FLYTRAP NEWS

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Clayton's original "ALL RED " Venus Fly Trap (*Dionaea muscipula*)

NEWSLETTER OF THE CARNIVOROUS PLANT SOCIETY OF NSW

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Meetings are regularly held on the second Friday of the following months
February, March, April, (May in lieu of April if the second Friday of April is Good Friday) June (AGM), August, September, October and November
TIME: 7.30 - 10.00pm
VENUE: Woodstock Community Centre, Church St, Burwood.

Remaining Meeting Dates for 1995				
			13th October	
			10th November	
			3rd December	Christmas *Swap Meet.*

CURRENT MEMBERSHIP RATES

Single Membership within Australia	**$A17**
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Please make cheques/money orders payable to the Carnivorous Plant Society of NSW

Without prejudice

Editorial

Denis Daly

Same or Similar ... Aphrodite or Venus ... crinita or muscipula

Those of you who are following this saga will note that in a letter to Tom Kapatany the Plant Varieties Office stated *"Mr Clayton's red VFT appears distinct from 'Royal Red'. Mr. Clayton would need to verify this if he intended to sell the plant without the grantee's authority."*

Subsequently the PVRO informed Colin Clayton that he could verify that his original "ALL RED" VFT plant was distinct from 'Royal Red' by asking a number of persons their "unbiased feelings" as to whether they can distinguish between his plant and 'Royal Red'. (I must say that this common sense approach by the PVRO came as somewhat of a surprise.)

At Colin Clayton's request the CPS of NSW convened a committee meeting to consider our "unbiased feelings" with respect to the differences, if any, between 'Royal Red' and Colin Clayton's "ALL RED" VFT. The committee met and compared the photograph, provided by Colin, of his original "ALL RED" VFT with the photograph of 'Royal Red' in the advertisement for ***Dionaea muscipula*** 'Royal Red' that was placed by Exotica Plants on page 47 of the ICPS's Journal, CPN Vol 24 No. 2.

In the photograph of 'Royal Red' in the ICPS journal the green parts of 'Royal Red' appeared more yellow than green when compared to the colour of the weed seedling (and moss) growing in the pot. However the description in the Plant Varieties Journal Vol 7 No. 2 of June 1994 classifies the trap margins of 'Royal Red' as green even though they appeared as yellow-green in the photograph in the ICPS journal.

The traps of Colin's plant start life totally red whereas the traps of 'Royal Red' start life with the green (green yellow) margins very much in evidence. This is a clear, instantly recognisable, distinction between the two varieties. Additionally Colin's plant has red pigmentation on all surfaces including those that have been declared as having no red pigmentation in 'Royal Red'. (Plant Varieties Journal Vol 7 No. 2 of June 1994 and the photograph of 'Royal red' in the ICPS journal.)

Mr. Clayton's "ALL RED" VFT is distinctly different from 'Royal Red' (and indeed from Thomas K. Hayes' "all red petioled" VFT and from Paul Kane's plant) as it is ALL (dictionary definition of all) RED with no green or no green yellow. Those parts of the older traps that are not bright red have faded or bleached with age. (The VCPS have also advised Colin that they believe that his "ALL RED" VFT is distinct from 'Royal Red')

Dr. Miloslav Studnica of Botanicka Zahrada Liberec in the Czech Republic, in a reply to the same request for a comparison by Colin Clayton, has stated that in his opinion Colin's plant is different from 'Royal Red". (Colin is awaiting receipt of a number of opinions from Australian and overseas.)

Thomas K. Hayes' 'all red petioled' *Dionaea muscipula,* while similar to 'Royal Red', is distinct from 'Royal Red' in that the non red bands are green (rather than yellow-green), are variable in width (rather than uniform in width) and the transition from red to non red regions is blurred (rather than sharp) within the same trap and between traps.

The following comparison table is included detailing differences perceived after viewing photographs of four of the plants involved in this controversy.

