FLYTRAP NEWS

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Photograph of dried flower specimen of *Drosera whittakerii* form Onkaparingakuitpoensis collected by Richard Davion (Tilbrooke).

NEWSLETTER OF THE CARNIVOROUS PLANT SOCIETY OF New South Wales (Sydney, AUSTRALIA)

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P.O Box 87
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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.

Meeting Dates for 1996			
9th February		9th August	
8th March		13th September	
12th April		11th October	
		8th November	
14th June	AGM	8rd 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

I have to report that the committee of the ACPS has sold 'Royal Red' Venus Fly Traps to the general public at their annual show on 25th & 26th of November 1995 [1]. Even though only 37 'Royal Red' *Dionaea muscipula*'s were sold to the general public, due mainly to the poor quality of the particular plants offered for sale, the committee of the ACPS has shown that they are prepared to act as an agent, (hardly an ideal agent but an agent nevertheless), for the PBR holder. (The normal *Dionaea muscipula*'s on sale to the general public sold like hot cakes but the sick looking 'Royal Red' plants did not. The prices of $6.50 (80mm) and $7.50 (100mm) were not unreasonable yet even though all the normal *Dionaea muscipula*'s were sold out there were some 39 'Royal Red' plants left unsold. I would certainly not consider any agent who offered sickly looking plants for sale, thus potentially resulting in bad publicity, to be a competent agent.)

It is now certain that support from the "revocation of the PBR" cause will not be forthcoming from the committee of the ACPS. It is however refreshing to now have the official position of the Committee of the ACPS out in the open. I do not see why they did not declare their position sooner for they have a perfect right to that opinion. (Those members of the ACPS who would like to assist the "revocation cause" should correspond direct with the co-ordinator of the opposition to the PBR, Richard Davion (Tilbrooke), GPO Box 248, ADELAIDE South Australia, Australia, 5001.)

Supporters of the "revocation cause" are urged not infringe the PBR holder's legal rights, for if you do you will get into trouble and, more importantly, will damage the "revocation cause". (Meanwhile while waiting for better news enjoy our short tale of the "Quest of the Heroes of Adeladium" and do not forget to respond to our plebiscite.)

References:-

[1] One double sided pamphlet published by the Australian Carnivorous Plant Society Inc. of P.O. Box 391 St Agnes S.A. 5097 in November 1995.

"Quest of the Heroes of Adeladium".

Denis Daly

(With apologies to the classics.)

Meanwhile in the fair city of Adeladium, Tubertulosii and his Addlednoughts contemplate their quest to seek the golden Nepenthium fleecii. (All those who possess golden Nepenthium fleecii will never desire any other possession.)

Legend has it that far to the north of Adeladium beyond the desert of Droseium, beyond the pillars of Hypogeum, beyond the brown swamp infected with the feared bacterium *Caninus mangeurs*, upon the plains of Cordalibum, Aphrodite's temple of Regis Rubeus may be found.

Deep within that temple sequested in sacred bronze and crystal shrines, tendered by Zeamay nymphs and guarded by ferocious carnivorous Muscipulii, Nepenthium fleecii grow in perfect, immaculately clean, cornucopia inscribed with gold encrusted ruby's.

Without prejudice

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Oh woe to our heroes, for Aphrodite's servant, the dreaded monster Anthocyanus roams the golden Zea fields of Cordalibum that surround the temple seeking hapless victims which it dips into a batter of Zea starch before feeding them to the Muscipulii. (Only Anthocyanus knows the secret ingredients that must be added to make Royal Zea Jelly.)

Within this fabulous white marble temple more perils await our heroes for the king, (by the grace of Anthocyanus,) of the Muscipulii, Rubeus Muscipulus XXII and his royal family have the power to blend in with the earth itself and so become invisible. Rumour has it that this power is derived from Royal Zea Jelly fed to the royal princes and princesses before germination in the crystal Zeacubator.

