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Meeting are held on the second Friday of each month
Time: 7.30pm—10.00pm
Venue: Woodstock Community Centre
Church St, Burwood
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Upcoming Speakers and Events

Date	Subject	Speaker
10th March	Germinating *Nepenthes*	Hamish McKeller
April	No meeting	
12th May	Gemmae collecting	Greg Bourke
21st May	Koi/Pet and Garden Show	Display and Sales
9th June	Borneo trip 2006	Greg Bourke
14th July	To be confirmed	
11th August	Tuberous Drosera	Greg Bourke

Committee 2006

Clandestine Diversity: Snap-Tentacles of the Genus *Drosera*

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In 1994 we filmed *Drosera burmannii* (**Figures 1&2**) in our greenhouse to record the rapid movement of its elongated marginal tentacles for a new video ([1]). A well known phenomenon even 12 years ago, reported to be similar to *D. sessilifolia* (both in section

Figure 1. D. burmannii in cultivation showing distinct elongated marginal retentive glands or snap-tentacles.

Thelocalyx). After becoming aware of those snap-tentacles without glue-production we surprisingly found some more sundews standing just next to them, actually less eye catching but showing the same tactic, namely the hybrids *D. capensis x aliciae* (**Figure 3**) and *D. rotundifolia x spatulata* (synonym: *D. tokaiensis*) (**Figure 5**) as well as some Pygmy *Drosera* species (section *Lamprolepis*). However, fully occupied with our movie we paid no further attention to it, at least until we received a VHS video by Richard Davion in 2003, which brought the rapid tentacles back to mind. Now it was *D. glanduligera* (section *Coelophylla*)(**front cover**), a minute species and quite difficult to cultivate, which grows naturally near Richard's property in Adelaide (South Australia). For almost 25 years he tried to convince other carnivorous plant enthusiasts that the elongated tentacles (which he calls "ribbon-tentacles") of this species need only fractional parts of a second for snapping. 1995 and 99

Figure 2. Elongated marginal tentacle of *D. burmannii* showing raised (jelly cushion) trigger mechanism

he even published articles on the subject in "Flytrap News" ([2-3]) mentioning also the movement of *D. burmannii*, *D. pygmaea* and *D. callistos*. This proved to be in vain, because obviously other carnivorous plant enthusiasts either ignored or did not believe him – until we showed his VHS recordings on our DVD "A Hunting Veggies Cocktail" ([4]). Having also been successful in cultivating the minute plants during the following winter season, we started to investigate the phenomenon with a macro-lens and our USB-microscopes. Finally we thoroughly confirmed Richard's discovery completely, writing an article for the German CPS (GFP) newsletter *DAS TAUBLATT* ([5]).

Taking another detailed look at the *Drosera* species in our collection became a reason to contact some old CP friends. Anja and Holger Hennern showed us Pygmy *Drosera* photos from their last Australia tour and indeed several more plants showed elongated marginal tentacles without glue production. Photos in literature (i.e.: Plants of Prey ([6]) or Carnivorous Plants of Australia Vol. 2 ([7])) either don't show them at all, or just coincidentally, and drawings incorrectly show all these tentacles with a glue drop. Obviously the authors did not pay any attention to the phenomenon because there are no further comments.

At least the presently most scientific book by the authors Juniper, Robins and Joël "The Carnivorous Plants" ([8]) mentions – more generally speaking – that several species exist which develop rapid moving, glue-less marginal tentacles e.g. *D. burmannii*, putting them into one context concerning

Figure 3. *D. capensis x aliciae*

Figure 5. D. rotundifolia x spatulata (D. tokaiensis)

the evolution from *Drosera* tentacles to the snap trap of *Dionaea*.

Very interesting! So we started to record plants out of different *Drosera* sections with macro- and microscope images and spent a lot of time filming real time and time-lapse videos. Then we called on a well known expert for systematics (and an editor of Carnivorous Plant Newsletter - CPN), Dr Jan Schlauer, to ask him for his opinion on the phenomenon as well as for a fitting designation for the obviously mostly overlooked snap tentacles, which he also knew on principle. Somehow surprised about the extent of our observations (which he called "somehow bizarre") he considered that due to their behaviour they could be called catapult- or jerk-tentacles (and in German: Katapult- or Schnelltentakel). We immediately agreed to the German words (especially "Schnelltentakel" is charming) and found also the English names were fitting. Actually after another communication with Richard Davion we decided to keep on using the word snap-tentacles for our English translations. Incidentally some *Drosera* species show also a rapid movement with glue producing (sometimes elongated) tentacles but these are explicitly not meant. However, sometimes there is indeed a relation between them, as you will see.

Figure 6. *D. scorpioides* Photo G. Bourke

Looking at the snap-tentacle behaviour of different species actually not only the Australian Pygmy *Drosera* species, but nearly all checked "snappers" showed a similar ability to move about as fast as *D. burmannii* and *D.sessilifolia.* The 100-fold faster speed of *D. glanduligera* remains a record and is actually still unique for the genus. Considering the difference between species with or without marginal snap-tentacles – both can be closely related and listed within the same section – leads to an interesting result. Holger Hennern supposed (pers. comm.) that only basal rosettes develop snap-tentacles, but not stem building species or such with upright pointing trapping leaves because that makes sense for the trapping. In association with flying prey glue is much more effective than a snap-tentacle, which indeed is quite ineffective from the point of view of winged insects. The elongated marginal glue-tentacles of *D. binata*, *D. scorpioides* (**Figure 6**) or *D. indica* are good examples for this. With regard to small Arthropods crawling directly on the soil it's another story all together. Here the downwards pointing snap-tentacles appear like a set of bars (see photos) that start moving up within seconds when touched by prey, forwarding it directly to the gluey lamina. Once triggered they are either set upright around the leaf margin and complicate escaping the glue, or they bend in like i.e. *D. burmannii* (**Figure 7**)- and especially effective *D. glanduligera* – holding on to the prey until it's really tied up and pressed into the trapping and digesting mucus. In addition this is also a clever method to avoid prey theft by ants, which is a common problem for many *Drosera*.

