



**THE
INTERNATIONAL
PINGUICULA
STUDY
GROUP**
Newsletter No.6.
April 1995



Pinguicula cyclosecta
Photographed by Thomas Carow growing on the vertical
limestone walls on a mountain above El Mirador,
Tamaulipas, Mexico.

INTERNATIONAL PINGUICULA STUDY GROUP

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AIMS OF THE I.P.S.G.

1. To meet with other collectors of the species and primary hybrids.
2. To exchange information between members and to provide a forum for the exchange of information.
3. To allow the exchange of seeds internationally to improve member's access to species so that they are perpetuated in cultivation. International exchange of plant material other than seed is more difficult. As phyto-sanitary regulations have to be abided by. *In-vitro* tissue culture and micro-propagation may make this easier in the future.
4. To encourage the use of botanically correct names or otherwise the use of *nomen-nuda* until the plant has been officially described as a species.
5. To encourage accurate record keeping including such details as: location data, altitude, climate and soil type.
6. To re-introduce "lost species" to cultivation.
7. To encourage the production and selection of new primary hybrids.
8. To encourage and help the preservation of habitats in all countries where the species grow wild.

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CONTENTS

PAGE		
2.	Editorial	Stan Lampard
3.	Here at last! <i>Pinguicula cyclohexa</i>	Johan van Marm
6.	What's been pollinating my <i>Pinguiculas</i> ?	Lloyd Wix
9.	<i>Pinguiculas</i> down under.	David Bond
11.	Traditional uses of <i>Pinguicula</i> in food Part 1	Lloyd Wix
16.	Growing cabinets for <i>Pinguicula</i>	Andy Carter.
	IPSCG OPEN DAY	
	SEED BANK	
	REVIEWS	

EDITORIAL

During the course of 1994 no less than four new species of *Pinguicula* have been discovered and described from Mexico! Two from the state of Nuevo Leon, described as *P. jorgehinonii* and *P. hintoniorum* by B.L. Turner, one from the Atlantic coastal area of Oaxaca named as *P. greenwoodii* by Martin Cheek, and one from Querataro & Hidalgo named as *P. mortezumii* after the type locality of the Rio Mocetzuma by Zamudio & Ortega.

These are exciting times and I hope to bring you more news of these discoveries in due course. Meanwhile we are well into another year and already I have my first blooms appearing on European species such as *P. longifolia*, heralding the arrival of Spring and stimulating the urge to pollinate and propagate. David Bond's article on p9 serves to illustrate the importance of producing seed. Few of us would be able to enjoy the privilege of growing our plants had not someone made the effort!

Please send your surplus to Chris Heath, our seed bank organiser, who will offer it for sale in order to raise funds to subsidise this Newsletter. Seed should be supplied with full details, stating parentage; remember of greatest genetic worth is wild collected seed, followed by seed raised by cross pollination of different clones of a given species under controlled conditions. Self pollination is often the only option available but should be used only as a last resort as 'inbreeding' is likely to reduce vigour. The importance of controlling conditions of pollination is well illustrated by Loyd Wix's article on p6, and I look forward to hearing from Loyd just what has been pollinating his *Pinguiculas* as well as tasting some of his 'Tactemaek'! Loyd's article on the traditional uses of *Pinguicula* in the food industry adds a fascinating extra dimension and may provide an incentive to nurture all those *P. grandiflora* gemmae through to maturity rather than just letting them perish! In parts 2&3 Loyd will tell us how to do it!

Johan van Marm reveals some of the fun and frustrations associated with the discovery of plants in habitat, whilst Andy Carter shares the knowledge he has gained through constructing a growing cabinet to reduce costs and improve conditions for growing his *Pinguiculas*.

I hope you find Newsletter number 6 enjoyable and interesting in spite of the reduction in the number of photographs with this issue. The cost of a centre spread has become prohibitive, in its place I would welcome any photos that have good enough contrast to be reproduced in black & white or pen and ink drawings to accompany articles. I have not made much progress with the proposed '*Pinguicula Convention*' though I'm optimistic that we may be able to organise such an event for November this year. Your support and suggestions would be welcome.....please!

In the meantime I will be holding a joint
IPSG / C.P. SOCIETY Open Day
in Birmingham on Saturday 6th May 10am -6pm.
Stan Lampard.

Here at last: *Pinguicula cyclosecta*
 Johan van Marm, Germany.

Last Winter myself and three other enthusiasts visited Mexico to explore the Sierra Madre Oriental, a broad mountain range of high limestone peaks stretching northward from Mexico City to Monterrey, which is well known as the locality of many newly discovered *Pinguiculas*. The dry and hostile conditions came as a surprise to us, a habitat more suited to desert scrub and cactus plants, but then many of the smaller Mexican species do have 'succulent' characteristics and we soon learned to look for the butterworts on the shady north facing cliff faces where conditions are cooler and moister. We were lucky to find many species in such niches though often only after a considerable struggle! Our attempt to find *P. cyclosecta* was one such day full of difficulty, much 'debate' and near disaster!