Will Tubertulosii and his heroic companions become golden brown Zea pastries or red Royal Zea Jelly? Will they ever grace the fair city of Adeladium with their countenances again? Will they infect the citizens of Adeladium with *Caninus mangeuri*? Don't miss the next exciting episode.

Plebiscite on sale of 'Royal Red' at CPS of NSW venues

Denis Daly

As *Dionaea muscipula* 'Royal Red' are now on sale the Committee of the CPS of NSW feels that it is appropriate to seek the guidance of members with respect to the following question:-

"If this Society is approached by the PBR holder, agent of the holder or commercial reseller to endorse or permit the sale of *Dionaea muscipula* 'Royal Red' at an official function of the CPS of NSW should the committee of the CPS of NSW endorse or permit such sales to occur and if so under what conditions?"

The Committee has adopted the following interim policy but seeks to ascertain whether this is in accord with the wishes of the majority of members. Please return the completed plebiscite to the secretary. (The committee has resolved to assume those who do not bother to vote are happy with the Committee's decisions and thus shall be deemed to be in favour of the interim policy as stated below. However in this Society your Committee is giving you, the members, the chance to have your say on this controversial matter. It is YOUR Society. Tell us what you want! The Committee administers the Society for YOU not for our own grandiosement.)

Interim Policy on CPS of NSW involvement in trading in 'Royal Red'

In accord with this Committee's, well known, moral opposition to the granting of PBR in this instance and given the general nuisance and costs (in ensuring that royalties are sent to the PBR holder) imposed upon this Society the Committee of the CPS of NSW has set the present interim policy of not endorsing or granting permission to commercially trade in *Dionaea muscipula* 'Royal Red' within venues under the control of the CPS of NSW. (Notwithstanding the preceding, at official CPS of NSW venues, members of the CPS of NSW, acting in a private capacity, may display, enter in contests, given away or otherwise deal in 'Royal Red' *Dionaea muscipula's*, provided that PBR royalties are not required to be guaranteed by or be collected by the CPS of NSW.)

Without prejudice

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At all times the remittance of PBR royalties to the PBR holder shall be the responsibility of the individual member dealing in 'Royal Red' *Dionaea muscipula's*. (However, it goes without saying that, at other than official CPS of NSW venues anyone can do what they like with 'Royal Red' *Dionaea muscipula's*.)

Without prejudice

Follow up on stop press

Unusual form of *Drosera whittakerii* discovered by Richard Davion (Tilbrooke)

As previewed in the last issue of Flytrap News a variety of *Drosera whittakerii* (that Richard has named Onkaparingakuitpoensis) with carnivorous glands on the petals (though not on the sepals) was discovered by Richard growing in the Mt. Bold Reserve (the catchment area for the Mt. Bold Reservoir).

The preliminary report in the last Flytrap News (Vol 9 No 1) of carnivorous glands on the rear of the petals was incorrect. The carnivorous glands are indeed on the front of the petals. (The precise details of the location of these plants will not be revealed so as to prevent poaching of these plants.)

The photograph on the front cover of this issue is a photograph of the pressed flower sample sent to the editor of Flytrap News by Richard Davion (Tilbrooke). The dried flower is photographed from the front. The unattached petal at the 5:30 position is viewed from the front while the unattached petal at the 4:30 position is a viewed from the rear.

Editorial Note:
Of interest to note is that each photograph varies from copy to copy as 36 photos were taken and multiple prints requested at the time of developing the negatives due to the better price obtainable from film processors compared to the cost to get multiple reprints of the one negative. Why film processors have such pricing policies is not understood. Refer to previous issue of FTN Vol 8 No.4.

Repository of information on the Propagation and Cultivation of Carnivorous Plants

Denis Daly

Information on propagation of carnivorous plants from seed is secreted in various books and old journals that are, in general, inaccessible to newer CPer's, who are most in need of this information as they start their collection. Even if this information was available there is no way of knowing whether the method suggested had been proven or had simply been "made up", and whether it was useable given their environmental conditions, let alone being a good method.

