the Croc (*Crocodylus porosus*) infested swamps and rivers. It didn't take us long to locate *N. mirabilis*. In fact it grows only metres from the Jardine river ferry crossing.

It was actually pointed out to us by the ferry driver who is from the local Injinoo tribe. Surprised that he knew what a pitcher plant was I asked him if the locals had any traditional uses for

Figure 5 (opposite page). A spectacular red form of *Nepenthes mirabilis*



these plants. He said “The local name is Honey Jar. We put the native bee honey in them so we can carry it around for a snack”. This was the first I had heard of *Nepenthes* being used by the indigenous Australians. The *N. mirabilis* (Figure 3) along the Jardine River rely on the permanent water supply tapping in with extensive root systems. In fact we only saw *N. mirabilis* growing near permanent rivers.

Forms of *N. mirabilis* were found to be quite variable from one river to the next in the Cape region and quite different from those throughout South East Asia and Indo China (McPherson, S. Pers. Comm.). Some forms of *N.*



Figure 6. *Nepenthes rowanae* mottled form



Figure 7. *Nepenthes rowanae* showing a well developed peristome

mirabilis stood out from the rest. One population with all green paper thin pitchers with mottled red interior were a spectacular site when viewed into the sun (Figure 4). These plants grew up to 15m in length with up to 30 growing points and were often patrolled by Green Tree Ants.

Another spectacular form of *N. mirabilis* (Figure 5) was a beautiful robust red pitcher form with almost leathery leaves. This particular form reminded me more of *N. tobaica* (see Fig. 123. *Nepenthes* of Sumatra, Clarke 2001) than *N. mirabilis* in pitcher form with a distinct swelling below the hip in the

middle of the lower pitcher. This fits the vague description in Bailey of *N. jardinei*. Interestingly the leaves of this and several others in The Cape region were lacking the fimbriate margins often distinguishing the species.

Nepenthes rowanae is quite widespread in The Cape but unlike *N. mirabilis* it prefers the sunny swamps where surrounding vegetation is shorter than 3m. Typically *N. rowanae* forms a large prostrate or scrambling plant to 3m in diameter with pitchers to 20cm tall. The distinct large mouth of the pitcher with pitchers being at least half as wide than they are tall and peltate insertion of the tendril to the leaf blade are the most distinguishing features of this species.



Figure 8. *Nepenthes rowanae* with double wings



Figure 9. A large burgundy *Nepenthes rowanae* growing in saturated soil

Another character that stood out was the amount of sweet nectar exuded from the large glands beneath the lid of the pitcher. The nectar attracted ants as well as flying insects.

Some swamps we visited contained only one distinct form of *N. rowanae* while others yielded extreme variations reminiscent of *N. rafflesiana* at places like Bako National Park in Borneo where almost every plant differed from the next in shape, peristome size and colour from the next! Figures 6-9 show such variation.

Nepenthes tenax was the third species encountered growing often partly submerged in water. The diminutive pitchers of this species are not spec-

tacular but the way in which this plant succeeds in its environment is. *N. tenax* has self supporting stems and self supporting pitchers which enable it to withstand the almost continuous barrage of wind they encounter.

Larger plants of the species or possible hybrids with *N. mirabilis* form large stands that are spectacular (Figure 10). The transition between *N. mirabilis* and *N. tenax* in such areas is very subtle and it is difficult to distinguish where one species ends and the other starts (Clarke, C. Pers. Comm.). In fact the dividing of *N. tenax* is dubious from a taxonomic point of view. Perhaps only genetic studies will reveal the full picture with this and similar scenarios in The Cape.



Figure 11. *Nepenthes mirabilis x rowanae*



Figure 12 *Nepenthes mirabilis x rowanae* (mottled form)

Hybrids between the three discussed species are also present where the parent species are sympatric. This only serves to create confusion as it appears that these can further cross to form complex hybrids. Nevertheless some of these are as spectacular as their parents. Figures 11-14 show examples of some of the more interesting hybrids encountered.

In conclusion, The *Nepenthes* of Australia are some of the most variable and understudied *Nepenthes* in the world. This is due to a combination of the extreme conditions in which they inhabit and the remoteness of the area. My trip to The Cape has only served to increase my interest in the *Nepenthes*

of Cape York and I look forward to further exploration by myself and others to help fully understand what's out there.

I'd like to thank Stewart McPherson for sharing the experience with me, Dr Charles Clarke, Geoff Mansell, and Mark and Joanne Pritchard for sharing knowledge on the *Nepenthes* of Cape York.



Figure 13. Possible *Nepenthes mirabilis x rowanae* upper pitcher with a large amount of nectar under the lid



Figure 14. *Nepenthes mirabilis x tenax*

References

- Bailey, F.M. 1897, Contributions to the Flora of Queensland. Queensland Agricultural Journal 1:231
- Clarke, C. & Kruger, R. 2005 *Nepenthes rowanae* (Nepenthaceae) A remarkable species from Cape York, Australia. Carnivorous Plant Newsletter 34(2): 36-41
- Clarke, C. 2001 *Nepenthes* of Sumatra and Peninsular Malaysia. Natural History Publications (Borneo), Kota Kinabalu
- Danser, B. H. 1928, The Nepenthaceae of the Netherland's Indies. Bulletin de Jardin de Botanique, Buitenzorg. Serie III. 9 (3-4): 249-438



Stewart McPherson and Greg Bourke in a large stand of *Nepenthes tenax* and *Nepenthes mirabilis x tenax* in the far north of Australia. This particular swamp flows for over 15km to the coast with *Nepenthes* growing along the flanks. Crocodiles are also common in this swamp!

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