We set off early from our hotel in Ciudad Victoria at 7am, without stopping to eat breakfast - we would 'find' this on the way! During the first part of our journey spirits were high as we travelled swiftly and smoothly along a newly paved road north to Santa Eufracia. I dreamt optimistically that the road might be like this all the way to Dulces Nombres! However, although our maps showed roads and towns with accuracy, dirt tracks and villages that were there on paper did not seem to exist on the ground, whilst others had appeared without warning! This served to delay us at every junction and many times we had to return back along tracks that had led us to nowhere. It took us several attempts to find our way out of Sta. Eufracia, following vague directions from locals who knew nothing of the village Dulces Nombres, except that it may be near the abandoned mines in the mountains just north on Tinajas. There was a look of great disbelief on their faces which then turned to ridicule when they realised we wanted to drive into the mountains in our VW combi, arms waving skyward as if to show how high the mountains were. Whilst the eldest of them inspected our tyres and axle clearance the others were insisting that the terrain was too rugged to be attempted in such a vehicle. When they realised we were still serious about continuing, we were finally and respectfully pointed in the right direction, they clearly thought we were mad!

Of course Mexican road maps do not show contours or potholes, how naive we were in retrospect to attempt this journey without a 4-wheel drive vehicle! My earlier dreams were soon shattered as the dirt track was repeatedly crossed by streams turning it to mud, broken by rashes of deep water filled potholes. Because of this we reduced our speed to a mere 5km/hr, any faster and water would have got into the engine, any slower and we would have ended up stuck in the pot-holes. This would not have been good as we had not met with any other vehicles and would have been helplessly alone. We determinedly drove ahead, afeared, this was meant to be the dry season so the road should have been passable..!

Finally after what seemed hours of driving through dense bushland, the landscape began to take on a more rugged form and we started to gain

altitude, clearly the mountains were ahead, though we had yet to see them clearly through the shrouds of mist. At the same point the road was paved with rock and spirits rose as we gained speed. However, this was to be short lived. We had caught up with a truck then as we rounded the next bend the track forded a river then rose very steeply on the opposite side of a steep ravine. We slowed to let the truck go first. Thomas, our driver, did not think we would have any chance of following and as the thought of going the rest of the way by foot reminded me of Fats Domino's song: 'I'm walking for my company'..... Sure enough, even the truck with high axle and deep-tread tyres was floundering as it attempted to drive up the track, wet tyres from the river did not make it easy to drive over the loose stone track. The driver's companion took a spade from the back of the truck and threw some dry sand beneath the tyres to increase the grip on stones that had been worn smooth. Clearly Thomas was right, we could go no further in our vehicle but there could be little chance of getting very far by foot in what remained of the day. There was just one other chance, perhaps we could hitch a lift on the back of the truck? The Mexican driver was pleased to help. Within minutes we were on our way again, sitting on top of loose bales of straw hanging on to what ever we could as the driver negotiated pot-holes hair-pin bends along the steep and slippery track. All the time music was blasting from the truck radio: as he swerved to miss pot-holes and we ducked to avoid being swept off by overhanging branches I thought one lapse of concentration by him or us and surely we would have ended up in the ravine! This part of the journey was both most exhilarating and most wearying. The driver said it would take 5 hours to reach Dulces Nombres, would we ever make it? Not before night fall!

It took two hours for the truck to climb out of the ravine and we emerged onto a pass at a place called El Mirador at about 1200 metres altitude, to behold breath-taking scenery through this unspoilt mountain range. Here we saw beside the track some carpets of *Selaginella*, a sure companion of *Pinguicula* at many sites we had visited before. Should we stop and search here or carry on? We decided to stay on board the truck as the track was now much less steep.

Before us, towering above the pass was a massive limestone escarpment which stood unbroken as far as we could see into the distance. As the truck drove on we began to realise our big mistake. The track was to follow the southern slope of the escarpment, and as the sun continued to beat down, the vegetation changed to a xerophytic scrub of leafless trees *Agaves*, *Tillandsias* and *Cycads*, surely not suitable for *Pinguicula*? After travelling several km along this route there was no sign of suitable habitat. One by one we finally accepted that there was no point in going on as we would never reach Dulces Nombres before darkness. We jumped from the truck and bitterly retraced our tracks.

Some time later, back at the pass we searched amongst the *Selaginella* which we had seen earlier, but there were no *Pinguiculas*. We rested, exhausted and frustrated on the green fields at the pass by El Mirador. While we debated

what to do next I looked the whole time to the mountain, with its steep limestone buttresses. From here maybe we could reach the shaded northern face? In no time, Thomas and I set off across the gentle green slopes then into dense woods. The trees grew amongst large rocks changing the walk into an exhausting climb. After scrambling over loose scree we eventually reached the north facing limestone wall

The wall was clothed with fierce *Agaves* and *Hechitias* which offered the only hand holds, helping us to get a closer look. Here, I saw several small blue-green rosettes, at first I didn't think they were *Pinguiculas*, they looked so unusual. Then I suddenly realised here at last was *Pinguicula cyclosetta*!

The habitat of *P. cyclosetta* is a north facing, vertical limestone wall rising above *Abies/Oak* woodland. The air is cool and windy. The rosettes are found growing on small carpets of moss, with *Selaginella* and ferns, or in small crevices and ledges in the shade beneath *Agave* and *Hechitia*. Here the rock is bare except for the covering of the dried remains of the previous Summer leaves.

WHAT'S BEEN POLLINATING MY *PINGUICULAS* ?