Without Prejudice

Plant Part	'Royal Red' from photo in ICPS journal	Clayton's original "ALL RED" VFT	Thomas K. Hayes' "all red petioled VFT"	Paul Kane's red VFT
Petiole Upper Surface	Most were red although one, maybe two, are green or green-yellow.	All were red although the red density varied through red to orange to golden orange.	Most had some red although two, maybe three, are green.	70% were red. Of the remainder that were green, all but 2 or 3 had some red colouration.
Petiole Lower Surface	Most were red though a few had areas of green or green yellow colouration.	Samples of areas on the lower surface of the petiole were limited, due to the angle at which the photograph was exposed, but colouration ranges from red to orange to golden orange.	Samples of areas on the lower surface of the petiole were limited, due to the angle at which the photograph was exposed, but colouration ranges from red to green.	Samples of areas on the lower surface of the petiole were limited, due to the angle at which the photographs were exposed, but petioles that are red on top are red beneath and those that are green on top are green beneath. One green petiole had a red midrib beneath.
Trap Inner surface (excluding colour margins around edge of traps)	All were red.	All were red.	All were red.	Samples of areas on the inner surface of the traps were limited, due to the angle at which the photographs were exposed but all that could be seen were red.
Trap inner margin (excluding the inner margin fringe hair ridge)	All of the inner margins of the traps were green or yellow green. The line between red and yellow green or green generally, though not always, closely followed the "sharp" transition from trap inner surface to the ridge containing the fringe hair base.	There was no discernible colour transition in the interior surface region between the trap hinge and the edge of the ridge from which the fringe hairs emanate.	All of the inner margins of the traps were green but the width of this band varied from trap to trap. The transition between red and green on the insides of the traps was variable and tended to blur.	Samples of areas on the inner surface of the traps were limited, due to the angle at which the photographs were exposed, but the transition between red and green in the inside of the traps was variable. The width of the green varied from nothing to one third of the trap lobe within the one trap and between different traps.
Inner Margin Fringe Hair Ridge	All of the trap inner margin fringe hair ridges of the traps were green or yellow green.	The trap inner margin fringe hair ridges of the younger traps were red. However those fringe hair ridges in the older traps tended to "bleach" toward orange, golden orange or golden yellow in colour. Nevertheless these fringe hair ridges always contained some red pigmentation and did not exhibit any tendency to yellow green or green.	All of the trap inner margin fringe hair ridges of the traps were green.	The trap inner margin fringe hair ridges of the traps could be either red or green consistent with the variations in the width of the inner green boundary.
Trap outer surface excluding margins around edge of trap.	All were red except a small area adjoining some midrib attachment regions that tended to yellow green or green.	All were red including midrib attachment regions.	All were red except a small area adjoining some midrib attachment regions of some of the older traps that tended to a greenish hue.	All were red except a small area adjoining some midrib attachments tended to green.

Plant Part	'Royal Red' from photo in ICPS journal	Clayton's original "ALL RED" VFT	Thomas K. Hayes' "all red petioled VFT"	Paul Kane's red VFT
Trap outer margin	All of the outer margins of the traps were green or yellow green. The line between red and yellow green (or green) colouration was distinct and reasonably "sharp".	All were red.	All of the outer margins of the traps were green although the width of the green band is variable between individual traps. The transition between red and green on the outside of the traps was variable and tended to blur.	Not all of the outer margins of the traps were green and when the margin was green the width of the green band is variable between individual traps. The transition between red and green was often gradual and uneven in symmetry rather than sharp and symmetric.
Outer Trap Margin on new unopened traps.	Clearly shows the non red pigmented margin (green yellow) colouration forming around the margins of the trap.	Unopened traps and fringe hairs are entirely red.	There was only one new trap forming clearly visible in the photograph examined. No sign of green could be seen on that new forming trap, however the area adjacent to forming "fringe hairs" could not be observed due to the angle at which the photograph was taken.	The new trap in the close up photograph clearly shows the green margin forming around the margins of the trap. The transition is however blurred. A newly forming trap without external green margins was observed in the photograph of the overall clump.
Fringe Hairs	Almost all of the fringe hairs had some red colouration, though none were completely red nor had any red colouration at the base of the hair junction with the trap margin.	The fringe hairs on the younger traps are fully red. However the fringe hairs on the older traps had significant areas of lighter red tending toward orange, golden orange, yellow or "bleached".	Almost all of the fringe hairs had some red colouration, though none were completely red but a few had red colouration at the base of the hair near the junction with the trap margin.	Almost all of the fringe hairs had some red colouration. Some were observed that were completely red.
Red / non red boarders	Sharp	Indeed it was felt that a red/non red boarder did not exist. The transition between shades of red on the traps tends to be blurred and restricted to the ridge from which the fringe hairs emanate. Even the transition on the petiole is gradual and blurred.	Sharp in some traps but blurred and variable in most traps.	Often blurred rather than sharp.
Variability within itself	No	No	Moderate	Yes

Paul Kane's plant (acknowledged as the parent of Royal Red by the PVRO) is, as is to be expected, very similar to 'Royal Red'. However 'Royal Red's' colouration and pattern is more uniform and less variable within traps or between traps. Paul Kane's Plant frequently has red on parts that have been declared as having no red pigment in 'Royal Red' in the Plant Varieties Journal Vol 7 No 2. (These differences could make Paul's plant statistically distinguishable from its progeny 'Royal Red'.)

In Table 11 on page 17 of the Plant Varieties Journal Vol 7 No 2 June 1994 for the comparison plant, the sum of the entries of Expected values for the two plant parts, Petiole (upper surface) and Trap (outer surface) do not equal the sum of the observed values. Why was the error, in the submission, not noticed by the PBR Office during their verification of the correctness of the statistical analysis? (While this may be a misprint it casts doubt on the overall conduct of the comparison growing and resultant statistical analysis.)

The Mann Whitney test, while a valid statistical procedure for comparing the variability of populations is only applicable if the original random sample is itself representative of the populations to be investigated.

In the Plant Varieties Journal Vol 7 No 2 June 1994, we read the basis of scoring "red = 1" or "green = 0" was that "any plant part exhibiting red colouration (no matter how much) being classified as red". Given, for example, a trap whose outer surface has a non red margin (as 'Royal Red') but that the remainder of the trap's outer surface is a checker board of red and green squares. The crude criteria of "any plant part exhibiting red colouration (no matter how much) being classified as red" would find the checkered outer surface of the trap being scored "red = 1" and the statistical analysis would declare that such a plant is indistinguishable from 'Royal Red'.