Exactly that hypothesis seems to be confirmed by our investigations. Considering the shape of a plant (basal rosette or not) for the sections *Drosera* and *Lamprolepis* (see table), it is thus possible to

Figure 7. *D. burmannii* holding a small ant. Photo G. Bourke

Figure 8. *D. ericksoniae*

predict relatively accurately whether a species develops snap-tentacles or not. Especially interesting in this respect is section *Lamprolepis* because also the upright growing species like (conspicuously) *D. scorpioides* show precisely at that marginal place elongated glue-tentacles - also able to move quickly - where i.e. the basal rosettes *D. ericksoniae* **(Figure 8)** or *D. occidentalis* develop their snap-tentacles. Obviously dependent on plant shape we find "snappers" and "only mucous" plants which are very closely related, sometimes sharing even the same growing sites. That needs some more consideration.

The theory of evolution tells us that *D. arcturi* (**Figure 9**) and *D. regia* (monotypical sections) are the most archaic *Drosera*. Neither have marginal snap-tentacles (not yet ?), only uniform "normal" glue-tentacles. The plants in section *Ergaleium* (bulbous *Drosera*), *Lasiocephala* (*D. petiolaris* and relatives)(**Figure 10**) and *Prolifera* (Queensland sundews) show the same behaviour. Indeed we find basal rosettes within these sections, but none of them developed snap-tentacles, neither *D. schizandra*, nor *D. whittakeri* or *D. falconeri*. Indeed "snappers" are mainly limited to the Southern Hemisphere. The most northerly reaching species are *D. spatulata* in the east (Australia to Japan) and *D. capillaris* in the west (both Americas). Looking at our table below we see that snap-tentacles can be found in Asia, Australia, both Americas and in South Africa. Actually the simultaneous spreading of closely related genera in Australia, South America and Southern Africa (i.e.: the family Proteaceae) is today well known in Biology. The reason are common ancestors some 100 Million years

Figure 9. *D. arcturi*

Figure 10. D. ordensis from the the section *Lasiocephala*

ago, when all the continents (including India) were united as Gondwana. Unfortunately is Antarctica - which also participated in that botanical hotspot - meanwhile too cold for insects and carnivorous plants. However, divided by the following continental shift the surviving genera continued their evolutionary development independently on different continents.

This being considered, one gains the impression of a "modern" Sundew species which, in the days of the Dinosaurs in Gondwana, still developed additional optimised marginal tentacles to effectively catch crawling prey from the soil. The fixation of prey is also a smart way to avoid theft by insects like ants, which also started their successful world-wide development some 100 Million years ago. Maybe there is even causality. In addition the variable behaviour of section *Lamprolepis* (approx. 40 species) clearly shows an ability to switch - if a new species appears by adaptation – the genes between the production of marginal glue- or snap-tentacles. The important triggers for that amazing adaptation mechanism are environment and prey (mainly if crawling or flying) and thus logically the growing shape of the species. One more observation: if cross-breeding the basal rosette *D.aliciae* with the upright growing *D. capensis* the resulting (natural) hybrid *D. capensis x aliciae* (**Figure 11**) produces rapid snap-tentacles despite development of a stem (within many years). *D. binata* seedlings show snap-tentacles, but only until the leaves start getting forked. Here is still plenty of room for further investigations.

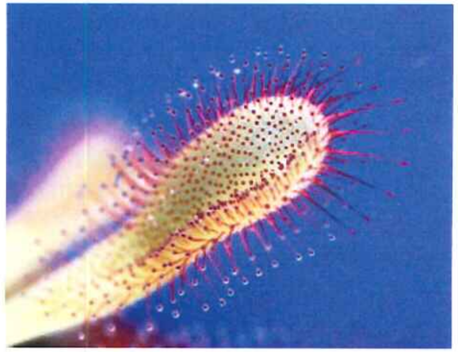
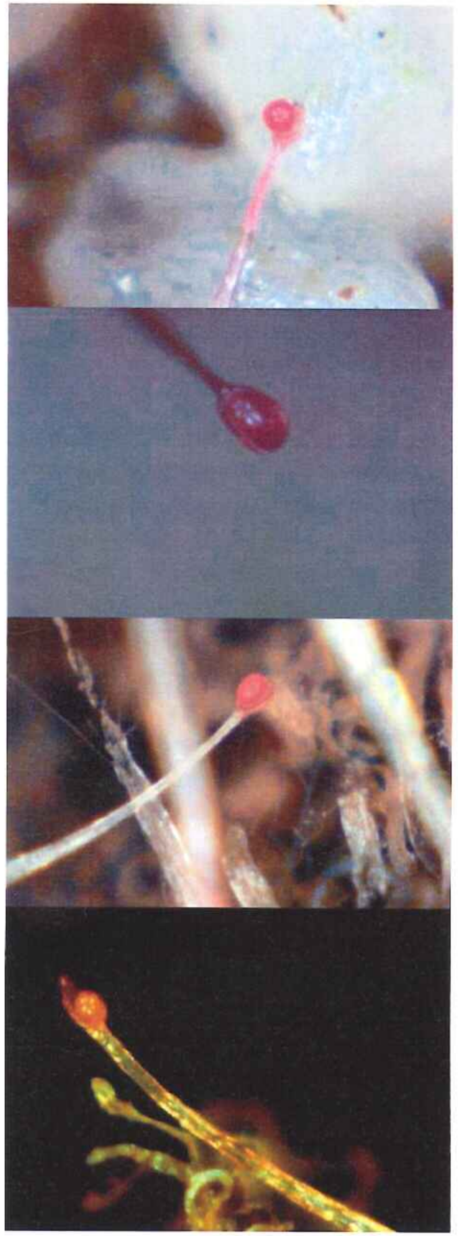