By Loyd Wix
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In order to set seed with the majority of *Pinguicula*, some pollinating agent is normally required (*Pinguicula lusitanica* being an exception producing plenty of seed without any second party assistance). In the wild insects are the most likely pollinators, with bees probably responsible for pollinating the European species such as *P. vulgaris* with wide mouths to the flowers. The construction of many of the Mexican species with flat faces and narrow mouths to long, thin spurs suggests a possible relationship to moths or butterflies. After all only an insect with a very long tongue could possibly feed from plants in the Section Longitubus such as *P. hemipiphytica*! Thus the often noted similarity of the flowers of these plants to certain orchids could, in part be explained by both groups appealing to similar pollinating insects. In cultivation it is our selves who act as the pollinating agent with the assistance of a watercolour brush, split match stick or any thing else to hand that can suitably carry out the operation. After all, kept under glass often with the company of other carnivorous plants there are often very few insects, in addition the Mexican species are several thousands of miles away from their natural pollinators. Or at least this is what I believed until the summer of 1994.

Following the construction of a new greenhouse (to accommodate my ever increasing collection of *Pinguiculas* and other carnivorous plants), one of my older 6 X 8 foot greenhouses became effectively a dumping ground for all the plants and empty plant pots and other paraphernalia that I didn't want cluttering up the main collections. Amongst the stacks of empty plant pots, and endless pots bursting at the seams with various *Drosera* were a number of *Pinguicula*, mostly *P. moranensis* 'caudata' and *P. x 'Sethos'*. Despite the neglect, the plants appeared to be enjoying their new environment, responding by producing a fine display of flowers which I mainly viewed from the outside as I walked past to the new greenhouse. I took little interest in the 'dump' apart from the haphazard visits to put water into the trays out of an occasional feeling of obligation.

On one of these infrequent visits to the old greenhouse during early summer, I noticed something unusual about the *P. x 'Sethos'* plants. Although many plants still had flowers, there were many flower stems present from which the flowers had long since dropped. Usually the flower stems start to loose turgor and begin to wilt and die quite soon after the flower has dropped unless the flower has been pollinated. On further inspection of the plants this appeared the case with every flowerless stem topped by a large fleshy, green seed pod. The *P. moranensis* 'caudata' plants had no seed pods on them though this did not surprise me as I have never been able to generate any seed by self pollination or cross pollination with a different species. Although a hybrid, I (and others) have generated seed from *P. x 'Sethos'* by self and cross pollination, though on this occasion I had not been responsible for the developing crop of seed.

So what had industriously pollinated all of these flowers? I suspected a moth or

butterfly given the shape of flowers though the only ones that I found were long since dead. During my less than thorough search the only living organisms I discovered were several woodlice and a few spiders, none of which could have carried out the pollination of the plants. During the search my interest turned to concern when it dawned on me that what ever had been pollinating the *P. x 'Sethos'* in the old greenhouse may well have been doing the same thing in the main collection. This may have made utter nonsense of my hybridisation records! After giving the matter some thought it occurred to me that one means of checking whether this had happened would be to check the *P. x 'Sethos'* in the main collection to see if these had seed pods. As I had not pollinated these myself then I reasoned that the presence or absence of seed pods could be used as an indicator to the likely hood of potential pollination contamination in my hybrid seed. An inspection revealed no seed pods, and given the different location of the main collection of *Pinguicula* I feel reasonably confident that I was the sole pollinating agent in my conservatory.

I started to routinely observe the plants in the old greenhouse including a few night time visits hoping to discover the identity of the mysterious pollinator but to no avail. A few weeks later it became apparent that the pollinator was no longer present as further seed pods failed to develop and have not done so since. This observation may suggest that the pollinator is present for a few weeks only during early summer and thus I shall have to wait till summer '95 to try to apprehend the culprit.

These observations I believe raise some interesting points:

1. Due to the sheer number of *P. x 'Sethos'* flowers pollinated and thus visited by the mysterious pollinator suggests that the pollinator was obtaining some benefit from providing the service to the plants. After all if the pollinator gained no advantage why expend the effort to visit so many flowers? - there are few free services in life! This would suggest that the pollinator was able to feed from the flower and thus must be able to land and affix itself to the flower in such a way as to access the mouth of the flower, and have a tongue long enough to reach into the spur. So some as yet unknown insect living in or around the Nene valley in Northamptonshire was able to pollinate (and presumably gain benefit from) a man made hybrid who's parents originated several thousand miles away in Mexico!
2. The assumption that human intervention is required to pollinate the majority of our plants is clearly not entirely true. It would be interesting to hear if anyone else has experienced similar occurrences of mysterious pollination of *Pinguicula*, as if this phenomenon is reasonably common some form of protection may be required to prevent such random pollinating activity if seed is being purposely produced.
3. I have assumed that pollination was carried out by an insect, but is it conceivably possible that under certain conditions *P. x 'Sethos'* could pollinate itself as *P. lusitanica* can?
4. The insect - flower relationships of *Pinguicula* (particularly the Mexicans) may prove to be an interesting area of study and may help to explain the existence of so many obviously similar though subtly different plants, for example the *P. moranensis* complex. Perhaps here we are seeing a similar situation to that found in the European bee orchids with each species appealing to a different type of bee, though with *P. moranensis* I would suspect a relationship with moths or butterflies. If slightly different flowers appeal to different pollinators, then this would serve to minimise the chances of hybridisation. Another possible example may be