Obviously in the above hypothetical example the plants would not be the same. Why would the statistical analysis fail to detect the difference? Could it be that the random sampling procedure used did not result in scoring in a manner that was truly representative of the populations to be investigated. (GIGO ... Garbage in garbage out.)

Had similar varieties (such as Thomas K. Hayes all red petioled VFT) been used it would have been obvious from the start that the crude (coarse graduation) criteria of "any plant part exhibiting red colouration (no matter how much) being classified as red" would not be an appropriate scoring method when used on such a large proportion of the overall surface area of the plants.

In the actual 'Royal Red' comparative growing trial. The qualified person did not undertake to advise on the existence and availability of similar varieties to use in the comparison trial growing. Had he done so it is likely that the comparison growing would have used similar varieties. The PBR Office has neglected their duty to the Australian Public in not ensuring that all the criteria for granting this application were complied with in a manner consistent with scientific rigour.

Breeding versus Discovery

It is ridiculous that the issue is whether a plant looks like the discovered plant 'Royal Red' when the discovered plant is one of many similar varieties that can be selected from the naturally occurring population. Why should Plant Breeders Rights be given on a plant that was discovered and not the result of a breeding program. It is time that the B for BREEDING was put into PBR (and not b for begorra .. will you look at what I found).

Meanwhile at Collectors Corner

Tom Kapitany has notified the PVR Office that he intends to sell all red clones commencing 1st November 1995 and requests the PBR Office:- "If you feel any of these clones are protected by the PVR act would you please indicate which clone is protected providing precise details and photographs including light, nutrition seasonal variants including lat'/lognitudinal variations." Good point Tom.

By not providing precise information as to what is 'Royal Red' and threatening to take action against those who might inadvertently (because of the failure of the PVRO to provide information) be selling a variety deemed to be the same as 'Royal Red' the PVRO is way out of line.

Given that the PVRO office are so certain about the distinctiveness of 'Royal Red' they must have detailed information on 'Royal Red'. If the PVRO fails to provide precise details of 'Royal Red' why should any grower be required to assume that any of his plants are 'Royal Red' or indistinguishable from it?

Thomas K. Hayes "all red petioled" ***Dionaea muscipula***

Worlds Largest Carnivorous Plant Grower Visits Dingley Home and Garden

Theo de Groot and Colin Clayton (in hat) at Dingley Home and Garden.

Mr. Theo de Groot manager of Cresco Nursery in Holland (reputedly the world's largest Carnivorous Plant Nursery) recently visited Dingley Home and Garden. Colin Clayton has entered into an arrangement with Mr. Theo de Groot, to interchange material and ideas and that as a result Dingley Home and Garden's range of plants will increase dramatically.

This will bring benefits not only to Colin's business but will increase the range of carnivorous plants available to the general Australian public, including the present Australian CP growers. The increase in sales to the public will provide a secondary spin off benefit to us CPer's in that if CP's become popular amongst the public then interest in local branches will arise strengthening the existing societies and providing a wealth of cultural information. Australian CP's will also find their way around the world bringing benefits to CPer's world wide.

Import of new Carnivorous Plant material into Australia would be beyond the resources of the amateur CP Societies. A few individuals may be able to import one or two species at great cost but growing these species would, for years, remain confined to a few individuals or cliques rather then be commonly available to the general public.

History has shown that such selfish individuals or cliques are likely to attempt to circumvent quarantine and deal with poachers and smugglers (to reduce their costs) and are thus a positive menace to Australian horticulture and to the conservation of any plant species that they covert. The protection of species by making the plants readily available (at a reasonable price) for cultivation thus destroying the incentive for poaching from the wild and smuggling is clearly the best method of preservation of the species.

Such imports can only occur if commercial interests are prepared to invest resources in mass propagation techniques (preserve the species in natural habitat) optimise the mass propagation techniques to meet the stringent (and rightly so as we are free of many pests and diseases that plaque other countries) Australian quarantine regulations and amortise these costs over a significant number of plants.

On behalf of the committee of the CPS of NSW I extend to Colin congratulations on the conclusion of this innovative and far sighted business arrangement.

Proposal for a Federation of Carnivorous Plant Societies

At a meeting of the Carnivorous Plant Society of NSW held on the 11th August 1995 the members discussed amalgamation. While amalgamation involved the almost certain loss of sovereignty for smaller groups and Societies and thus was unacceptable it was felt that a federation of Carnivorous Plant Societies, so that we might assist each other generally and most particularly in times of need, might be attainable. It may also be appropriate to make available Associate Membership of the federation for Garden Clubs and other specialist plant societies with a secondary interest in Carnivorous Plants.

The meeting decided that the CPS of NSW should take the initiative and seek the views of the VCPS and NZCPS. Due to the unhelpful attitude of the committee of the ACPS to the amalgamation proposals it was decided that it would be more productive to initially only seek the views of the VCPS and NZCPS. However the committee of the ACPS would be welcome if they want to participate in forming (not exclusively run or take over) the Federation.