Figure 11. *D. capensis x aliciae*

All in all this could be of interest for systematics too and we are looking forward to the discussions on this topic because, last but not least, our USB-microscopes show that the shapes of the investigated snap-tentacle heads are also pleasantly different (see table pages 16-18). From this point of view the trigger mechanism of *D. glanduligera* looks for example like an evolutionary improvement of the hemisphere-shaped snap-tentacle heads which are typical for the Pygmy *Drosera* species (relatively similar also to the Southern Australian *D. hamiltonii*). That structure changed obviously into a stalked ball, which lies moveably on the three-fold subdivided tentacle head, acting as a highly sensitive contact-sensor. Combined with a kind of articulation connecting the now divided tentacle stalk, the movement becomes approximately 100 times faster than in all other species of the genus, which is a really new dimension. Like the authors of "The Carnivorous Plants" ([8]) state for *D. burmannii*, we consider also *D. glanduligera* to be a remarkable development of nature with respect to the development of rapid snap traps in *Aldrovanda* and *Dionaea*.

Actually there still remains the question of the trigger of movement



Top to Bottom: *D. binata, D. hamiltonii, D. pulchella* and *D. glanduligera*

Top to Bottom: *D. montana, D. sessilifolia, D. sessilifolia* (after soaking in alcohol), *D. rotundifolia x spatulata.*

in the other snap-tentacles. Tests with a needle show that a trigger mechanism must exist on the tentacle head or the cells connecting head and stalk, but how does it work? With the exception of *D. glanduligera* all snap-tentacle heads consist of a kind of scoop (lower side mostly flat), with a shape ranging from round to lengthy dependent on the species. On the upper side we find an embossed pillow-like cell-structure (also with various shapes depending on the species) which is in all cases inflated (we call it "jelly-pillow") to varying extents depending on the condition of the plant and the age of the trapping leaf. If that inflated surface is touched, no matter whether by insect or by needle, a shockwave probably moves through the "pillow" and hits the bottom cells, which trigger an action potential that moves on into the tentacle stalk. Or the action potential is produced at the junction between head and stalk, as observed with the mucus producing tentacles. Actually the action potential moves into the stalk, where it causes some particular cell-groups to increase their inner pressure. The whole tentacle starts bending now due to this rapid cell growth (turgor-growth). The development of such action potentials by contact (also by chemical stimulation) has been proved by Prof. Stephen Williams (USA) in the early 70's with "normal" *Drosera* tentacles ([10-14]). Using minute electrodes he measured the action potentials, their movement through the cell tissue and their amazing ability to cause particular remote cells to adapt their pressure, all without the existence of nerves. Therefore it's very probable that the principles of triggering and movement are very similar for the snap-tentacles which are in fact modified glue-tentacles.

D. spatulata Pink

More about snap-tentacles from different continents under our microscopes, magnifications on video in real time and time-lapse, and even more can be found on our new DVD "*Drosera* – Snap-Tentacles and Runway Lights (German: *Drosera* – Schnelltentakel und Landescheinwerfer) ([9]). There we also explain our theory of the function of the yellow emergences of *D. hartmeyerorum* which also developed from normal glue-tentacles. Last but not least, the trigger-hairs responsible for the snap-trap movement of the Waterwheel Plant and the Venus Flytrap developed from *Drosera* tentacles too. Another fact that Stephen Williams describes very convincingly by comparative investigations of the family Droseraceae ([10-14]).

The sketches that follow showing the different shapes of snap-tentacle heads are only thought to highlight the diversity of those structures and we count on your forgiveness for Siggi's drawing talent. For the upport of our investigations and this resulting article we would like to express our special thanks to Richard Davion (who discovererd the fastest tentacle movement in the genus *Drosera*) and Stephen Williams for their important information and material on the topic. Thanks also to Anja und Holger Hennern who shared their rich "Pygmy experience", and to Jan Schlauer for his opinion and name proposals. We are also grateful to Dr. Eberhard König, who gratis donated some missing species for our investigation, as well as Dr. Barry A. Rice for his support concerning *D. capillaris*. Last but not least we say thank you so much to Elvis Pöhlmann who spent much time for making the high resolution photos of *Drosera* species in our CP collection and to Paul Smith for proof reading my poor English.