P. ethiense and *P. sp* 'Ascension' the flowers of both although being very similar, the presence of the long 'S' shaped spur in the latter may suggest pollination by an insect with a longer tongue in comparison to the pollinator of the former. If this is the case with *P. ethiense* and *P. sp* 'Ascension', then despite the similarity to each other, a reliance on different pollinating insects would suggest evolutionary divergence between the two populations. The differing length of the spurs would also limit the prospects of hybridisation between such populations as short tongued insects could not feed from long spurred plants. In addition if an insect could feed on both long and short spurred plants, the length of the spur would determine the position at which the anthers deposit the pollen (presumably on the insect's tongue). As a result pollen deposited by a long spurred plant will be in the wrong position to be received by a short spurred plant (how many of you have come across similar problems whilst hybridising using watercolour brushes?). However this would still allow pollen from a short spurred plant to be deposited on a long spurred plant. Thus insect - flower relations may prove to be a useful means of establishing how different separate, isolated populations really are. I should stress however that these comments are pure conjecture and that I have no evidence to support these hypotheses. If nothing else I would like these comments to generate debate around the subject especially if backed up with observations from the field.

Mean while I shall wait until May and see if I can persuade a colleague of mine with an interest in moths to set up some traps in the greenhouse. So hopefully I shall be able to identify my mysterious pollinator in 1995, providing of course that the elusive character returns with a taste for *P. x* 'Selhos'.

PINGUICULAS.....DOWN UNDER

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Greetings to all the Northern Hemisphere growers.

It is with great joy that I receive my regular newsletter on the Study and Growing of Pinguicula. Here in Australia only a small number of Carnivorous Plant growers actually grow Pinguicula. This then makes it hard to obtain plants or gather any unusual material to trade. With very tight Quarantine regulations, the only way to obtain plants is through seed.

This is often a problem too, as seed sent for is often not fresh or is crushed in the post.

The small collection of plants that I have, has slowly grown over that past few years. With only a small amount of plants to experiment with, I have been very cautious in the trials I have undertaken. That is why this newsletter is so important, as it allows me to read what others are doing and I can apply their ideas and successes to my growing thoughts.

Mexican species are the easiest for this as leaf cuttings develop quickly and easily.

When Dr. Lau visited Australia in late 1992, I had the privilege to meet and talk with him. This led to him sending seed to us, (the Victorian Carnivorous Plant Society where I am the current president/lector), and through a member who is able to work amazingly with Pinguicula in Tissue Culture we have been able to have plenty of a plant called *P. 'Pico de Orizabo'* and have 2 others ready to be 'deflasked' in early 1995.

Down here in Australia we are suffering through a long dry Summer.

As you can imagine, this is not ideal for growing Pinguicula. As this not an unusual problem we have to face, the way that we grow these plants needs to be adapted accordingly, and this is the main reason for this letter.

Here in Australia, to keep the humidity high but not let the plant rot at the same time, is often a difficult task. To overcome this, I have been growing my plants, (the Mexican species), in large hollowed out TREE FERN LOGS. I don't know how readily available these are in other parts of the world, but here in Australia they are very common in all Nurseries at a nominal cost. Once you have purchased your log, the hollowed out section, which is about 18 inches long and about 6 inches wide, is filled with live sphagnum moss. The plants are then added. I tend to put about 6-12 plants into the log. The log is placed in a protected but sunlit area.

This is very easy to keep damp by pouring in a cup of water in each day. The tree fern log keeps very moist and this allows the sphagnum moss to grow happily. Because of the size of the log, you can even forget to water and the plants will not dry out. Because of the log the plants do not sit in water and will not rot. You would have to be careful to not put in very small species as these may become overgrown by the moss.

I have successfully put:

P. moranensis, *P. 'pico de orizabo'* and *P. moranensis X ehlersae*.
out in their own individual log. To add to my conclusions of their success, the
P. moranensis X ehlersae has multiplied and divided into 20+ clumps and I
counted 30+ flowers out at the one time in early November 1994. (3 years
after being placed in the log.)

The *P. moranensis* was placed in the log because for 4 years the small
plants had only minimal growth and only one had flowered. After just one year
in the log, all 5 plants flowered, and one had 6 flowers on its own. All the
plants look terrific.

The *P. 'pico de orizabo'* were only added 6 months ago after a short period
out of tissue culture but are growing well with one large plant having 2 flowers.
This holiday season I will have time to plant out a few other species in this way.
Sadly the amount of plant material I have to experiment with is limited so to any
Pinguicula grower who has spare seed to send to fellow growers in Australia, it
would be most appreciated. The best thing about the successes that others and
myself have been able to find for growing the plants in Australia, is that the
plants are becoming alot easier and cheaper to obtain.

I have been able to share my plants around with other C.P. growers and even a
few Nurseries, that see *Pinguiculas* as a good seller with orchid growers.

Maybe others who live in warmer places might like to try this method of
growing your *Pinguicula*. They look stunning when you put them on display in
the fern log at a plant show.

I know this as I had many excited comments on my logs at our annual show
this year.

Although I have no material to swap, I would be happy to correspond with any
grower who would like to assist me (and other Down Under growers.) to better
grow and understand their plants.

