Carniflora Australis

Journal of the Australasian Carnivorous Plant Society Inc.
Volume 7 No. 4, September 2010

ISSN 1448-9570 PRICE $8.00 Free with Membership

SUBSCRIPTION

All members, single, family and overseas $AU25.00

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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
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UPCOMING SPEAKERS AND EVENTS

Date	Subject	Speaker(s)
10th September 2010	*Sarracenia* propagation	Jessica Biddlecombe
8th October 2010	Discovery of Carnivorous Plants	Stewart McPherson
12th November 2010	Carnivorous Plants of South America	Stewart McPherson
27th November 2010	Christmas swap meet	Jenssen's House
10th December 2010	General Chat	
14th January 2011	Trivia night	
11th February 2011	AGM Borneo trip 2010	 Greg Bourke
26th February—6th March 2011	Plants with Bite—Mt Tomah Botanic Gardens	Two talks daily over the four weekends
11th March 2011	The Snowy Mountains	Greg Bourke

COMMITTEE 2010

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Vice President:	Stewart McPherson
Secretary:	Jessica Biddlecombe
Treasurer:	Steve Moyle
Committee Members:	Peter Biddlecombe
	Laurie Dorfer
	Terry Nicholls
	Jenssen Turnowsky
	Terry Watts

New Cultivars

Key Words: cultivar: *Drosera* 'Leo Bourke', *Nepenthes* 'Fat Boy', Nepenthes 'Red Rocket', *Utricularia* 'Irene'

Drosera 'Leo Bourke'

Submitted: 12 June 2010
GREG BOURKE—Captive Exotics, PO Box 117 Corrimal NSW 2518 Australia
Email: orders@cativeexotics.com

***Drosera* 'Leo Bourke' (Front Cover & Figures 1)** is a selected clone of a complex hybrid between three African *Drosera*. The primary hybrid is *D. dielsiana* x *nidiformis*. A selected clone of this hybrid was then crossed with the informally named *D.* "coccicaulis" (*D. natalensis*) with a large vigorous seedling selected for propagation. It forms a large semi erect rosette of 6-9cm that forms a column with age. This hybrid was produced in 2004.

The name chosen for this plant is in honour of my grandfather Leo Bourke who together with my grandmother Irene Bourke sparked my interest in gardening when I was a child.

Drosera 'Leo Bourke' should be propagated from root or leaf cuttings only.

Figure 1: Clockwise from top left: Drosera dielsiana x nidiformis, *Drosera* 'Leo Bourke', *D. nidiformis*, *D. dielsiana*, and *D.* "coccicaulis" (*D. natalensis*)

Nepenthes 'Fat Boy'

Submitted: 12 June 2010
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***Nepenthes* 'Fat Boy' (Figure 2)** is a squat form of *Nepenthes ventricosa* originating from a selected clone of plants introduced into cultivation in Australia in the 1980's. There are numerous clones of *N. ventricosa* in Australia and across the world most of which are more elongated possibly originating from material collected at lower altitudes or possibly of hybrid origin. *Nepenthes* 'Fat Boy' is easily distinguished from most clones by its broad squat pitchers which generally have a round pitcher opening often much smaller than the pitcher body. The lower pitchers are ivory to greenish in colour with a similar coloured peristome which often ages to red (**Back cover**). The inside of the pitcher also turns bright red to purple with age which is not always seen with other clones of *N. ventricosa* in cultivation. Upper pitchers are light green in colour with a green peristome.

Despite its name, *N.* 'Fat Boy' is a female plant and should be propagated by cutting only and grown in intermediate conditions.

Nepenthes 'Red Rocket'

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***Nepenthes* 'Red Rocket' (Figure 3)** is a selected clone of *Nepenthes alata* introduced into cultivation in Australia in the 1970's or 1980's. The plant derives it's name from its vigorous nature and it's all over reddish colour and deep red upper and lower pitchers. Interestingly unlike many clones of *N. alata*, *N.* 'Red Rocket' lacks an appendage under the lid of the pitcher.

I received this plant from Jenssen Turnowsky in 2005 who had inherited the plant from his father who was a passionate grower of pitcher plants. *N.* 'Red Rocket' is a male plant which should be propagated via cuttings. This is an adaptable cultivar being able to tolerate both highland and lowland conditions. Bright light is preferred for good plant colour as stems can remain green in low light levels. Pitcher colour however remains red in all conditions

Figure 2: (Above): The distinctive tubby pitcher of Nepenthes 'Fat Boy'.
Figure 3: (Right): A red lower pitcher of *Nepenthes* 'Red Rocket'.

Utricularia 'Irene'

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***Utricularia* 'Irene' (Figure 4)** is a selected clone of *Utricularia uniflora* that produces white flowers with small violet blotches near the pallet on the lower lip. In order to maintain the cultivar plants must be propagated by division of subterranean stolons. Temperate conditions are preferred with damp to wet soil. This cultivar tends to flower later in the season than other clones preferring mid to late summer.

The name chosen for this plant is in honour of my grandmother Irene Bourke who together with my grandfather Leo Bourke sparked my interest in gardening when I was a child.

Figure 4: The beautiful flower of *Utricularia* 'Irene'

Highlights from a Late Summer Trip to Tasmania in 2010

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Between 20 February and 2 March 2010 I enjoyed a trip to Tasmania in which I devoted some time to looking for carnivorous plants. Tasmania has about 15 native species of carnivorous plant (Clayton 2004) and I saw nine species on this trip, which are described in the following text.

I have visited Tasmania before, in 1991, 1992, 1993 and 1995 to observe a range of carnivorous plants (e.g. Gibson 1998). On this trip I planned to revisit some favourite sites, and also discover places I had not been to. It was interesting to note a few changes between sites since previous visits, and sadly things are not looking too good for some of them.