Photos: Elvis Pöhlmann unless stated – Tables and sketches: S. Hartmeyer

Bibliography:

(1) Hartmeyer, I., Hartmeyer, S., (1995) Reiseziel Insektivoren (Englisch: Beautiful and Hungry – Part 2), private DVD

(2) Davion, R., (1995) Now you see it - Now you don't, FLYTRAP NEWS (CPSNSW) Vol. 8/4:17

(3) Davion, R., (1999) That damned elusive Pimpernel, FLYTRAP NEWS (CPSNSW) Vol. 13/1: 10

(4) Hartmeyer, I., Hartmeyer, S., (2004) Quer durch's Karnivorenbeet" (Englisch: A HUNTING VEGGIES Cocktail), private DVD

(5) Hartmeyer, I. & Hartmeyer, S., (2005) *Drosera glanduligera*: Der Sonnentau mit "Schnapp-Tentakeln", DAS TAUBLATT (GFP) 2005/2: 34-38

(6) Erickson, R., (1968) Plants of Prey, University of Western Australia Press

(7) Lowrie, A. (1989) Carnivorous Plants of Australia Vol. 2, University of Western Australia Press

(8) B.E. Juniper, R.J. Robins. D.M. Joel, (1989) The Carnivorous Plants, Academic Press London: 303

(9) Hartmeyer, I. & Hartmeyer, S., (2006) *Drosera* - Schnelltentakel und Landescheinwerfer" (Englisch: *Drosera* – Snap-Tentacles and Runway-Lights), private DVD

(10) Hartmeyer, I. & Hartmeyer, S., (2002) The International Carnivorous Plant Conference – 2002 in Tokyo, private DVD

(11) Williams, S.E., Pickard, B.G., Connections and Barriers between Cells of Drosera Tentacles in Relation to Their Electrophysiology, Planta (Berl.) 116, 1-16 (1974)

(12) Williams, S.E., Comparative Sensory Physiology of the Droseraceae - The Evolution of a Plant Sensory System, Proceedings of the American Philosophical Society, Vol. 120 No. 3, June 1976

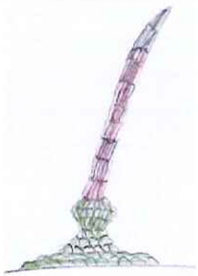
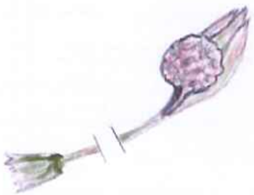
(13) Williams, S.E., Pickard, B.G., The Role of Action Potentials in the Control of Capture Movements of *Drosera* and *Dionaea*, Plant Growth Substances 1979, Springer Verlag Berlin-Heidelberg-New York

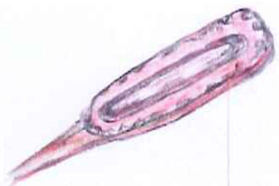
(14) Williams, S.E., Albert, V.A., Chase, M.W., Relationships of Droseraceae: A Cladistic Analysis of *RBC*L Sequence and Morphological Data, American Journal of Botany, 81(8): 1027-1037, 1994

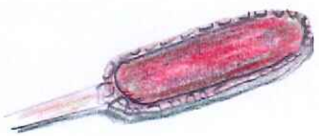
List of investigated Plants

PLANT NAME Green = develops snap-tentacles Red = develops only glue-tentacles	*DROSERA* SECTION in alphabetical order	ORIGIN OF SPECIES
Drosera hartmeyerorum	*Arachnopus*	Australia (Rem.: shows additional "yellow emergences" which developed from glue-tentacles)
D. indica	*Arachnopus*	Asia/Australia/Africa/Madagascar
D. arcturi	*Arcturi*	Australia/New Zealand
D. glanduligera	*Coelophylla*	Australia
D. aliciae	Drosera	South Africa
D. anglica	*Drosera*	Northern Hemisphere
D. capensis	*Drosera*	South Africa
D. capensis x aliciae	*Drosera*	Natural hybrid, South Africa
D. capillaris	*Drosera*	Both Americas
D. cistiflora	*Drosera*	South Africa
D. cuneifolia	*Drosera*	South Africa
D. esterhuysenae	*Drosera*	South Africa
D. filiformis	*Drosera*	North America
D. glabripes	*Drosera*	South Africa
D. intermedia	*Drosera*	Northern Hemisphere
D. madagascariensis	*Drosera*	Africa/Madagascar
D. montana	*Drosera*	South America
D. nidiformis	*Drosera*	South Africa
D. rotundifolia	*Drosera*	Northern Hemisphere
D. rotundifolia x spatulata (*D. tokaiensis*)	*Drosera*	Natural hybrid, Japan
D. slackii	*Drosera*	South Africa
D. spatulata "pink Blüte"	*Drosera*	Asia/Australia
D. spatulata "weiße Blüte"	*Drosera*	Asia/Australia
D. venusta	*Drosera*	South Africa
D. villosa	*Drosera*	South America
D. auriculata	*Ergaleium*	Australia
D. bulbosa	*Ergaleium*	Australia
D. erythrorhiza	*Ergaleium*	Australia
D. gigantea	*Ergaleium*	Australia
D. macrantha	*Ergaleium*	Australia
D. menziesii	*Ergaleium*	Australia