I am please to be able to report that the VCPS has indicated that, even though they also envisage that it will take a "lot of discussion to get it working to the satisfaction of all concerned", they believe "the idea is pretty good in principle". As of the date of publishing the NZCPS has yet to reply.

It is expected that each participating Society (full member or associate), group or individual, adopt an appropriate enthusiasm for a Federation that will provide mutual benefits to all rather than manoeuvreing to attempt to gain advantage over one group or individual that may be perceived as "ripe for plucking".

As any Federation must be able to encompass members (groups and individuals) with divergent opinions such issues as moral opposition to the "Royal Red" PBR is NOT considered a prerequisite for considering participating in the proposed federation. (It is hoped that the Federation will have some moral code that would act to censor those persons who would act in an improper or immoral way and that would involve some rules on morally appropriate actions when applying for PBR.)

A note of caution:-

It is inevitable, given the complexity of the situation, that some suggestions, from any quarter, may, to say the least, not "go down too well" with others contemplating the federation. I would suggest that at the onset that we resolve to always keep an open mind, confront any unpleasant issues arising immediately, then "get on with business" without recriminations. In short we need to be "up front" at all times while we "brain-storm" this out. The more ideas put up the better, even ridiculous ones, because that's how brain-storming works ... one ridiculous idea triggers another idea, triggers another etc., etc., until a good idea emerges from amongst the unacceptable.

The Journals

Centralised publication of a journal would be a possibility and the participating Societies (or members) would need to provide finances (and possibly volunteer workers) for the federation to be able to publish the journal.

This concept would lead to the demise of the individual societies' journals which would need to be replaced by "modest" newsletters such as produced by the English CP Society or the French CP Societies' "Dionaea".

Finances

Finances would need to be carefully thought out as it is probably inevitable that we would enter a "catch 22" scenario in that subscriptions would have to increase to ensure that the Federation Journal would be of sufficient quality document so that it is worth the cost of the subscription increase to the member Societies and their members. The journal will have to be professionally printed and that will produce an immediate large increase in costs to those Societies who are at present able to knock together a relatively cheap publication. This will be quite a shock for some members.

A workable financial arrangement needs to be provided so that each Societies' newsletter was either sent out individually or included with the journal. Certainly seed bank lists will need to be sent out with the journal. Individual Societies costs of meeting venues and PO box costs would need to be structured into the membership subscriptions along with complimentary journal copies.

There would be a loss of overall revenue as individuals who are members of more than one Society would only need to be a member of one Society.

Once a common journal and reciprocal seed bank rights are in place it would seem that membership subscriptions would need to be equal in all Societies who join the Federation (at least those in the same country) to ensure the survival of each of the Federated Societies yet still permitting freedom of choice of which Society to join. The question of cross subsidies from one group to another in times of trouble or for a new group or for one with say, high meeting place costs, will arise.

Preparing Scientific Specimens

Daryl Brenton

Preservation of Herbs

The whole plant should be collected including the underground organs. Alternatively for rare species details of the underground parts of the plant are noted only and left to grow the following season. To prevent wilting the specimens are placed in a plastic bag which is sealed with a rubber band.

Preservation of Water Plants

The plants should not be kept in water after collection but spread on paper and dried normally. Fine or very soft plants may be arranged on the paper underwater and pressed with waxed paper on top.

Tropical Conditions

Under humid, tropical and coastal conditions, care must be taken to prevent mould growth before pressing add a small amount of ethyl alcohol only when absolutely necessary as it may cause discolouration.

Spirit Collections

Very fleshy or delicate parts may be preserved in airtight jars containing either:-

1. 70% ethyl alcohol or methylated spirits. 30% water.
2. formalin + acetic acid + alcohol.
3. Lugol's solution (available from chemical suppliers)

   * Take care when using 2 or 3 as they form dangerous vapours.
   * A piece of paper with names and notes should be written in pencil (pen will fade) and placed inside the jar. Also label both the lid and the jar.

Pressing and drying

Plant should be pressed flat between paper as soon as possible after collection and before wilting. Do not use glossy paper.

Editorial note:-

Any reference to alcohol that does not specify which alcohol refers to ethyl alcohol. Due to alcohol excise tax formalities it is a waste of time trying to purchase pure ethyl alcohol unless licensed to do so. Use methylated spirit, which is almost pure ethyl alcohol polluted with a small quantity of the poisonous methyl alcohol to make it undrinkable.

Hints on Pressing Plant Specimens

Daryl Brenton

1. As soon as possible lay the specimens between the drying paper in the way you want them to finally look, cutting away unwanted material. Loss of colour will result from too slow drying.

2. Thick cardboard (e.g. corrugated) should be placed between papers containing the specimens, especially when using a fan and/or heater. Otherwise use thin timber (e.g. masonite, plywood).

3. Plants of uneven thickness (e.g. bulbs) should be placed between wads of newspaper or thin sheets of styrofoam to distribute pressure evenly. Circulating warm air is advisable to prevent mould.

4. Moderate pressure is then applied. For small numbers, several books can be used, or better still, strap the specimens between sheets of pegboard, drilled plywood, stiff cardboard or wooden lattices.