Where I went

On this trip I flew in and out of Hobart, the state's capital, located in the south east of the island (**Figure 1**). After hiring a car for the duration of my stay I had a quick stop at the Salamanca Markets by the waterfront of Hobart before starting a counterclockwise loop through the island and headed north to Deloraine, near Launceston, where I visited a friend. After a quick trip to the northern part of the Central Plateau to see *D. arcturi,* I headed west to Cradle Mountain to walk around Dove Lake. This area sure has changed in the 15 years since I was last there. Now one is encouraged to park the car at the tourist centre just outside the park entrance and hop on a bus to go into the park. Once inside I made it to Dove Lake to do the walk around the lake. Once again, as happened last time, I got caught in heavy rain at the furthest point from shelter.

From Cradle Mountain I headed to Queenstown where I was based for two days. Despite the wet start I was fortunate to experience some warm, fine days on the west coast and spent one day walking over an area I did my fieldwork for my Honour's degree in 1991. On the second day I did a loop to Zeehan and Strahan and was able to find a *Drosera spatulata* site I saw 19 years before. I allowed a full day to get to Hobart, and included a stop at Lake St. Clair to look for a site where *Utricularia dichotoma* grew with *U. monanthos*.

I spent the latter half of my trip based in Hobart and caught up with two carnivorous plant enthusiasts: Darren 'Spot' Cullen and Miguel de Salas, whom I have known for many years. I

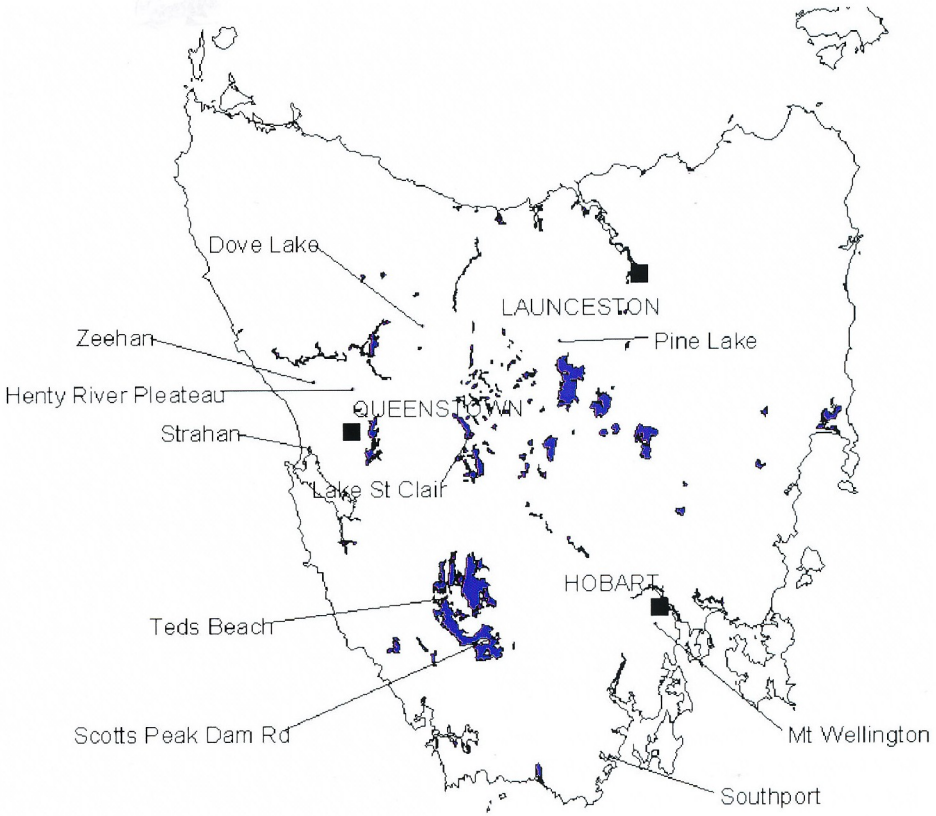

Figure 1: Map of Tasmania showing the locations mentioned in the text.

traveled with Spot down to the extreme south east of the island to look for *D. spatulata* near the Type location at Southport, and also to look at some great carnivorous plant sites near Hobart.

On this trip I had planned to get to the north east coast, around the Freycinet Peninsula. However, upon advice from Spot and Miguel that this part of the state was best visited in Spring to see carnivorous plants, I instead headed to the South West. Spot and Miguel had kindly provided me with details of some excellent sites along the Scott's Peak Dam Road beside Lake Pedder. This included locations with *Utricularia uniflora*; a species I had not seen in Tasmania before. Before flying out I made the obligatory trip to the summit of Mt. Wellington and revisited a site with *D. arcturi*. I also had a chance to see a range of exotic species of carnivorous plant in Spot's great collection, and also to observe plants for sale at the Salamanca Markets.

More details are provided below for the species seen on this trip:

Drosera arcturi

Drosera arcturi is an unusual sundew. It is a summer-growing, winter-dormant perennial species that forms a few-leaved semi-erect rosette of narrowly oblong leaves (**Figure 2**). The leaves are green or orange and the trapping leaves have a sparse cover of stalked glands. A single erect scape emerges from the centre of the rosette in early summer and has one; rarely two to four, white-petalled flowers with white stigmas that open in mid summer. The rosettes grow at the end of a horizontal, sparingly branched rhizome. I saw plants growing in a number of habitats: in cushion plants in alpine low shrubland, in peaty soil in Button 'Grass' Plains (*Gymnoschoenus sphaerocephalus*), and in moist to sodden gravel (**Figure 3**). At the time of my visit all plants had stopped growing, and they were in various stages of going dormant. Some plants still had bedewed leaves whilst others, even in the same population, were fully dormant, with a tight winter bud nestled at the base of dead leaves from the previous season. Flowering had long since finished, and many plants had ripe fruit.