PLANT NAME Green = develops snap-tentacles Red = develops only glue-tentacles	*DROSERA* SECTION in alphabetical order	ORIGIN OF SPECIES
D. modesta	*Ergaleium*	Australia
D. pallida	*Ergaleium*	Australia
D. peltata	*Ergaleium*	Asia/Australia/New Zealand
D. platypoda	*Ergaleium*	Australia
D. ramellosa	*Ergaleium*	Australia
D. rosulata	*Ergaleium*	Australia
D. stolonifera	*Ergaleium*	Australia
D. tubaestylus	*Ergaleium*	Australia
D. whittakeri	*Ergaleium*	Australia
D. zonaria	*Ergaleium*	Australia
D. callistos	*Lamprolepis*	Australia
D. dichrosepala	*Lamprolepis*	Australia
D. enodes	*Lamprolepis*	Australia
D. ericksonae	*Lamprolepis*	Australia
D. lasiantha	*Lamprolepis*	Australia
D. occidentalis	*Lamprolepis*	Australia
D. pulchella	*Lamprolepis*	Australia
D. pygmaea	*Lamprolepis*	Australia/New Zealand
D. sewelliae	*Lamprolepis*	Australia
D. scorpioides	*Lamprolepis*	Australia
D. falconeri	*Lasiocephala*	Australia
D. lanata	*Lasiocephala*	Australia
D. ordensis	*Lasiocephala*	Australia
D. paradoxa	*Lasiocephala*	Australia
D. petiolaris	*Lasiocephala*	Australia
D. binata (only seedlings !)	*Phycopsis*	Australia/New Zealand
D. adelae	*Prolifera*	Australia
D. prolifera	*Prolifera*	Australia
D. schizandra	*Prolifera*	Australia
D. regia	*Regia*	South Africa
D. hamiltonii	*Stelogyne*	Australia
D. burmannii	*Thelocalyx*	Asia/Australia
D. sessilifolia	*Thelocalyx*	South America

Plant **(all family Droseraceae)**	**Tentacle-shape** sketches S. Hartmeyer. Scale varies a little	**Characteristics**
***Drosera* species** **Generally** (Sundew) Tentacle length and shape of the glandular head can be different depending on the species.		Glue-tentacle typical for the genus. Contact sensitive. Moving 90° needs approx. 20 seconds to more than 60 minutes also depending on the temperature.
Aldrovanda vesiculosa (Waterwheel Plant) Aquatic monotypic genus. The cell structure of the trigger hairs shows a similar construction like *Drosera* tentacles. **World-wide in warmer regions**		After contact the triggerhair produces an action potential, which moves to the lamina which is thus caused to snap shut. Duration approx. 0.1 – 0.5 seconds.
Dionaea muscipula (Venus Flytrap) Monotypic genus. The cell structure of the trigger hairs shows a similar construction like *Drosera* tentacles. **USA**		After contact the triggerhair produces an action potential, which moves to the lamina which is thus caused to snap shut. Duration approx. 0.1 – 0.5 seconds
Drosera glanduligera Section *Coelophylla* **Australia**		Snap-tentacle with genus unique trigger- und snap mechanism. Touching the tentacle head causes the younger looking part of the tentacle to snap in direction lamina (approx. 180°). Duration approx. 0.15 seconds.

Drosera ericksonae Section Lamprolepis Similar to most species of section Lamprolepis. **Australia**		Snap-tentacle. Touching the head causes bending direction lamina by changing turgor within particular tentacle stem cells. Duration approx. 5-15 seconds.
Drosera hamiltonii Section *Stelogyne* **Australia**		Snap-tentacle. Touching the head causes bending direction lamina by changing turgor within particular tentacle stem cells. Duration approx. 15-25 seconds.
Drosera burmannii Section *Thelocalyx* **Asia, Australia**		Snap-tentacle. Touching the head causes bending direction lamina by changing turgor within particular tentacle stem cells. Duration approx. 8 - 15 seconds.
Drosera sessilifolia Section *Thelocalyx* **South America**		Snap-tentacle. Touching the head causes bending direction lamina by changing turgor within particular tentacle stem cells. Duration approx. 8 - 15 seconds.
Drosera montana Section *Drosera* **South America**		Snap-tentacle. Touching the head causes bending direction lamina by changing turgor within particular tentacle stem cells. Duration not recorded.

Drosera capillaris Section *Drosera* **Both Americas**		Snap-tentacle. Touching the head causes bending direction lamina by changing turgor within particular tentacle stem cells. Duration not recorded.
Drosera aliciae Section *Drosera* Very similar also to *D. aliciae x capensis, D. slackii, D. cuneifolia, D. pumila, D.esterhu-ysenae, D. venusta* **South Africa**		Snap-tentacle. Touching the head causes bending direction lamina by changing turgor within particular tentacle stem cells. Duration approx. 15-25 seconds.
Drosera spatulata Section *Drosera* Very similar also to D. rotundifolia x spatulata **Asia, Australia**		Snap-tentacle. Touching the head causes bending direction lamina by changing turgor within particular tentacle stem cells. Duration approx. 15-25 seconds.
Drosera hartmeyerorum Section *Arachnopus* The yellow emer-gences - which only this species develops on the lamina and be-neath bracts at the flo-rescence – are modi-fied glue-tentacles. **Australia**		Yellow emergence: the head is build by honey-comb shaped transpar-ent giant cells which are optical active. The sunlight is focused on a bright yellow center and thus bright yellow reflected. Ability of movement (adjustment to light) is assumed.

Mt. Tomah 2006

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Robert Pollet explains what you shouldn't do to your plants

The second annual Carnivorous Plant Display was held at the Mount Tomah Botanic Gardens on the 25th and 26th of February 2006. Following some serious advertising in the local press the mountains turned on the perfect weekend for the show.

Unlike the previous year which was rainy and miserable, 2006 was hot and sunny which was good for the CP enthusiasts who could actually get out into the garden to have a look around but also for the public, many of whom had their first look at the bog garden. The good weather certainly affected the day, there were notably more people at the Gardens which for us translated into a great opportunity to promote carnivorous plants to the public, not to mention making some great sales.