5. The papers should be changed daily for the first few days and then accordingly to the dampness of the paper. Take care as wet paper will lead to mould. Most plants should be dry in two weeks.

6. In the field, drying can be aided by placing the presses in the sun. While drying the press could be tied to a roof rack in dry weather. A hot air fan would be invaluable in the field or at home. Special drying cabinets could be made or purchased.

7. Small numbers of specimens could be "baked" in a microwave oven (for 1 or 2 minutes generally) until dry but DO NOT place newspaper, sticky tape or metal inside a microwave to prevent the risk of fire or malfunction. (the newspaper ink or sticky glue may ignite)

Mounting

Specimens should be mounted to prevent fragmentation. This can be achieved using PVA or long lasting tape (Y8440 Scotch from 3M) to fix the specimen to cardboard or strong paper (ordinary sticky tape will not do as it breaks down too quickly)

Identification

A Herbarium may be willing to identify plants that you are unable to identify yourself. Specimens should be accompanied by full field and location notes, each placed on a separate sheet or in a separate newspaper folder packed as a flat parcel. Specimens should be numbered and a separate set of plant specimens kept by you so you can relate to the same numbered specimen when you receive your reply. Material should be dried and not packed in plastic. Specimens sent in bottles should be carefully packed and sealed in plastic to avoid leakage.

General Propagation of Carnivorous Plants

Phil Archer

edited by Denis Daly

Editors note:

In reviewing propagation articles published in past issues of Flytrap News I came across two articles by Phil Archer [1 & 2] (Phil cited references [3] & [4]) outlining the general principles of germination of seeds which I have abridged, correlated and separated from his observations of specific species:-

Germination is another example of a plant response to a stimulus, or in most cases, a combination of specific stimuli.

While dry seed contains 10 to 20% water almost all seeds require water to be present in sufficient quantities to provide the stimulus that switches on the growth response. Once placed in a wet environment moisture enters the seed through a microscopic hole called the micropyle. This helps in softening the stored starch in the seed and also softens the tough skin of the seed called the testa. However too much water can cause decomposition of the embryo and fungal attack will then kill the seed.

For many plants water alone is insufficient for germination. Sufficient light may also be required for some plants while for others light does not seem to be critical. Other seeds will not germinate if day lengths are two long or two short. (A behaviour called photoperiodism.) Surprisingly enough it is not the day length that is important but the length of darkness or night length. (Turn a light on for short periods during the night and chrysanthemums will not flower.)

All seeds require oxygen for germination. As an active seed requires a lot of energy and this energy is supplied by respiration sufficient oxygen is required.

Most plants have an optimum temperature at which they will germinate and grow at a rapid rate. They also have a minimum temperature below which they will neither grow or germinate. Most carnivorous plants seem to require a temperature of around 25^{o}C. However once germinated many seedlings can also be damaged by high temperatures and strong light.

In the case of plants from regions where the winter temperatures are below that minimum temperature below which the plant will not grow a period of cold treatment, called stratification, is normally required to trick the seeds into believing that winter is over. Other seeds require abundant nutrients or a high concentration of certain minerals to be available.

When all the stimuli are correct for the particular species the embryo within the seed begins to grow. The radicle will emerge and will grow down in response to gravity (geotropism). The cotyledon will grow upwards, in the opposite direction to the pull of gravity and towards light (this response is called phototropism).

It is at this time that many seedlings can be lost, with the supply of starch in the seed exhausted, the seedling must rely upon its external environment. For CP's acidity needs to be correct, between 5 and 5.6 on the pH scale.

Whilst germination of some seed can be difficult, mainly through lack of information on the optimum conditions for that species, most species have evolved to a specific environment and the seed will only germinate if all conditions are favourable for survival. Yet, through this specialisation they have also been able to survive when conditions are not favourable.

Do not give up on seed just because you have failed to supply it with the specific stimuli that the species requires. Any seed tray should be allowed at least 12 months before it is discarded. Also do not discard pots two readily. If a plant dies, hold onto the pot for at least a year. Sometimes the plant will reappear. These rules should be followed if you live in an area where growing conditions are not ideal or if little is known about the species with which you are working."

References

[1] Germination of Carnivorous Plants, Part 1, P. Archer, Flytrap News No 5, September/October 1986, published by CPS of NSW.
[2] Germination of Carnivorous Plants, Part 2, P. Archer, Flytrap News No 6, November/December 1986, published by CPS of NSW.
[3] Biology. H.J. Crook, K.F.P. Burkitt and W.B.I. Barker: Longmans 1960.
[4] Biological Science: The web of life. Australian Academy of Science, Canberra, A.C.T.

3D Photography

Adapted by Denis Daly from information supplied by Richard Davion (Tilbrooke)

Included with this issue is a set of stereo slides of *Drosera glanduligera* a generous gift provided by Richard Davion Tilbrooke. They can be viewed by use of two hand held slide viewers such as two reflecta® B40.

The recommended technique for viewing stereo (3D) slides is as follows. Place each slide (provided with this issue) in a slide viewer, white surface toward the eye, printing upward, noting which viewer contains the right slide and which contains the left slide. Look into both viewers simultaneously with both eyes. Imagine that each of your eyes is a camera looking at the same plant. By moving the slide viewers vertically and horizontally both images can be made to appear in the same position in the field of view. At that time the view will be a three dimensional image.