I observed *Drosera arcturi* at Pine Lake, the Henty River Plateau, along the Scott's Peak Dam road and on the summit of Mt. Wellington. It often grew in the company of *D. binata, D.* pygmaea and U. *lateriflora*, and more rarely with *D. spatulata*. This species occurs also in mountains of mainland southeastern Australia and also in New Zealand (Salmon 2001).

In Tasmania *D. arcturi* is a variable and imperfectly known species. What is considered to be the typical form has short leaves up to 6 cm long, and single -flowered scapes. It occurs in mainland Australia, New Zealand and in Tasmania it appears to be in the eastern and northern part of the Central Plateau and associated ranges (eg Mt Wellington and Pine Lake). Some plants in the north west of the Central Plateau (e.g.

Figure 2: A large and orange-coloured *Drosera arcturi* plant in 'Buttongrass' sedgeland on the Henty River Plateau of western Tasmania. This was one of the few plants to still have a living insect-trapping leaf.

Figure 3: A dense population of small-leaved *Drosera arcturi* in south western Tasmania. It is not yet clear which form of *D. arcturi* these may be.

Cradle Mountain) differ from the typical form by having blood red stigmas (Gibson 1998, Clayton 2004). Populations from the western and southwestern part of the state include the 'Giant' form, which can produce leaves to 25 cm long and have scapes with up to four flowers. The 'Giant' form is larger in all parts (eg floral parts and seeds) to the typical form, and has a dormant bud that consists of usually two narrowly triangular leaves that, upon growing to maturity in early summer are found to have no stalked glandular hairs (Gibson 1999). Robert Brown collected samples of the 'Giant' form of *D. arcturi* from Port Davey in March 1804, which were later described as *D. 'lingulata'*. More work is needed to understand the morphological variation in this complex.

Plants of this species appear to be long-lived and I was able to find plants that I saw in 1991 that were still alive and growing strongly.

Drosera auriculata

Drosera auriculata is a tuberous *Drosera* with a seasonally produced erect self-supporting stem with crescentic leaves (**Figure 4**). It is characterized by glabrous sepals and cylindrical

seeds more than 1 mm long. In most cases this species grows in the cooler months of the year, and flowers in spring before going dormant (e.g. Erickson 1978, Salmon 2001). However, in parts of Tasmania, such as elevated areas of the west coast of Tasmania this species instead grows in the summer and goes dormant to survive the frosty winters.

On this trip I observed the remains of dormant plants along ephemeral drainage lines in hills near Cradle Mountain. I saw plants that were in active growth and had only just finished flowering in sodden shaded creek edges and wet gravel on the Henty River Plateau where they grew in the company of *U. monanthos* and *D. arcturi*. This species also occurs widely in southeastern Australia and in New Zealand (Lowrie 1998, Salmon 2001).

Drosera binata

Drosera binata is a distinctive sundew with semi-erect leaves in a rosette. Its linear leaves are dichotomously branched, sometimes multiple times and are held at the end of elongated, glabrous petioles (**Figure 5**). Mature plants send up between one and three erect scapes from the centre of the rosette. They divide into a cyme containing many fragrant white-petalled flowers. Only a few plants in a population flower, unless the site is regenerating after a bushfire or other clearing event; then many more plants will flower. Given that the plants in Tasmania appear to be self-incompatible, it means that seed production per population is

Figure 4: An immature plant of *Drosera auriculata* in moist shallow soil beside the Heemskirk River.

minimal except in the first year or two following site disturbance. Spot took me to one such spot in the Peter Murrell Reserve, near Kingston, where the rare event of seed set was occurring. The plants in Tasmania commonly have only once-divided leaves on the ends of self-supporting petioles, which conforms to the informal idea of the 'T-form' plants (sensu Slack 1981). However, in some populations plants with an abundance ofmultiply divided leaves with up to 8 terminal lobes abound.

I observed this species in peaty soil in Button 'Grass' Swamps, in moist gravel, in flooded roadside gutters and shallow creeks and cracks on bedrock in seepage areas at Dove Lake, near Lake Pedder, on the Henty River Plateau, and near Zeehan. Other plants accompanied them, including: *D. pygmaea, U., lateriflora* and *U. dichotoma*, and less commonly with *D. spatulata,*

Figure 5: Robust plants of *Drosera binata* growing in a flooded gutter in western Tasmania.

D. peltata var. *gracilis, D. arcturi, U. monanthos* and *U. uniflora*. This species occurs widely in southeastern Australia and New Zealand (Lowrie 1998, Salmon 2001).

Drosera peltata* var. *gracilis

Hairy-sepalled tuberous sundews with avoid to shortly conical seeds pose another taxonomic puzzle in Tasmania's carnivorous plant flora. The current flora treatment (Morris 2009) recognized three taxa, all at specific rank: *D. peltata, D. foliosa* and *D. gracilis*. However, uncertainty still exists about taxon limits and rank; so here I use the more conservative and informal name of *D. peltata* var. *gracilis* for reddish erect plants with small white-petalled flowers and cylindrical to conical seeds up to 1 mm long (**Figure 6**). This taxon grows opportunistically whenever soil moisture and temperature conditions are suitable. Thus this taxon grows in summer in wetlands of the Central Plateau, west coast and south west. However, it usually grows in winter and spring near Hobart. I saw some plants in fruit with a few late-season flowers in wet gutters and gravel seeps in the west coast and near Lake Pedder. I also visited sites near Hobart where plants were fully dormant by then.

These plants grow in the company of *D. binata, D. pygmaea, U. dichotoma, U. lateriflora* and *U. monanthos*. This taxon also occurs in southeastern parts of the Australian mainland.