THE TRADITIONAL USES OF *Pinguicula* IN FOOD

Part 1 USES AND GEOGRAPHICAL DISTRIBUTION

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Introduction.

This is the first of three articles on the use of *Pinguicula* to modify food products in
order to confer certain desirable qualities, and as such their use can be considered as food
processing aids. Originally my interest was in the use of *Pinguicula vulgaris* to produce a
traditional Swedish fermented milk (an article on this appeared in a CPS Journal Ref. 1),
however the information that I uncovered in the literature indicated that the use of *Pinguicula*
was by no means peculiar to Scandinavia nor restricted entirely to dairy products. Neither the
less, the majority of the information that I have collected has come from Scandinavian sources
with the bulk of the information coming from 3 articles (Refs. 2,3,4).

The reason for so much of the information originating in Scandinavia appears to be
due to an ethnological and linguistic study of Scandinavia conducted in Sweden from 1870
onwards. In addition, the dairy economies of both Sweden and Norway have been surveyed
in extensive studies. The papers that I have had translated have called upon the information
generated during the course of these studies and has presented me with a dilemma in relation
to providing comprehensive references. The three Scandinavian articles do not include
complete references but simply refer to the original author with a date as part of the text. I'm
not sure if this is due to the convention of the journals in which the articles were published,
or due to the way in which information from the 19th century surveys was archived. Due to
this, for particular accounts, I will quote those references in a similar manner to the
Scandinavian authors, i.e. within the text.

It was not possible for me to obtain all of the original references due to the reasons
I have stated above. In any event obtaining every last reference would not have served much
purpose as I could never have got so many references translated into English. As it was some
of the information proved a great challenge to translate as some was in obscure Norwegian
dialects and others in ancient Icelandic! At this point I should like to thank Norman Davron
of the UK and Pernilla Petersson of Stockholm, Sweden for their efforts in translating the text
and in obtaining information from within Scandinavia.

This first article will concentrate on the world wide use of *Pinguiculas* in food
processing together with the uses that the plants are put to. The second article in this series
will concentrate on the Scandinavian lämmjolk fermentation of milk utilising *P. vulgaris*, whilst
the third will provide some contemporary accounts (including my own) of carrying out these
fermentations.

Pinguicula Processed Foods

The overwhelming majority of reported uses of *Pinguicula* in the modification of foods is with dairy products. The information included with these reports in the literature would suggest that *Pinguicula* were used in dairying for two quite different reasons. In addition there is a reported use of *Pinguicula* to treat meat. These uses are as follows:

1. Vegetable Rennet. - In several areas of Europe where *Pinguicula* are relatively common, it was recognised that the plants had the ability to coagulate or clot milk. This property is similar to that of the enzyme Rennet which is used in the production of cheese. Thus one use of *Pinguicula* was as a vegetable alternative to Rennet. Rennet is a proteolytic (protein cleaving) enzyme which is extracted from the stomachs of calves (after slaughter). Rennet acts upon the milk protein casein, cutting sections from the surface of the protein which as a result the modified casein sticks together and clots. Following clotting, the renneted milk separates into curds and whey (you remember the little miss Moffet nursery rhyme), a phenomena termed syneresis. The curds are separated from the whey and subsequently made into cheese after a number of other processing stages have been carried out. Obviously, in an age prior to the industrialisation of farming and food processing, a plant that could provide a similar functionality to Rennet would have certain advantages especially in remote areas where a calf or it's stomach may not be available for the production of cheese. Whether or not the functionality of *Pinguicula* truly emulates the functionality of Rennet is debatable as the acidification of milk through the action of bacteria alone can also cause milk to clot and separate. I will mention this in more detail in Part 2 of this article. On a final point on Rennet, I should perhaps mention that most 'Rennet' used these days is a modified enzyme produced courtesy of biotechnology from bacteria. After all I wouldn't like to be responsible for putting people off eating cheese.

2. Thick or Ropy Milk. - This is the classic Scandinavian use of *Pinguicula* to ferment tåmjölk, a thick ropy fermented milk that seems to have served a number of purposes. Unlike the previous use of *Pinguicula* to clot milk, in the tåmjölk fermentation one of the reasons cited for using *Pinguicula* was to prevent the separation of the fermented milk into curds and whey. As a result the final product has a structure similar to certain yoghurts, with a thick somewhat slimy consistency with a characteristic ropiness. In certain contexts ropiness is considered as a defect though this is not the case with tåmjölk where the ropiness is an important attribute. Ropiness is a word used to describe a structural attribute of the milk rather than a descriptor of flavour or odour as how it tends to be used negatively in a wider context. The best way to describe ropiness is to imagine dipping a pencil into a vat of material and attempt to scoop out some of the material when the pencil is withdrawn. As the pencil is removed, it is possible to also remove some of the vats contents which also remain in contact with the bulk of the material. As the pencil is moved further away from the vat, the material pulled out of the vat will be stretched out into long strands or ropes (hence ropiness). It is worth pointing out that there are other similar ropy fermented milks in existence else where in the world which are produced without the use of *Pinguicula*. I will discuss this point further together with the traditional uses of tåmjölk in Part 2 of this article.