Reversing the slides in the holder or swapping the right with the left makes the plant appear to be growing in a hole in the soil. However reversing the slides in the holder and swapping the right with the left makes the image normal again. ($180^\circ + 180^\circ = 360^\circ \equiv 0^\circ$ phase change)

How to take 3D photos

We humans are capable of perceiving depth because we have two forward looking eyes spaced slightly apart (spatially out of phase) and by comparing the slight difference our brains can perceive depth (3D). A camera photograph is a single identity (containing magnitude and hue of the scene only) and one photograph (Unless it contains spatial phase information as does a hologram.) does not contain enough information to enable reconstruction of the 3D image. What is needed is either the phase information or two exposures containing magnitude information that is spatially out of phase.

Sounds complicated? It can be if one wants to delve into the mathematics of Fourier transforms. Fortunately the practical solution involves first making an exposure with a camera lens positioned at the location where your left eye might have been AND then make another exposure where your right eye might have been.

The practical implementation is to fix the camera to a pivot attached to a jig that enables the camera to be set up on a central position and then moved, first to the left and then to the right. The distance from the extreme right to the extreme left position should be equivalent to the spacing between ones eyes (order of 55mm).

Such a jig is easily made from a rigid bar into which three holes are drilled in a straight line 27.5mm apart. You then have to use your own ingenuity to be able to affix the jig to a camera tripod, or other rigid structure while still permitting access to screw a securing bolt into the camera body through the holes in the jig.

It is recommended that the tripod be capable of being securely affixed to the ground either with spikes or by placing rocks around its feet. For close up shots using bellows, extension lenses or macro lenses it might be appropriate to make a special purpose rig including a tripod of sorts.

Method 1

The central position is used only to determine the extent of the frame and to note what central reference point is to be used to align the exposures. Do not make an exposure when the camera is in the central location.

Move the camera to the left hole, align the reference point with the centre of the frame by rotating the camera clockwise (inward toward your nose), focus then expose. Next move the camera to the right hole, align the reference point with the centre of the frame by rotating the camera anti-clockwise (inward toward your nose), focus then expose.

Remember that to perceive depth both your eyes automatically look inward and focus on the same point in the scene. When the camera is at each "eye location" you must ensure that the same reference point is in (or very close to) the centre of the frame even though portions at the edge of the frame may be only in one of the exposures. Do not worry about the edges for you will capture sufficient information to enable your mind to be able to reconstruct a 3D image from the extreme left of the left exposure to the extreme right of the right exposure.

Method 2

Alternatively the camera could be fixed in one position on the tripod and the plant moved right from the central position to duplicate moving the camera left. It would still be necessary to pivot the camera to align the reference point with the centre of the frame. The plant is moved left to simulate moving the camera right. This method is not suited when there is more than one object in the picture and care must be taken not to rotate the plant. It is obvious that this method is unsuited to field use as most plants cannot be moved easily.

Vertical alignment.

However keep in mind that as your eyes are spaced horizontally but aligned vertically you will have to view a vertically spaced stereo photo (slide) pair as if you were lying on your side.

On page 77 of reference [2], due to an error in printing, you will have to rotate the page anti-clockwise to align the vertical registration of the lower set of images to fully appreciate the 3D effect.

Further viewing.

In 1988 and 1989 Richard submitted one article and sets of stereo (3D) photographs to the ICPS journal CPN [1], [2], [3]. I have adapted those articles to form the basis of this article.

You may care to look at the photos on page 112, 113 of the ICPS Journal CPN Volume 17 No 4. [1].

As an alternative to the instructions given on page 111 of reference [1]. Hold the page, or affix it, so that it is 175 to 450mm from your face. Look at, and focus upon, the area containing both photos then, without loosing focus try to look at your nose. The 3D photo will appear in the centre of your field of view between the original photographs.

Note that in the photo of the *Cephalotus follicularis* on page 112 of reference [1] the 3D photo that appears contains portions of the *Sarracenia* plant and pot that only appear in the left hand photograph. Marvellous thing, the mind, it can deduce the missing spatial phase information from the phase information deduced for the adjacent areas of the photos. An identical effect occurs for the *S. purpurea venosa* in the right of the field of view.

Acknowledgment

The slides enclosed as an attachment to this issue of Flytrap News were produced from an original set of slides by Group Colour (S.A.) Photography Laboratories of 50 Park Terrace, Gilberton, SA, 5081. (tel 08 342 7711, 08 344 4313, 08 269 4920)

References.

[1] Depth with perspective, 3D photography, by Richard D. Tilbrooke, Carnivorous Plant Newsletter, Vol 17 No 4, December 1988, published by International Carnivorous Plant Society, Fullerton Arboretum, California.

[2] Photos in 3D #2, by Richard D. Tilbrooke, Carnivorous Plant Newsletter, Vol 18 No 3, September 1989, published by International Carnivorous Plant Society, Fullerton Arboretum, California.