It is proposed that a repository of personally proven (by the submitting author) propagation and cultivation techniques for Carnivorous Plants be established and kept current by a repository coordinator.

The individual information would remain copyright of the author but no restrictions would be placed upon making and distributing copies (to anyone) provided that the source (author) and his/her reference sources are acknowledged on each copy. The information may not be sold for commercial gain but reproduction and distribution (e.g. copying and postage) costs may be recovered. Non profit Societies and charities would be permitted to receive a donation, over and above the production costs, provided that such a donation is no more than 10% of those production costs.

The repository co-ordinator is at present me, the editor of Flytrap News. Correspondence is invited from interested persons who wish to volunteer to perform this task.

Expressions of interest are sought from those who wish to participate by submitting the results of their experimental cultivation techniques to be added to the repository.

By participating you share your knowledge and experience with others but you get to share the knowledge and experience of many others. You don't make the same mistakes as they did, they don't make the mistakes you did. You improve on their cultivation techniques, they improve on yours, someone else improves on them yet again.

Cultivation of CP's becomes easy, general public find that growing CP's is easy, demand more varieties, commercial ventures meet the demand, ease of propagation ensures that it is cheaper to mass propagate from captive stock thus preserving the wild stock, more CP varieties become available, public interest grows, more members of Societies. Everyone Wins!

Proposal for a Federation of Carnivorous Plant Societies Part 2 Denis Daly

As so aptly put by the VCPS, Federation will take a "lot of discussion to get it working to the satisfaction of all concerned". It is now time to start to collect ideas to get this discussion going.

Each member of the CPS of NSW and other interested Society is asked to put some **ideas or expectations down on a scrap of paper** and send it to the committee of their respective Society so that all may contribute to and participate in the "Brainstorming".

I cannot overemphasise that it does not really matter how "far out" the ideas are because "brainstorming" works by tossing around ideas, no matter how ridiculous, until good ones "pop out".

I published some **"initial ideas"** in the last issue of FlyTrap News as well as in correspondence to other Societies. Now it is the turn of others to put their ideas forward. (I did not anticipate that my initial ideas would be acceptable to the majority or even viable, let alone being "hailed as the ultimate wisdom". I simply proposed some initial thoughts to start the "ball rolling".)

I do not claim to be infallible or to have all the answers. The tag of "ridiculous" can equally well apply to any one of my proposals as to an idea from anyone else.

I do not seek to make the Federation my Federation. The Federation must be OUR (our members, other society's members, all participating Societies) Federation. Only a Federation based on the principles of OUR Federation will work.

Without prejudice to those involved, amalgamation soon became untenable due to one group pushing their ideas and interest regardless of whether that had a detrimental effect on all the other interested groups. The amalgamation failure is even more tragic when one considers that the original proposition of amalgamation came from a member of that same group who subsequently considered that it did not matter if, by not supporting local branches of an amalgamated Society, the nucleus of members of the present Societies was disbanded/destroyed.

However the amalgamation debacle produced one worthwhile concept to input to the Federation "brainstorming" process. That was that of the Federation to be acceptable the individual federated CP Societies, (both founding and those joining the Federation at a later date,) must retain their sovereignty.

Do not "tar" me with the same brush as those who proposed amalgamation. Federation is NOT Amalgamation. Federation CANNOT BE Amalgamation. The present Societies will not agree to such a proposition and rightly so.

If Federation is to be successfully then only the best and fairest ideas and solutions to the many difficulties will do. Your (YES YOU THE INDIVIDUAL MEMBERS AND SOCIETIES) ideas and requirements are vital to forming a Federation. Do not be afraid to express your ideas and aspirations of Federation. Be assured that each individual who submits ideas can have those ideas treated anonymously (if you are shy or do not want the credit for a "fruity sounding idea").