One final point on ropiness is that the presence of *Pinguicula* in pasteurised land has often been cited as the reason for unwanted ropiness in milk, this is mentioned in a standard text on dairying from the 1950's (ref.5). It has also been a widely held belief that cows that had

eaten *Pinguicula* would produce ropy milk. Reports of such beliefs go back a number of centuries, Holland in 1777, Linnaeus reported the belief in Lapland in 1737, and E. von Gregerz (an inspector on a Swedish estate) in 1874 said that cows would provide ropy milk for several days after eating *Pinguicula*.

3. Meat Tenderization. - An isolated report from Germany on vegetable 'Rennet' substitutes dating to 1918 mentions the use of Fettkraut (*P. vulgaris*) to tenderize freshly slaughtered or tough meat. The secretion from the leaves was apparently added to water to which the meat was added, which gave rise to a softening effect on the meat. It is impossible for me to say how widely *Pinguicula* was used in this way, though the effect on meat was quite well known. L. Witmack in 1878 reported that such leaf secretions when added to water were capable of dissolving meat. Brøndegaard (ref.4) mentions the findings of some investigations (unnamed by him) that the meat tenderising enzymes must belong to a group of protein cleaving enzymes called phytopainases. One such enzyme, Papain is used commercially and domestically to tenderise meat. Papain is also of plant origin (extracted from the unripe fruit of the papaya tree, *Carica papaya*) and had also been used traditionally for the same purpose.

The Geographical Distribution of the Use of *Pinguicula*

One good indicator for the use of *Pinguicula* in the production of dairy products is in the folk names that exist for *P. vulgaris* across Northern Europe. All the following names suggest the use of *Pinguicula* in dairying:

- tågräs, tätört, sägräs, säört, tåmjölksgräs, tåmjölksblad, skyrgräs, sköblad, sköblomma, löpgräs, sljörgräs. - All from various regions of Sweden.
- tette, tettebloms, tettegräs, kjæsegräs, fjukkmlksgräs - From Norway.
- lyfjagras, løbegras, kæsigras - From Iceland.
- undirlogugras - Faroe Islands.
- maitoruohu, mälkegräs - Finland.
- earring-grass - English.
- yirrin-girse, ekel-girse - Orkney and Shetland Islands.
- thickening-grass - Scotland.
- steepweed, steepgrass, steepwort - Northern Ireland.
- càya-lach or caille-lait - France.
- fettkraut, schmanbläichen - German.

From this it can be seen that across Northern Europe, *P. vulgaris* has a whole host of different names. Despite the extensive list, even a non linguist can start to pick out

similarities between many of the names. Even the names that do not seem similar non the less have similar meanings, thickening grass or other references to the plants ability to coagulate milk. The existence of these folk names with similar meanings all points to a similar use of the plants across this range. Given the geographic distribution of these names, the naming and use of the plants may have been distributed during the various migrations of Scandinavian people across North Western Europe.

Further information on the geographical use of *Pinguicula* may be found in Francis Lloyd's book, *carnivorous plants* (ref. 6.). Quoting F. Darwin, Lloyd mentions that farmers in Wales had used *Pinguicula*, and quoting Pfeffer through Oppenheimer that peasants in the Italian Alps had similarly used it. Further fragmentary information in the Scandinavian papers also suggests the use of *Pinguicula* in the Pyrenees and the Balkans. And finally, the látnijölk fermentation was taken across to North America by Scandinavian immigrants during the last century, although I have not been able to discover the extent of this in the U.S.

With respect to the species of *Pinguicula* used in these applications, *P. vulgaris* is exclusively mentioned. Given the geographical distribution of the use of *Pinguicula*, it is possible that species other than *P. vulgaris* may have been used. In addition, it is possible that the authors of the papers were most familiar with *P. vulgaris* and hence the reason for this species being cited in the literature.

Conclusions

From the information that is available, it is quite apparent that most of the deliberate use of *Pinguicula* has been in relation to the production of dairy products. The use of *Pinguicula* as a meal tenderiser does not seem to have been as widely used as the dairy applications.

From the available information on the geographical usage, it appears as though areas in which *Pinguiculas* are relatively common, and dairy activities are carried out, then the two are associated. This seems to be true across the distribution range of *Pinguicula* across Western Europe. The main use has undoubtedly been within Scandinavia where I suspect the custom was taken to most other areas of North Western Europe, and eventually North America. I have not been able to find any evidence for the use of *Pinguicula* in Japan, and the only information I have from Mexico I received via the Internet CP discussion group. J.L. Hudson listed a *Pinguicula* (probably *P. moranensis*) as *Agarra Mosca Violeta* as a medicinal, food, herb or ornamental plant collected by the Zapotec people in Sierra Madre del Sur, Oaxaca. However I have not found out what use the Zapotec had for it, though I would be pleased to hear from anyone who knows the answer to this.

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Growing Cabinets For Pinguiculas

By Andy Carter

Whilst waiting for the last JPSG newsletter, I thought I would put down on paper my preparations for winter. Having started in mid - December, it had reached 7 pages when the newsletter finally arrived (it was worth the wait though), but unfortunately since then, disaster has struck.

During late September and October, I noticed that growth of my Pinguiculas was slowing, and I was wondering if I should heat my greenhouse to near tropical temperatures, or overwinter at a lower temperature. I was reluctant to reduce the temperatures too much, as some specimens were still physically very small, even those that I had purchased in the spring (perhaps the result of a lack of feeding and humidity combined with a busy summer and too little time spent in the greenhouse).