The plants on display this year were the usual high standard and the set up was a little different. Using boxes and hesian, the display plants ran along the trestles through the middle of the room with plants for sale clustered around them.

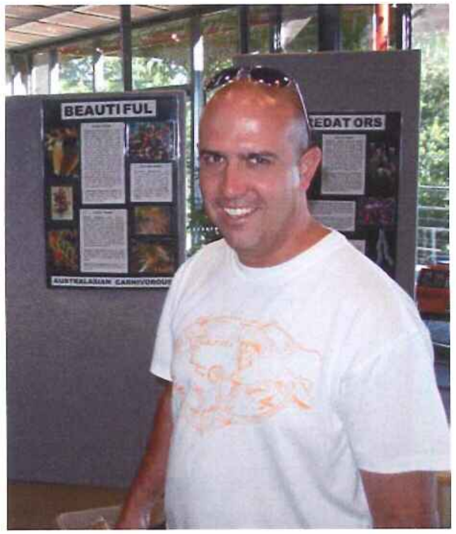
Brocchinea reducta

A section of the Bog Garden

There were additional sets of tables on the walls bursting with more plants for sale. Kirsty did a fantastic job with posters which depict what CPs are, how they grow and where they are found. The whole display gave the public a great opportunity to see the variety of CPs both native and from overseas.

Sales this year were fantastic. Thanks to all of the growers who provided plants, Richard Sullivan, Gordan Hanna, Peter and Jessica Biddlecombe, Phillipe Reyter and Margaret Frey. Sales were so good on the first day we had to send Richard and Philippe back home to replenish our stocks. It should be noted that the weather had a marked affect on the plants we were selling. The drought as we all know has made growing our plants that little bit harder but it was the heat wave during Christmas that really affected our stocks. Growers who would normally have provided supplies simply didn't have the plants. It will be interesting to see how the change in our weather patterns affects what we can grow and maintain over the next few years.

The Bog Garden is of course the big attraction at Mount Tomah. It was good to see the plants are settled. So settled in fact that the Sarracenias have had to be stuffed with cotton wool to prevent them from over feeding. Insect supplies around



The sign says it all! Jenssen Turnowsky

Heliamphora minor grown by Richard Sullivan

the area are so good that the pitchers were rotting from too many snacks. The availability of insects certainly hasn't affected the other plants in this section, the *Drosera, Dionaea* and *Utricularia* all looked in great condition. The security camera which has been installed seems to have put a stop to our five fingered friends who decided to borrow plants from the garden when it was first planted up.

Mathew Murray (Senior Horticulturalist) from the gardens gave a talk on Saturday afternoon explaining the mechanics of the hanging swamp with a Power Point presentation. He then took people down to the bog garden to show how the bog worked. It was a great opportunity for the public to see the bog up close. The previous years talk was rained out and had been conducted around the display in the visitor's centre.

The main focus of course for events such as the display at Mount Tomah, the Koi, Pet and Garden Show and our involvement in the Sex and Death display at the Royal Botanic Gardens is to give our members an opportunity to get

A selection of Nepenthes pitchers captivated the visitors.

together and to promote our plants to the public. It was good to see society members getting up there and getting involved. But without the public we would just be talking

Sarracenia luecophylla whith its beautiful white windows is always a popular species

to ourselves and we already know how great these plants are.

Talks were held through out the weekend by our society members. Our thanks to Robert Pollet for his Saturday presentation around the displays with some general information on CPS and cultivation. Richard Sullivan and I gave a similar presentation on Sunday morning following by my slide presentation on Sunday afternoon about my 2005 trip to Borneo. This gave people an overview of the different species found in this nepenthes paradise.

The public were a real mix this year, young and old, those with plants already and those who had no idea what a CP is. At one stage on Saturday afternoon a bus load of Sydneysider's descended on us. In a mad rush they purchased all sorts of plants for window sills, children and their gardens. Their interest seems to be in the strangeness of the plants and they were keen to even purchase the display plants. While they asked questions about how to grow their selections though I am not sure how many were actually listening to the answers.

Then there were the kids. I think for most they start with a venus fly trap and move on from there. There was little boy around 10yrs of age who was with his Dad and Granddad. From their conversation he already had a couple of plants at

Richard Sullivan attempts to keep up with the demands of the public!

home and was going to buy a few more with his pocket money. He had some pocket money and picked a little *Dionaea* and *Drosera* but his Granddad was offering to buy him bigger plants. But the kid was on a mission and he kept his little plants. What amazed me was this kid wasn't greedy, was happy to buy the plants himself and he had his heart set on the healthy little *Dionaea* over a larger not so healthy one. He even asked questions to make sure that he could grow them properly. Who needs a play station?

So overall the weekend was a great success. Thanks again to all of our society members who made themselves available to help out. Thank you to Kate Faithorn from the Mount Tomah Botanic Gardens for her efforts and all the garden staff who are always happy to help us (and clean up after we leave).

Let's get growing for next year. Fingers crossed for an even bigger and better event, and hopefully the gardens restaurant will put the Rabbit Pie back on the menu!

Mathew Murray educates the masses while sinking into the bog

Searching for the Three Sisters

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The three Drosera species from the section *Prolifera, D. adelae, D. prolifera* and *D. schizandra* had eluded me on previous trips to the far north of Australia but on my trip to the region in March 2005 I was armed with good maps for all three species. Failure was impossible! Or so it seemed.