Figure 6: Abundant plants of *Drosera peltata* var. *gracilis* in moist gravel in western Tasmania. The plants here were at the very end of the flowering season.

Drosera pygmaea

Drosera pygmaea appears to be the most widespread sundew in Tasmania. Plants form flat rosettes up to 2 cm

Figure 7: Large plants of *Drosera pygmaea* from near Hobart. These are amongst the largest plants of this species I have seen.

across with small circular lamina on filiform pedicles (**Figure 7**). They often have single-flowered scapes up to 3 cm tall that have small white-petalled flowers. As with other 'pygmy sundews', *D. pygmaea* has a conspicuous silvery white stipule bud in the rosette centre, which opens for a few weeks in autumn or early winter for the production of plate-like modified leaves (gemmae) that readily detach; each one is able to produce a new plant – a clone of the adult plant. These plants also set viable seed too.

This sundew grows in a wide range of environments, from sea level to over 1000 m altitude. I saw plants in peaty soils in button 'grass' plains of the west coast and south west; in moist moss in roadside gutters through sclerophyll forest near Cradle Mountain; in moist gravel seeps beside roads in the west coast; in cushion plants in alpine herb field on the summit of Mt Wellington, and in seasonally moist peaty sand soils in low shrublands around Hobart. Plants were observed commonly growing with *D. binata* and *U. lateriflora*

and less commonly with *D. arcturi, D. auriculata, D. peltata* var. *gracilis, U. dichotoma, U. monanthos* and *U. uniflora*. This species is also widespread in southeastern Australia (Erickson, 1968) and it also occurs in south western Australia (Lowrie 1989) and New Zealand (Salmon 2001).

This species of pygmy sundew can be cryptic due to its small size, and it also appears capable of re-establishing itself on sites by seeds presumably among the soil seed bank. The main variation I observed in this species pertains to the development and extent of red pigmentation. Some plants had fully green leaves with fully red glandular hairs. Other plants developed red colouration to other parts of the leaves too. On earlier trips to Tasmania, when I saw open flowers I noticed that some populations included plants with three fine red veins at the base of the otherwise fully white petals.

Figure 8: Vivid red rosettes of *Drosera spatulata* from near Zeehan in western Tasmania.

Drosera spatulata

There are two general comments to make about *Drosera spatulata* in Tasmania: (1) it is remarkably uniform in morphology, (2) that despite the abundance of seemingly suitable habitat this species is only locally common in a few parts of the state. Plants form a flat rosette typically up to 3 cm across with narrowly wedge-shaped leaves (**Figure 8**). Numerous scapes emerge from the centre of the rosette, each of which has four to more than 20 white-petalled flowers arranged in a one-sided raceme. Flowers open for a few hours around the middle of the day and are up to 8 mm across.

I saw plants growing in most peaty soils of creek banks, and in seeps over quartzite. They were often in the company of *D. pygmaea* and *U. lateriflora* yet only occasionally seen with *D. arcturi, D. binata* and *U. dichotoma*. On my travels I was able to relocate a site for this species to the north west of Zeehan, one which I first visited in 1991. I promptly found this sundew (and others) in creeks nearby. With Spot's help I was able to relocate a site for this species near Southport, about 80 km south of Hobart, near where the Type specimen was collected. Many thanks to Miguel and Spot, for I was able to see this species at one of the few inland sites known, along the Scott's Peak Dam Road where plants grew with *D. arcturi* 'Giant' form and

other local carnivorous plants.

This sundew ranges widely along the western margin of the Pacific Ocean, reaching as far north as Japan. It occurs as far west as Sumatra and Peninsular Malaysia. This species also occurs in New Zealand where populations of different leaf shape occur (Salmon 2001). Further studies into this species complex will require further investigation of plants in Tasmania, thanks to the location where the Type collection was made.

Utricularia dichotoma

'Fairies Apron's' as *U. dichotoma* is sometimes known (Erickson 1968) is the most widespread large bladderwort species in Tasmania. They're particularly abundant in the western and southern part of the state. Plants are stoloniferous and have spoon-shaped leaves up to 3 cm long, often with only the very end exposed above water or surrounding vegetation. An abundance of traps, generally 2 to 3 mm long emerge at nodes along the stolons, often around the leaves. Erect scapes arise from the junction of stolons and can reach up to 40 cm long. They bear flowers in opposite pairs or in whorls of three at one to three of the nodes (**Figure 9**). The flowers have substantial triangular lower petals to 3 cm across with two or three bright yellow ridges at the base, or 'palate'. A small erect upper petal to 5 mm long rises over the palate. The nectar spur is up to 8 mm long and is held vertically below the sub-horizontal lower petal. Flowers are usually produced in summer, but flowers have been recorded in at least some populations around the state at any time of year. For some reason many populations of *U. dichotoma* had very limited seed set in 2010, and it is not clear whether this is due to summer heat and drought or a lack of pollinators.

This species grows in wetlands around much of the state, including stream edges, gravel seeps, the floor of shallow pools, waterways, and depressions in peaty soil in Button 'Grass' plains. I saw this species at Lake St. Clair, the Henty River Plateau, around Zeehan, Strahan, near Lake Pedder and around Southport. It is locally abundant, and large populations in full bloom are a pretty sight. It often grew in the company of *Drosera binata*, *D. peltata* var. *gracilis*, *D. pygmaea* and *U. lateriflora*. This species also occurs widely in southeastern Australia, extending into southern Queensland. I do not support the reduction of *U. monanthos* of synonymy with *U. dichotoma* (see below).

So far the only variation I have seen in this species pertains to one population on the Henty River Plateau that I observed in 1991, which had brown (as opposed to yellow) ridges on the palate. It seems likely that some populations in Tasmania may behave as annuals, and some populations are likely to include plants that form tubers (as have been found in Victoria, NSW and the Australian Capital Territory).