[3] Photos in 3D #3, by Richard D. Tilbrooke, Carnivorous Plant Newsletter, Vol 18 No 3, September 1989, published by International Carnivorous Plant Society, Fullerton Arboretum, California.

Propagation of some Specific Species of Carnivorous Plants

edited and collated by Denis Daly

Cephalotus follicularis

Cross pollinate between open flowers with a small brush each day. A continual watch must be kept for ripening seed pods as the seed is light and fluffy. It is readily distributed by the wind. [3] When the seed pod shows signs of opening cut the pod off and store in a dry place.
Sow seed within a month of harvest on seed raising mix in a punnet and place in 6mm of water in a water tray. Seed sown in February germinated by the middle of August. Some of the Seed harvested in February was withheld and sown in late early September. It did not germinate. Seedlings can be susceptible to damping off and should be transferred to sphagnum as soon as possible. [3]

Darlingtonia californica

The seeds should be placed in a plastic dish, water added and placed in the freezer for one and one half days. After this time the ice from the plastic dish, with the seeds stuck in the surface should be placed, seeds down, on the surface of a pot containing chopped sphagnum moss. 80% Germination in 10 days. [5]

Byblis gigantea

Soaking the seed in a 0.1% w/v solution of giberalic acid as recommended by Allen Lowrie [4] prior to sowing on seed raising mix in a polystyrene cup placed in a water tray has been proved to be a success [3]. However the seedlings are very susceptible to "damping off". There is some indication that the onset of winter soon after germination may assist in overcoming the problem of "damping off". [3] **Stop press:-** New seeds germinating now after cold winter indicate possible stratification application. [3]

Byblis liniflora

Harvest seeds in autumn and winter as the seed pods "brown off" and start to split. Sow in spring on 2:1 peat to sand [2] or on the surface of a good seed raising mix [3]. Germination can be delayed and erratic. Seeds sown in March 1993 did not show signs of germination until one and only one plant germinated in December 1994. This plant grew to maturity by mid February 1995 producing many flowers (subject of sketch presented on the cover of Flytrap News Vol 8 Number 3.) The plant flowered prolifically, producing many seeds, until June 1995 when it declined and died by mid June 1995.[3] Flowers close at night. Flowers must be cross pollinated over several days in order to set seed [3]. Individual flowers are self sterile. A number of flowers unfortunate to open when no other flowers were available failed to set seed even with repeated self pollination attempts. Plant is prolific in seed production, each flower produces up to 55 seeds. [3]

Given the success with giberalic acid with *Byblis gigantea* and the recommendations of Allen Lowrie [4] the author will experiment with the use of giberalic acid on Byblis liniflora seed this season by comparison with seed directly sown and with smoked seed [10] using some of the fresh seed from the plant whose life cycle was noted above.

Dionaea muscipula

Each flower produces pollen before the stigma is receptive so the younger flowers must be used to pollinate the older ones. This can be achieved by use of a small brush or by rubbing the flowers of two scapes together. Sow seeds directly on 80% peat 20% sand in seed trays in early spring. Do not use sphagnum. Do not keep too wet. Will germinate in very low light [1] [2].

Drosera spatulata

Prefers 1:2 peat sand. Germinates anywhere at any time. [2]

Drosera adelae

Use two different clones and rub flowers together over several days.
Seed capsules ripen over 2 to 4 months and when the pods turn dark brown shake out the dust like seeds. The seeds can be kept for some months in a refrigerator or sown immediately onto short tufted sphagnum. Germination takes around 10 days in an environment where adult plants are growing. Temperature should be kept at 18°C or above. Young seedlings are susceptible to damp off. [6]

Drosera aliciae

Germinate on 1:2 peat sand in seed trays watered by tray. [2]

Drosera binata

Germinates easily, weed like. [2] [3]

Drosera burmanii

Germinates readily. Can become weed like on sphagnum. [2]

Drosera capensis

The ultimate weed. [2] [3]

Drosera coccicaulis

Seed sown on the surface of seed raising mix in February germinated in December. High Yield. [3]

Drosera filliformis

Stratification in refrigerator for at least four weeks. Sow in spring. Use 2:1 peat sand in tray. Water by tray. Medium light. [2]

Drosera indica

Requires relatively high light to germinate [1]. An annual. Let plants self sow seeds in sphagnum. Plants germinate in December. [3]