It occurred to me that it might be possible to reduce heating costs while increasing plant size and health by using something similar to a dewpoint cabinet. My first thoughts were to start completely from scratch, or base construction on a commercially available rack system, but a visit to Kew with the CPS provided me with the answer where they had a number of similar growing cabinets in use behind the scenes.

These cabinets are very similar in shape and size to an ordinary garden coldframe, so the following week I took my aluminium Hall's coldframe apart, scrubbed it in detergent and bleach, and replaced the glass sidelights with light gauge aluminium, fixed in place with silicon mastic. I formed a tray 50mm deep from sheet aluminium, with sides bent and sealed at the corners with mastic. Air is supplied by an ordinary aquarium pump through plastic non - clogging airstones and temperature control is by a central heating timer with two thermostats from old gas boilers, (which are usually adjustable if you know where the screw is), controlling a 100 Watt miniature aquarium heater. Two fluorescent light fittings are fixed to a white reflective board above, hinged to the wall. This all sits in my garage and gives a cabinet approximately 4' x 2', and has been up, and running since the beginning of November.

During a spell of sub - zero weather the heater struggled to maintain daytime temperatures and humidity was therefore low. I think there were two main reasons for this, first that the sides of the cabinet were in contact with the heated water in the tray, thus conducting heat away. Second is

that due to the relatively cold external temperatures, the aluminium sides were allowing the internal atmosphere to cool locally to a greater degree than necessary, thus producing a less than saturated atmosphere overall.

I have since raised the cold frame above the water level on 38 x 16 mm plastic electrical conduit sealed with mastic to provide a thermal break. In future when temperatures are very low I shall cover up to three of the sides with expanded polystyrene, which should provide better conditions as well as saving energy. I have also fitted an additional 100 Watt heater.

Condensation on the glass covers can be a bit of a problem as they are set at a low angle and can cause drips, especially when they are lifted. I think the eventual answer to this will be to replace the glass with polycarbonate to reduce the transmission of heat and thus the formation of condensation. I have draped bubble wrap insulation above the cabinet over the lighting unit but this is really only effective while the lights are on and producing heat.

On the subject of lighting, over the first few weeks I noticed that growth didn't seem to be as good as expected, and that some specimens didn't seem as healthy as others. The tubes fitted were warm white in common with the other cabinets that I had come across. I set off to find some Triton tubes, but my local aquarium shops seem to be running down stocks of these and concentrating on Hagen tubes which are available in several different spectrum configurations. I decided on the Power-Glo tubes as these seem closest to Triton. The assistant in the shop explained that Triton are now rather out of favour with aquarists because they produce too much algal growth. It occurs to me that if this is the case then perhaps the Triton spectrum may be better balanced for photosynthesis and therefore better for plant growth generally! I have since found out that Hagen also produce a tube called Flora-Gro but I haven't managed to track any down yet.

Fitting the new tubes did nothing for the immediate appearance of the plants, and I had to take one or two outside to make sure they were not quite as grey as they looked! Fortunately they weren't. After a week with these fitted, things seemed to be going better. I have now added a third fluorescent fitting which holds one of the original warm white tubes to boost the red end of the spectrum.

Now for the plants themselves. Half of the cabinet is taken up with tropical and epiphytic Utricularias, Brocchinia and Heliamphora, with the other half left for Pinguiculas.

A great many of the Pinguiculas were still in their original pots as they hadn't grown significantly since purchase, and the original Vermiculite/Perlite medium was becoming rather caked so I decided to repot everything. The Vermiculite/Perlite I had previously mixed had been around for a while and had probably got damp so I decided to sterilise it in an aluminium bowl in the oven (while the wife was out, needless to say). This is not a good idea since both constituents are extremely good insulators and require a great deal of stirring, and all that happens is that the top layer behaves like popcorn and shoots all over the oven. Perhaps a microwave would work better.

I repotted all my smaller specimens leaving the compost dry, partly to reduce the chance of root rot in the elevated temperatures of the cabinet, and also thinking that in a saturated atmosphere it would take up its own water. This doesn't seem to have happened to any great extent and I have since applied a small amount of water to most of the pots. The plants are standing on perforated trays above the water level. I left this operation as late in the season as I thought practical to allow those that required dormancy to experience up to a month in this state.

It seemed the best course of action would be to try and induce growth at as fast a rate as possible, to counter any fungal attacks, so after a light spray of Benlate they were placed in the cabinet with a daytime temperature of 28°C dropping to 15°C at night. I started with a day length of 16 hours dropping to 14 hours after a week or so. I thought a longer day length to begin with might provide an additional measure against fungal attack.

After about six weeks everything seemed to be okay.

I was feeding on a regular basis using Vesutator air plant feed in a Vesutator fine spray as mentioned by Ron, although I have since added a small amount of Phostrogen acid plant food to this. I wonder if this will be sufficient if growth accelerates to any extent.

Now for the sad bit!

While completing some of the modifications to the cabinet, I removed the plants and took them into the house, carrying them outside for maybe 20

Metres. The weather was chilly but not particularly cold. Once the modifications were complete, after perhaps two hours, I carried them back and replaced them in the cabinet and sprayed everything with Benlate as a precaution. About two days later, some leaves and leaf tips had lost their colour which I presumed at the time was due to the cold experienced when transferring the plants. This occurred on virtually everything with the exception of Brocchinia reducta. I chopped off all the damaged leaves that I could find and increased the daylight period and waited with crossed fingers.