Figure 9: A posy of flowers of *Utricularia dichotoma* from western Tasmania.

Utricularia lateriflora

Utricularia lateriflora is the most widespread bladderwort in Tasmania. It is a smaller species than *U. dichotoma*, with thread-like stolons, minute bladders and commensurately smaller leaves. The scapes are remarkably tough compared to the underground part of the plant, and rise up to about 10 cm tall (**Figure 10**). The scapes have alternately arranged bracts and flowers. The purple, (rarely white) flowers are up to 5 mm long with a subhorizontal spur that sometimes exceeds the length of the lower petal. Most flowers set seed and the fruit capsule is spherical and about 3 mm diameter. In sheltered situations the scape may have an extended life by secondary scapes that develop from lower nodes. Once one knows what the fruiting scapes look like then one has a good chance of finding more plants in the wild.

Figure 10: A mini forest of *Utricularia lateriflora* scapes near Ted's Beach in south western Tasmania.

I observed plants in the Henty River Plateau, near Zeehan and Strahan, along the Scott's Peak Dam Road, at Teds Beach, and near Southport often in the company of *D. binata, D. pygmaea*, and *U. dichotoma*. This species also occurs widely in southeastern Australia (Erickson, 1968).

Utricularia monanthos

The Mountain Bladderwort, *U. monanthos*, is very similar to *U. dichotoma* but has larger leaves and traps (**Figure 11**). The flowers have lower petals up to about 1.2 cm across and are only produced in a single node at the end of a scape up to about 10 cm tall. This species often grows with or near *U. dichotoma*, and in the many places I have seen them they still remain morphologically distinct. Thus I do accept the reduction of *U. monthanos* to synonymy with *U. dichotoma* for Tasmanian and mainland Australian plants as suggested by Reut and Fineran (1999). Additionally most flowers of *U. monanthos* appear to set seed – unlike those of *U. dichotoma* – which suggests that *U. monanthos* may have a self-pollination mechanism. Recent genetic studies of some Australian bladderworts found that the same chloroplast DNA sequence in both *U. dichotoma* and *U. monanhos* samples sequenced (Reut and Jobson 2010). However, the consistent morphological differences between both taxa suggest a genetic basis that probably occurs elsewhere in the genome to the sequence targeted so far.

I have seen this species at the Henty River Plateau, near Zeehan and along streams and lake edges in the Central

Figure 11: Luxurious growth of *Utricularia monanthos* in a wet and shaded site in western Tasmania.

Plateau. Plants grow in gravel seeps, the edges of shallow lakes and stream margins, and in pools beside roads. In the Henty River Plateau I have seen rare populations with white and purple and white striped flowers (Gibson 1998). This species also grows in the higher parts of southeastern Australia (Erickson 1968) and in New Zealand (Salmon, 2001). *Utricularia monanthos* was often seen in the company of *Drosera binata, D. peltata* var. *gracilis, D. pygmaea, U. lateriflora* and *U. dichotoma*.

Utricularia uniflora

Utricularia uniflora is also similar to *U. dichotoma*, but has smaller traps of different morphology, shorter leaves that have a free margin that often appears orbicular, and has lilac flowers with lower petals to 1.4 cm across with a series of white and yellow ridges in the palate (Erickson 1968; **Figure 12**). This species appears to be restricted to the southwest, in the catchment of Lake Pedder and Lake Gordon, but occurs there in abundance in wet peaty soils of Button 'Grass' plains, in gravel seeps, and shallow margins of creeks and pools. This bladderwort was often found growing in the company of *U. dichotoma, D. binata* and *D. pygmaea*. It occurs on the southeastern Australian mainland and is particularly common in seepage zones in the upper Blue Mountains to the west of Sydney.

I had not seen *U. uniflora* in Tasmania before, and it was interesting to note how it grew at the southern end of its range. As per usual plants of this species showed some variation in flower shape, size and colouration in different locations - presumably due to natural variation between seedlings. Near Teds Beach there were some plants with lovely deep lilac-coloured flowers and

Figure 12: Lovely flowers of *Utricularia uniflora* in a roadside gutter in south western Tasmania.

also some plants that had incipiently three-lobed lower petals.

Exotic Species in cultivation

During my time in Hobart I saw some very healthy and impressive exotic species, particularly in Spot's collection. *Darlingtonia californica* certainly grows very well in southeastern Tasmania, and *Sarracenia* species and hybrids colour up very well. I was also impressed by the size, health and vigour of *Drosera regia* plants grown by Spot too. The other plants that caught my eye are too numerous to mention.

General Comments

Two things struck me during my travels - the first was the lack of plants in places where I recall them being abundant before, and the other was the apparent increase in spread and abundance of weeds in formerly weed-free areas on the west coast.

At many sites I noticed surface cracks in peaty soils in several areas of the west coast. Rain had fallen prior to, and during my visit, so the soil surface was now moist. But comments from locals indicated that the earlier part of the summer had been warmer and drier than usual. It may have been behind what appeared to be a decrease in abundance of carnivorous plants in several areas, as well as the inability to find plants at some sites where others have reported them in abundance - such as the Centennial Cemetery at Zeehan (Clayton 2004).