I also planned to revisit some sites previously visited in 2001 as well as visiting Rod Kruger's Nepenthes Nursery Captive Exotics. I made Rod's place the first stop on this visit given its close proximity to Cairns where I flew in the previous day. Rod had some valuable information for my trip and both his collection and sale plants were a delight to see. I was especially interested in seeing *Nepenthes rowanae* which was to be reinstated as a true species after being reduced to a synonym of *N. mirabilis* by Danser (1928). Rod had been observing *Nepenthes* in the far north when I met him in 2001 and had discovered some very interesting plants including some beautiful forms of *N. rowanae* (**Figures 1-3**). After several hours of talking Neps and eating Kate's (Rod's better half) fantastic chocolate muffins it was time to head of in search of local carnivorous plants.

Figure 1. A typical form of Nepenthes rowanae. Photo Rod Kruger

Figure 2. *N. rowanae* mottled form in cultivation at Captive Exotics.

Figure 3. *N. rowanae* squat form. Photo Rod Kruger

The permanent swamps near Mareeba in the Atherton Tablelands was my next stop where I found one of the largest of the aquatic *Utricularia* species. Plants of *U. aurea* at this site measured as long as 3 metres (**Figure 5**) many of which were branched. I counted the traps on one whorl of the largest plant I could reach, counted the number of whorls in 50 centimetres and was able to calculate the total number of traps on this one plant at 36,000! Almost every trap was coloured black with captured prey (**Figure 4**) and given that each trap is able to catch many prey, it is easy

Figure 4. The traps of *U. aurea*

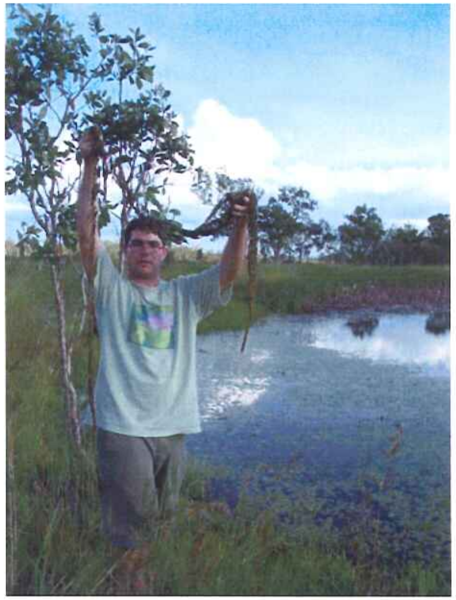

Figure 5. A large plant of *U. aurea.*

to see that these plants play a major roll in controlling insect pests!

U. bifida, U. caerulea and *D. indica* were seen further north on the sandy backs of a small creek. Here I was able to observe a large ant (*Polyrhachis* sp?) climbing the grasses that grew amongst the *D. indica* plants. The ant was carefully examining every Drosera leaf that was in contact with the grass. It was hunting for fresh prey and after only a few minutes it was rewarded with a fresh wasp. In **figure 6** the ant can be seen cleaning a small amount of mucilage from its antennae and legs.

Of the three rainforest *Drosera, D. adelae* is the most widely distributed. It occurs east of the Great Dividing range in roughly a 200km band from Ingham to Innisfail and on Hinchinbrook Island. Typically it can be found in sandy soils and amongst rocks at the sides of creeks but the plants I saw were growing on the vertical rock face of a waterfall! (**Figure** 7). A large colony of several dozen plants was found in this seemingly impossible situation. Given that this species self propagates from exposed roots it is likely that this colony was of a single clone. I imagine that little prey would be caught in such a situation but ample nutrients would be provided by the constant spray

Figure 6. Looking for an easy feed from the leaf of a Drosera be dangerous. The ant gets away this time!

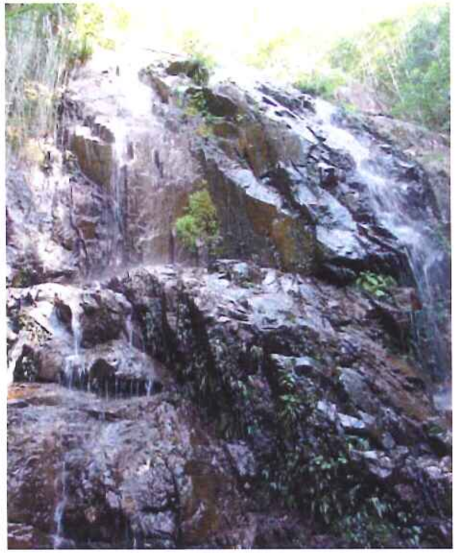

Figure 7. The lime green leaves of *D. adelae* can be seen in the centre of shot.

Figure 8. A close up of the colony.

Figure 9. D. adelae 'Green' on the left and 'Red' on the right.

of water on the leaves and exposed roots.

Although different flower colour forms are reported in cultivation there appear to be two distinct plant forms that I have encountered (**Figure 9**). The green form prefers warmer conditions year round and dislikes bright light. This form typically has broader leaves and reaches 25cm in diameter. The red form is able to be grown in direct sunlight and can withstand temperatures close to 0°C. It has narrow leaves with red pigmentation and has been confused with *D. regia* by visitors to my collection.

Drosera schizandra is one of the largest of all Drosera and has been found only on one mountain in Queensland. Mt. Bartle Frere at 1622m (5320ft) is the largest peak in Queensland. *D. schizandra* has only been found at a few locations on the slopes of the mountain where it is locally abundant. Like its sister species it propogates easily from the roots and leaves and forms large colonies of a single clone.