Three weeks later things were looking better with most of the plants now looking as if they were going to survive, although I noticed some brown spots on some of the leaves. Not being sure whether this was due to a fungal infection or even springtails I sprayed with Benlate just to be safe. The following day all the leaves had turned white again, but this time stayed white - and then died. In all I lost about fourteen species of Pinguicula with six species surviving. These are fighting back to life quite well now. The only explanation is that the Benlate killed them. Incidentally, I used tepid water to mix up the second application so I don't think that it was frost bite that caused the damage this time. Has anybody else had such problems? Over the last couple of months it occurred to me that the Benlate might have been contaminated with a small amount of Malathion residue left in the sprayer from previous applications.

I only have one major problem now. The aluminium water tray is leaking! It occurred to me before starting this project, that I might get some electrolytic action between the aluminium tray and the copper of the thermostats, but I thought that this would be relatively slow and of no real consequence. After three months I now have at least one pinhole! I suppose that the rather acidic rainwater at nearly 30 degrees doesn't help matters. So I have to take the whole lot apart again and line the tray with glass fibre. I am going to try to put this off until late spring if I can.

All in all the cost of this experiment, especially if the cost of the plants is included has possibly been more than heating the whole garden to tropical temperatures, but it seemed like a good idea at the time and maybe my luck will improve!

It's now early summer and I have carried out the still more modifications to the cabinet, namely replacing the glass covers with polycarbonate ones, (which isn't such a good idea as it increases the amount of condensation),

and laying capillary matting on the perforated trays to increase humidity, especially on hot days. The non - clogging airstones clogged and have been replaced by cascade aerators. I have also bought an electronic thermostat but I have not yet fitted it.

By the time next winter arrives I might have a usable cabinet.

I was watching a television programme some time ago in which a nurseryman was talking about insect pests and the fact that they use different coloured sticky traps for various insects. Yellow traps have been used to protect against Sciarid fly which can be a particular pest when growing Pinguiculas. The nurseryman said that commercially, blue traps are used against Sciarid fly but I have never seen any other colour on sale except yellow so perhaps it wouldn't have helped much anyway.

INTERNATIONAL PINGUICULA STUDY GROUP

et

U.K. CARNIVOROUS PLANT SOCIETY OPEN DAY

SATURDAY 6th MAY 1995

10am onwards...

at the invitation of

STAN LAMPERT

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You are welcome to view my collection of
Pinguiculas & other C.P.

Plenty of plants & refreshments,
good company & conversation !

Please write enclosing an s.a.e.
if you would like a map.

Seed Bank Report

Chris Heath
56, Cireulfield
Peckwater Street
London
NW5 2LE
England

While I have received several list applications, there has until recently not been enough seed in the bank to justify the use of your reply coupons. Could all members please make a special effort to "get pollinating in '95", so that this valuable service can fulfil it's potential to the benefit of us all. Your seed bank needs your support. Thank you to all those who have so far contributed.

Please list substitutes in order of preference when ordering.

Seed list - April 1995

- * P. acuminata
- * P. ehlersae
- P. emarginata
- P. grandiflora
- * P. hemiepiphytica
- P. ionantha (Pale Purple Flower)
- * P. laeucana
- * P. longifolia ssp Causensis
- * P. lusitanica
- P. lusitanica (Coll. Sampford Moor, Devon)
- * P. primuliflora
- P. rectifolia
- P. x Sethos (Self)
- P. vulgaris
- P. x Wesser (Self)

* = Limited Nos. of seed.

Photographs.

To benefit quality, could all photographs for use in the newsletter please include negatives which will be returned after publication. Thank you.

Carnivorous Plants - Total Listing.

Compiled by Gordon Ohlenroth
for The Victorian Carnivorous Plant Society Inc.

This is a comprehensive list covering every genus of carnivorous plants, running to some 34 A4 sized pages.

The section on Pinguiculas covers most of the well know species although there are a few omissions. This is perhaps understandable given the lack of material available to Australian growers. I also found one misprint - P. rotundiflora was listed as P. rotundifolia. Also listed are unnamed species (nomina nuda), synonymous names and named hybrids together with their parentage.

There are a number of uses for a reference list such as this. It is very helpful for the grower to be able to correctly identify synonymous names. I think that is also useful to know what species are actually out there waiting to be grown. For example, glancing through the rest of the listing I was particularly surprised to see just how many species of Genlisea have been described (over 30!).

However on the minus side the listing provides no reference to the naming authorities. Similarly when listing a name as a synonym no references to sources are made. I would also like to have seen some indication regarding the location of plants and the type of climate experienced. E.g. tropical / sub-tropical etc. This sort of information can be quite useful as a very simple guide to the required growing conditions when nothing else is known about a species.

The problem with any such listing is that it tends to be out of date before the ink has even dried. This is particularly the case with Pinguiculas which are in something of a state of flux at the moment. Perhaps because of this very fact, the list is printed in a comb - bound booklet form which presumably allows the up dating of individual pages relatively easily.

As a reference this listing is a useful addition to a carnivorous plant library and is recommended with reservations.

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