During my last visit I was surprised by how weedy roadsides have become, particularly in western Tasmania. Where before roadsides had the frequent blur of purple from patches of flowering *Utricularia dichotoma* in wet gutters, instead the dominant flower colour is now yellow – particularly from Cat's Ears (*Hypochaeris* spp.) and Trefoil (e.g. *Lotus uliginosus*). I also noticed several local roadside concentrations of Gorse (*Ulex europaeus*) and Scotch Broom (*Cytisus scoparius* subsp. *scoparius*), and wildings of Radiata Pine (*Pinus radiata*). The establishment of many of these species appears to have been assisted by the presence of European Honeybees - both those in hives brought in to wet forests for the production of Leatherwood honey, and also from feral swarms - which are able to negotiate and pollinate large pea flowers (such as those in Trefoil, Gorse and Broom). These weedy members of the Pea family are also of concern as they are able to generate their own Nitrogen from bacteria in nodules in their roots. That fact means they are able to grow and spread in the low nutrient soils of wetlands, and thus can spread from roadsides and potentially displace carnivorous plants.

Conclusions

It was great to get back down to Tasmania again; to catch up with friends; revisit favourite places and get to some areas I had not previously been. The assemblage of summer-growing and perennial carnivorous plants observed provided a chance to re-examine ideas

developed during previous visits. They also helped me realize that further study of several of these populations will help clarify taxonomic challenges in plants that extend beyond the shores of the Tasmania. I look forward to my next visit.

Acknowledgements
I'd like to thank Garry Conroy-Cooper for his help in the Deloraine area, particularly in talking me to Pine Lake. Darren 'Spot' Cullen and Miguel de Salas also provided assistance with fieldwork and details of some great carnivorous plant locations; many thanks to them.

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Drosera burkeana

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The diversity of carnivorous plants is very widespread, including plants of different shapes, colours and sizes. Unfortunately, sometimes smaller sized plants can often be overlooked in favour of larger plants. Some of these smaller plants actually have some interesting characteristics, and are very often easy to cultivate. The aim of this article is to present one of such small carnivorous plants, *Drosera burkeana* (**Figure 1**).

Drosera burkeana is a small, non-tuberous annual *Drosera*. Leaves are dark green in colour and the digestive glands are bright red. These glands give the plant an overall red appearance. It has a number of spatulate-shaped leaves that originate from the plant's central point, each leaf attaining a length of 1.5 cm. An individual plant is capable of holding onto 12 or so leaves at any one time. Flower scapes attain a height of approximately 6 cm, bearing a number of flowers. Petals are purple and pollen granules are yellow.

This plant is very easy to grow and thrives in pure peat moss. It thrives in full sunlight outdoors and should be kept moist by sitting it in a shallow tray of water. The plant's growth seems to be unaffected when watering from the top, and has survived weeks of continuous rain and a hailstorm outdoors.

Drosera burkeana is easily propagated by seeds. Sprinkle seeds on the surface of pure peat moss and place the pot in an enclosed terrarium. The pot should remain in this environment for at least 1 – 2 months after seeds begin sprouting. Ensure the peat moss is kept moist, and avoid overhead watering until plants are ready to be placed outdoors. *Drosera* seeds typically sprout between 1 – 2 months, but can begin sprouting in less than a month. From two attempts that were made at striking *D. burkeana* from a leaf cutting in sphagnum moss under outdoor shaded conditions, only one was successful. If you wish to attempt to grow this plant by leaf cuttings, it is probably best to place the pot containing the cutting in sphagnum moss in a shaded terrarium environment.

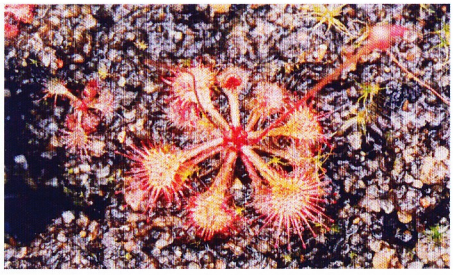

Figure 1: *Drosera burkeana* in cultivation. Photo Greg Bourke

Cultivation of *Genlisea*

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There are 22 species of *Genlisea* currently recognized (Fleischmann et al., 2010), and at least 19 of them have more or less successfully entered cultivation already. However not all species of *Genlisea* are easy to grow, nor are they commonly available for sale to the interested CP enthusiast. However some specialist shops do have a good selection of *Genlisea* species, and seeds which are more commonly sold or traded are a good source to start with. Germinating seed of *Genlisea* is somewhat tricky (like it is the case for many *Utricularia* species, too). The more fresh the seed is, the better the chances are to get good results with germination. Seed of *Genlisea* germinates best in very wet conditions. I usually sow them on peat or peat:sand mix and keep the pots very wet in tray system all time. I raise the water level in the tray just to the very top of the pot, or even allow a thin film of water (ca. 5 mm to 1 cm) cover the soil surface after a few days. Take care, as seed of *Genlisea* easily floats when fresh, but will stick to the soil when soaked with water after a few days. Germination in pure water or rain water (in clear glass or plastic bottles) works well, too, however you will have to transplant the seedling to a peat-based substrate soon after germination.

Germination of *Genlisea* is usually slow, and starts about 3-4 weeks after sowing the seeds (*G. violacea* or *G. filiformis* are quite fast), but can take up to 3 months in some species. Do not cover the seeds with soil, as *Genlisea* seed will need light in order to germinate!

Cultivation of *Genlisea* plants is like

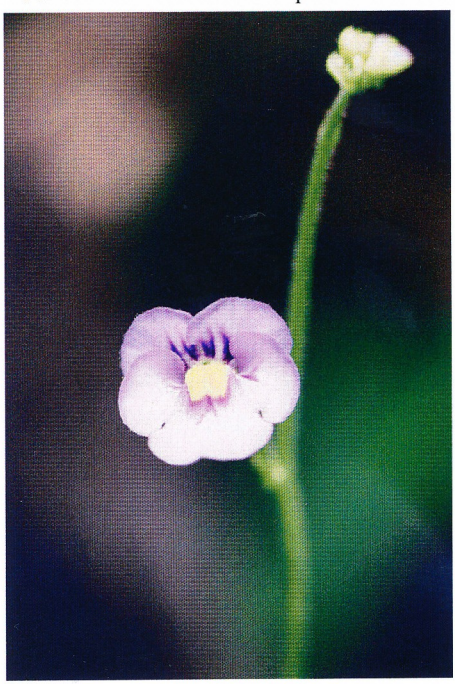

Figure 1: *Genlisea violacea.* Photo Greg Bourke

that of most terrestrial *Utricularia*. I use pure sphagnum peat or a mix of peat and white quartz sand (ca. 2/3 to 1/3). The size of the pot apparently does not matter, and tiny annual species like *G. filiformis* or *G. violacea* (**Figure 1**) will even grow in very small pots. Larger species, such as *G. aurea* or *G. uncinata* however will require bigger pots.