Drosera intermedia	Stratify in refrigerator for at least four weeks. Sow in 2:1 peat sand. Place pot in deep water (1cm from top) until germination. Germination can be slow [2].
Drosera montana	Treat as annual. Sow seeds 20mm deep in 2:1 peat sand, water by tray. Place in warm location in full or medium light. [2]
Drosera peltata	May require lengthening nights to germinate. [1]
Drosera regia	Save pollen from first open flowers as some later flowers have been observed not to produce pollen. Seed is small (2mm x 0.5mm), straight or curved and light. Each flower produces at least 40 seeds. Sow seed on surface of peat moss (sphagnum moss will smother it). Keep peat moss permanently damp. Water by tray and keep the tray away from breezes as the seed is easily disturbed. [9]
Drosera roraimae	Seed harvested in late March was sown immediately on the surface of seed raising mix and germinated within one month. The seed pot was standing in a water tray in full sun in a glasshouse [3].
Drosera sessifolia	Seeds sown on surface of seed raising mix in polystyrene cups in late March commence germinating in 6 weeks. [3]
Drosera trinervia	May require lengthening nights to germinate. [1]
Drosera venusta	Seed sown on the surface of seed raising mix in a polystyrene cup. Seed sown in mid March germinated within two weeks. Very high yield. [3]
Drosophyllum lusitanicum	Soak seeds in water for four weeks. Sow three seeds buried 10mm deep directly into terra-cotta pots with 50% peat 50% coarse sand, water well and place in water tray to germinate. Germination should occur within 1 to 6 weeks. Leave pot sitting in water tray for 2 months after germination then remove and place in a location that shelters the pot from rain so that the plant is watered only when pot gets very dry. This is very important as even drips of condensation or leaks from the covering structure or glass house roof falling on the plant can overwater it and kill it. [3] Plants can survive with less than 2 hours direct sun per day in winter. [3] There is some anecdotal evidence that seed germinates more readily if it is old harvested seed. [7]
Heliamphora tatei	Sow fresh seeds (4 to 6 weeks after harvest) directly on top of sterilised (boiled) 50% peat and 50% sand mix in polystyrene cup (holes in bottom) stand in saucer of water, cover with PTFE bottle whose bottom has been cut off and lid removed. Place in bright light and mist spray through open bottle top. Germination of seeds commences in 3 to 4 weeks but seeds can germinate after 3 months. Once germinated seeds are susceptible to damp off. Transfer to live sphagnum seems to help avoid damp off or at least reduce the losses. Germination rate can reach 50 % while survival rate to sphagnum is around 40 % [7] [3]. Seeds have also germinated when placed 5mm below the surface of seed raising mix in a polystyrene cup that is placed in a water tray.
North American *Drosera*	A period of cold treatment, called stratification, is usually required.[1] Protect young seedlings with shade cloth for the first two months. [1]

Piniguicula	Sow seeds on top of seed raising mix in polystyrene cup with holes in bottom. Water from tray. Well lit warm position. Transfer to sphagnum or vermiculite/pearlite after germination. Grow in shade house. Shelter those species forming winter hibernacula from rain in winter but do not let dry out. [3]
Sarracenia	A period of cold treatment, called stratification, is usually required [1] Protect young seedlings with shade cloth for the first year [1].
Stlyllium Species (non carnivorous)	Information supplied by Fred Howell [10] has led me to smoke the seeds after sowing them on the surface of seed raising mix in a polystyrene cup. A few have germinated but I believe that the majority will not germinate until spring. If necessary I will resmoke them. Given the evidence presented in [10] the smoking technique should be tried on all native CP's.
Tuberous Drosera	Sow seeds in March on 1:2 peat sand in 15cm pot and stand in water during winter. [2] [3]

Footnotes

The above is written for the southern hemisphere. Growers in the northern hemisphere should make the appropriate adjustment to the months.

Reference is made by the author to seed raising mix. This is a reference to commercially available seed raising mix, without added fertilisers, manufactured by any reputable horticultural company. Its use avoids the problems of sterilisation and grading of components and for the amateur hobbyest the minimum quantities needed do not lead to excessive costs.

Reference is made to the use of a Polystyrene cup as a seed raising pot. A polystyrene cup is cheap, sterile, insulating and can have large sections readily broken away to let roots pass without subjecting a root sensitive plant to transplant disturbance. The cup has three diamond shaped holes cut in the side and base with a pair of scissors to provide drainage holes. The polystyrene pot is an ideal container. The use of other containers such as Yogurt, butter and margarine containers that, aside from being free, help, albeit in a small way, to reduce the quantity of rubbish going to land fill dumps and thus represents an environmental friendly activity.(But be warned do not exhibit your plants in such containers. Show judges will be offended by the fact that there is writing on the Yogurt container or startled by the brilliant white of the polystyrene cup.)

References

[1] Germination of Carnivorous Plants (Part 1), Phil Archer, Flytrap News, issue 5/1986.
[2] Germination of Carnivorous Plants (Part 2), Phil Archer, Flytrap News, issue 6/1986.
[3] Personal experience.
[4] Correspondence from Allen Lowrie.
[5] Correspondence from Fred Howell.
[6] Sundews of the North Queensland Rain Forest, Robert W. Riedl, Flytrap News, No.2 September October 1985
[7] Talk with Josey Da Costa.
[8] Information from Colin Clayton.
[9] Follow up on Drosera regia, Robert Gibson, Flytrap News, Issue No 2 March/April 1986.
[10] Smoking out the Natives a report by M. Campbell on the work of Dr. Kingsley Dixon and Shauna Roche of the Kings Park Botanic Gardens, Perth, W.A. in Gardening Australia. January 1995.

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A variant of *Drosera whittakerii* with carnivorous glands on the rear of the petals (though not on the sepals) has been observed growing in the Mt. Bold Reserve (the catchment area for the Mt. Bold Reservoir). It is hoped that more details will be available for the next issue of Flytrap News.

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Nepenthes Ventricosa by John Mignano