D. schizandra can tollerate less water than both *D. adelae* and *D. prolifera* and can be found growing on the forest floor well away from any water courses. The first site I encountered it was on an old logging trail. Hundreds of large (<20cm) glistenning plants covered the forest floor either side of the trail (**Figures 10 & 11**). On the steeper sections the dark hairy roots could be seen on the soil surface,

Figure 10. *D. schizandra*

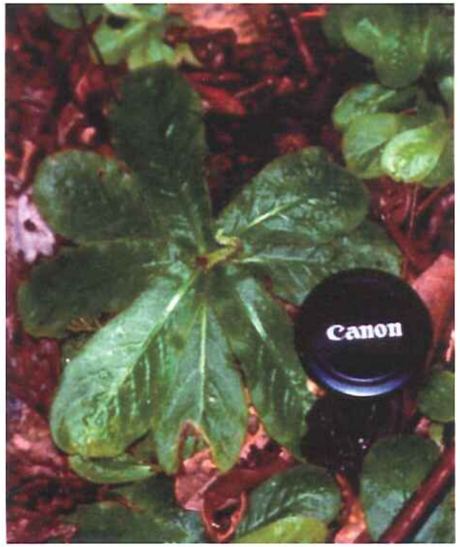

Figure 11. One of the larger specimens at the first site.

often with many small plantlets along the length. The root system is kept shallow as the soil below the thin layer of decaying nutrient rich leaf litter is both heavy and poor in nutrients.

D. schizandra typically has a fairly sparse covering of retentive glands on its leaves and it appeared that these are of little. The only prey I did see caught was extremely small (>3mm) flying insects. Then I noticed a similar ant to the one I saw scouting around the *D. indica* plants earlier in the trip (**Figure 12**). This ant was able to walk straight across the leaves without getting stuck on the sticky glands.

The retentive glands on the leaves at this site were roughly 3-5mm in length and the ants legs were longer. I was still not convinced that this was the entire reason for the lack of larger prey. After all, the glands were very sticky the plants were numerous as were the flying insects and the ants were few and far between.

Figure 12. Approaching the dinner table.

After some time sitting by the plants waiting for some action I decided to catch some prey for them. I caught a fly that was about twice the size of a common house fly and threw it onto a plant. It stuck fast but seconds later a skink ran out from under the leaf litter and stole the fly. Possibly a Bar-sided Forest-skink (*Eulamprus tenuis*) at 15cm in length this guy appeared to be relying on the *Drosera* for an easy feed. I caught a couple more flies and threw them onto the *Drosera* with the same result so I went a little further down

Figure 13. *D. schizandra* at site two.

the track and tried again. No skink waiting here but on return an hour later the fly was gone.

The second site (**Figure 13**)I found *D. schizandra* in abundance was about 3km from the first and about 400m lower in altitude. At this site

Figure 14. A typical plant from site two looking distinctly different to those at site one

plants were found in amongst rocks growing with mosses and ferns. The biggest plants here measured only 10cm across but they appeared quite different to those at the first site (**Figure 14**). On close inspection I discovered that the hairs on the underside of the leaves were much longer and more dense. Also the retentive glands on the upper surface were as long as 12mm. The smaller size may have been due to a lack of nutrients as there was a lot less leaf litter than at the first site. The soil too being sandy would have contained less nutrients than the dark red/brown volcanic soil at the first site. No ants were seen surveying the *Drosera* at this site either. Perhaps with the longer tentacle length it was simply too dangerous! Skinks were seen amongst the rocks but I could not get them to perform like those higher on the mountain.

On return to the car I found another small colony growing in direct sun. Mature plants at this site measured 7cm across and were yellow in colour. I calculated that they would have received up to 4 hours of direct sun per day. Obviously not ideal conditions for the species.

Figure 15. Half way to *D. prolifera* the rock hopping turned into rock climbing. That's me on the right for scale.

Notes to contributors

Contributions including articles, letters, photographs and drawings to the journal are greatly appreciated and may be forwarded to the societies postal address or online. The views expressed in this journal are of the authors not necessarily those of the Australasian Carnivorous Plant Society Inc.

Contributions to the journal may be submitted on 3.5inch (PC) disc, CD or by email. Use Microsoft Word whenever possible. For instructions on submitting photographs and diagrams please contact the editor (sydneycarnivorous@iinet.net.au). Contact details are preferred for publication but may be excluded by the authors request.

After the success of the first two Rainforest *Drosera* I was feeling quite confident of getting to the *D. prolifera* site. I left Cairns at 5am bound for Cape Tribulation 123km to the north. Pulling over at the side of the road I prepared myself for the 5km walk. With no trail to follow I headed into the dense forest of wild Pigs, crazy Cassowaries, shredding Rattan Palms and blood-thirsty Leaches.

The first kilometre took me almost an hour as I battled through the forest and onto the rocky river bank. I was told it would be easiest to rock hop my way up the river but with rocks the size of houses I wouldn't call it hopping.

After a short rest on a large rock in the centre of a Crocodile infested lagoon I picked up my back pack only to spill all my film, GPS, cameras and thousands of dollars worth of lenses onto the rock. Two of the lenses were smashed as they spilled into the water along with several rolls of film. I managed to fish it all out but the lenses were destroyed. Despite this I pressed on and on and on. The rocks got bigger, the sun got hotter and then I fell between two large boulders. I was lucky not to break anything but I had had enough. I turned back with only 1km to go. On the way back it rained HEAVY and by the time I got home I had begun to show symptoms of giardiasis after ingesting the parasite Giardia from the river.

I'd like to thank Rod Kruger and partner Kate for their hospitality.