I keep all my *Genlisea* species in tray system all year round, in the greenhouse or under artificial lights. *Genlisea* plants are adapted to wet or very wet conditions, and most plants grow submerged at least part of their life. For a successful growth in cultivation, this seems to be important: the wetter the plants are grown, the better and bigger they will grow! I keep all my plants in tray system all year round, and keep the water level just at the soil level, or even 0.5-1cm above it. Under my growing conditions, this system has been show to be perfect for *Genlisea* growth. I do not change the water regularly, but always refill some part that has evaporated.

I personally do not fertilize my plant, although Lubomir Adamec has reported a positive effect of soil fertilizing on *Genlisea* growth (Adamec, 2008). However I noticed that fertilizer applied to the soil will enhance the growth of algae and mosses in the pot and in the water of the tray. So I do not fertilize my *Genlisea* plants, but more to keep my setup free of mosses and algae.

Genlisea are sometimes infested by a few plant pests that attack most CPs from time to time: aphids like the scapes and flower parts of most *Genlisea* species (especially glabrous species such as *G. hispidula*) and root aphis can attack the trap leaves. All these bugs can be easily removed, and usually do not cause much harm to the plants. However there is one serious threat to *Genlisea* in cultivation: most species of *Genlisea* are highly sensitive to a rot caused by the soil "fungi" *Phythium*, *Fusarium* and *Phythophtora* (they are actually not fungi in a systematical sense, but belong to a different organismic kingdom, which is related to plants. Therefore, commercially available fungizides to not harm these pests!). These plant parasites are well known to some CP-growers as they are causing a severe centre-desease-rot to Mexican *Pinguicula* in cultivation (known as "brown centre desease", see Legendre and Kibellis, 2005). In *Genlisea*, the symptoms are the same: the plants infected will start to rot from the centre, although the leaves are still looking fresh and green. Usually, infected plants will die very fast, and there seems to be no cure for this disease. Especially *Genlisea aurea, G. roraimensis, G. uncinata* and *G. violaceae* are very sensitive to this disease, and it usually occurs when the plants are putting up their flower scapes. Scapes and leaves will wilt within one day only.

The best protection against this disease seems to be to keep the plants very wet. I never observed this disease in

Genlisea plants that I grow in tray system, but pots that are kept drier, or *Genlisea* planted in terrariums are easily infected.

Luckily, all species of *Genlisea* can easily be propagated by leaf cuttings. Both green epigaeus leaves, and underground trap leaves work well. Some species (eg. *G. violacea, G. margaretae, G. hispidula* (**Figure 2**)) even reproduce from stolons naturally. Sometimes, even young plantlets are formed from the bracts on the flower scapes, which can be planted and treated like adult plants then.

Most species are not more difficult to grow than terrestrial *Utricularia*. However *G. roraimensis* seems to require cooler conditions (like highland *Nepenthes* or *Heliamphora*) for successful growth for long time. Some African annuals (*G. barthlottii, G. stapfii, G. subviridis*) will always die back after flowering without forming adventiv plantlets, and only reproduce from seed. These species are tricky to germinate as well, and are difficult to maintain for a long time.

Figure 10: *Genlisea hispidula*. Photo Greg Bourke

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Nepenthes of Peninsula Malaysia

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Peninsula Malaysia represents a hotspot for plant and animal diversity in South East Asia. Home to all Malaysian states except Sabah and Sarawak, the peninsula occupies an area of 131,500 km² and is dominated by the Banjaran Titiwangsa mountain range and several other smaller mountain complexes. Benefiting from year round high rainfall, Peninsula Malaysia is home to eleven species of pitcher plants, of which, five occur nowhere else in the world. Three of the endemic species are particularly spectacular and widespread, namely *N. macfarlanei*, *N. ramispina* and *N. sanguinea*, and these shall be reviewed in this article.

N. macfarlanei is among the most common pitcher plants of Peninsula Malaysia. This species was named in honour of the Scottish botanist John Macfarlane who worked extensively on the taxonomy of *Nepenthes* at the start of the 20th century. *N. macfarlanei* occurs across western Peninsula Malaysia in southern Perak, northern Selangor and the extreme west of Pahang. It occurs from 900–2,150 m, mainly in sparse lower montane or upper montane forest or scrub on ridgetops and mountain summits. It grows both terrestrially or as an epiphyte, and readily produces a branched stem up to 4 m long and scrambles and climbs amidst surrounding vegetation.

The lower pitchers of *N. macfarlanei* (**Figure 1**) are up to 26 cm long and 9 cm wide and are very variable is shape, size and relative proportions. They are either wholly ovate, amphora shaped, or the bottom half of the trap is infundibular, and the top half is cylindrical or slightly inflated. Often the width of the trap narrows just below the peristome. Wings up to 10 mm wide, fringed with narrow filaments up to 12 mm long run down the front of the pitcher. The exterior of the lower pitchers is yellow, yellowish green, olive green, or orange, usually mottled with long, irregular, dark red or purple blackish and flecks. The interior of the pitcher is yellow, or cream, often with faint red or purple flecks. The peristome may be yellow, orange, red or purple, and is often striped with bands of dark red, purple or black. The lid is yellow, orange or reddish, often mottled with flecks of dark red, purple or black.

The upper pitchers are up to 24 cm long and 7 cm wide and are wholly infundibular, or the bottom half of the

pitcher is infundibular and above this part, the width of the trap narrows (often with a hip) and becomes cylindrical or infundibular towards the pitcher opening. Wings are reduced to narrow ridges which run down the (often) flattened front of the pitcher, or may be hardly discernable at all. The colouration of the upper pitchers is consistent with the lower traps, except that it is generally lighter and more vivid.

Figure 1: A very colourful upper pitcher of *Nepenthes macfarlanei* on Mt. Ulu Kali

Figure 2: The strikingly beautiful lower pitcher of *Nepenthes ramispina*

Nepenthes sanguinea is also widely distributed across Peninsula Malaysia. It's name is derived from the Latin *sanguineus* (blood red) and refers to the colouration of the pitchers of this plant. *N. sanguinea* is also widely distributed across the rugged interior of Peninsula Malaysia and the extreme south of Thailand. It occurs at altitudes of 300–1,800, although is mostly found above 1,000 m, growing in lower and upper montane forest and scrub on ridgetops and mountain summits, or on mossy slopes and cliffsides and amidst recovering, secondary vegetation.

It produces pitchers up to 35 cm long and 7 cm wide. The bottom third to half of the trap is ovate. Above this part, the width of the pitcher narrows (with a distinct hip) and becomes cylindrical towards the pitcher opening. Wings up to 8 mm wide, fringed with filaments up to 12 mm long run down the front of the pitcher. The exterior of the lower pitchers is usually red, dark red or purple, but may be yellowish green, orange or dark purplish black. Often the exterior is lined with faint, dark red or purple blotches. The interior of the pitcher is cream or light yellowish green, occasionally with small red or purple flecks. The peristome is usually pure red or purple, and darkens towards the back of the pitcher opening (particularily below the lid). The upper surface of the lid is the same colour as the exterior of the pitcher, and the lower surface may be yellow, green or red.

The upper pitchers are up to 28 cm long and 6 cm wide. The bottom half of the trap is narrowly ovate and elongated. Above this part, the width of the pitcher narrows (with a distinct hip) and becomes cylindrical towards the pitcher opening. Wings are reduced to narrow ridges which run down the front of the pitcher, or may be hardly discernable at all. The exterior of the upper pitchers may be yellow, green, orange, red or reddish purple, sometimes mottled with faint dark red blotches. The interior of the pitcher is light yellow or cream, and the peristome is yellow, orange or reddish. Occasionally, the upper pitchers have "eye–spots" on the interior of the pitcher opening, much like *N. reinwardtiana*. The upper surface of the lid is the same colour as the exterior of the pitcher, and the lower surface may be yellow, green or red.

The third species, *N. ramispina*, is named after Latin *ramus* (branch) and *spina* (spine) and refers to the structure of the spur present on the pitchers of this plant. It occurs across the Titiwangsa Mountains of Negri Sembilan, Selangor, Pahang, Perek and Kelantan at altitudes of 900–2,000 m, mainly in sparse lower montane or upper montane forest or scrub on ridgetops and mountain summits, or on mossy slopes and cliffsides and amidst recovering, secondary vegetation. It grows both terrestrially or as an epiphyte, and readily produces a branched stem up to 5 m long and scrambles and climbs amidst

surrounding vegetation.

Nepenthes ramispina is very distinctive and easily distinguished from all other Malaysian pitcher plants by its trap morphology. The lower pitchers are up to 22 cm long and 5 cm wide. The bottom third to half of the pitcher is ovate and variably swollen, though elongated and narrow. Above this part, the width of the pitcher narrows (usually with a distinct hip) and becomes cylindrical or very slightly infundibular towards the pitcher opening. Wings up to 8 mm wide, fringed with filaments up to 12 mm long, run down the front of the lower pitchers (although often are greatly reduced). The exterior of the pitcher is black in plants growing in direct sunlight and purplish brown often with black blotches in plants growing in shade (and in the intermediate pitchers). The interior of the trap is pure light yellowish green and the peristome is bright yellow in young, newly opened pitchers and suffused purple or black as the traps age. The upper surface of the lid is black and the lower surface is yellow, orange or reddish.

The upper pitchers are produced only when the plant develops a climbing stem, and usually only in small numbers and only after many intermediate pitchers have been produced. The upper traps are up to 20 cm high and 4 cm wide, but usually are much smaller than these maximum measurements. The bottom third of the pitcher is ovate variably swollen, though elongated and narrow. Above this part the width of the pitcher narrows (usually with a distinct hip) and becomes cylindrical or slightly infundibular towards the pitcher opening. The upper pitchers are rhomboid in cross section, and the pitcher opening is often angular. Wings are reduced to narrow ridges which run down the flattened front of the trap. The exterior of the upper pitcher and the upper surface of the lid are dull green or blackish green. The interior of the pitcher and the lower surface of the lid are light yellow or light green, and the peristome is yellow in young, newly opened pitchers, but gradually turns red, purple and black.

All three species are easily distinguished in the wild and are unlikely to be confused, owing to their very different pitcher structure and colouration. Hybrids involving these three plants are often very common where these species grow together.

Fortunately all three species remain widespread across the rugged interior of Peninsula Malaysia, and populations of all three (though particularly *N. macfarlanei* and *N. sanguinea*) occur within protected areas and national parks. All three species can be seen easily at the Genting Highlands resort, two hours outside of Kuala Lumpur!

Figure 3: A beautiful mottled pitcher of *Nepenthes ramispina x sanguinea*