Participating by making a submission will not involve any work for you other than to write the ideas down (handwritten will do) and send them to the appropriate Society's secretary.

Just send in what YOU think in your own words. **We need to know what you think of expect (and want) from Federation.**

If you do not have all the details or answers to the problems that you recognise as associated with the specific concept that you propose, send the concept in anyhow. Any concept, even an "incomplete" one, is a valid input into a "brainstorming" process. Others may not have realised that such a problem or need existed or indeed may be able to provide the solution. Once in the "brainstorming" process, concepts, suggestions and proposals may either be "matched" with other submissions to form the appropriate solution or generate other ideas that ultimately lead to obtaining the best possible Federation proposal.

We hope that you will send multiple submissions (slow brainstorming i.e. conducted like a slow auction) or, better still, if you can, come to your Society's Federation Proposal meetings and participate in "brainstorming" the various ideas.

While the process will take some time it is important that you become involved at the onset **so that YOU GET A SAY in the formation of the Federation.**

YOUR views/ideas/opinions are sought on the following topics, and any others you can think of:-

- How can it be assured that the Federation can be the best possible and provide maximum mutual benefits to all individuals and their participating Societies?
- Resolving financial issues such as funding of the Federation and individual Societies will be a most difficult task.
- How best to ensure that the Federation can encompass members (Society's groups and individuals) with divergent opinions or even diametrically opposed opinions on several topics.
- The logistics (and finances) associated with publication of a common, probably centralised, journal as well as each Society's (modest?) newsletter.
- Seed bank operations and reciprocal rights.
- Some moral code to censor those persons who would act in an improper way such as ripping wild plants out of a protected habitat.
- Associate Membership for groups with a secondary interest in Carnivorous Plants.
- Etc.
- Etc.
- Etc.

IUCN Carnivorous Plant Specialist Group

Denis Daly

The Carnivorous Plant Society of NSW has been approached by the IUCN (World Conservation Union) Carnivorous Plant Specialist Group (CPSG) inviting us to participate in the conservation and study of Carnivorous Plants.

As the conservation and study of Carnivorous Plants are key tenants in the Constitution of the Carnivorous Plant Society of NSW the committee has agreed to participate in the IUCN's Action Plan which seeks to establish the roll that "the numerous carnivorous plant societies worldwide can play in the future conservation and study of Carnivorous Plants".

In due course we will receive the draft of the Action Plan to comment on, and hopefully the particular details of how this Society may participate in the conservation and study of carnivorous plants will be defined. At present we have placed the CPSG on our mailing list as we will be on theirs (reciprocal exchange of information, newsletters, etc.).

This Society nominated Mr. Robert Gibson, one of our founding members, to be this Society's interface with the CPSG. I am pleased to be able to report that Robert has accepted this nomination.

Report of the Christmas Picnic of the CPS of NSW

Denis Daly

The annual Christmas Picnic / Swap meet of the Carnivorous Plant Society of NSW was held at Govetts Leap, Blackheath, in the Blue Mountains National Park on Sunday, 10th December 1995.

The day was not the best that one could have hoped for, starting off overcast and threatening to rain. Country members Philip Reyter and Richard Sulivan attended and indeed brought plants to trade. New member Kristie Wulf won the Mt. Kinabalu T shirt generously donated by Colin Clayton.

Richard Sulivan brought along a large *Drosera regia* in flower for its second year (so much for the old wives tail that *D. regia* dies after flowering). Richard seeks another clone of *D. regia* in order to be able to successfully pollinate his *D. regia*. I traded two *Heliamphora tatei* seedlings for other plants. (I think I can thus claim to be the first person in Australia to trade in *Heliamphora tatei* for whatever dubious honour might accrue from such an act.)

Richard sold some plants to members of the local bush fire brigade who were having a fund raising sausage sizzle and canteen at Govetts Leap.

In the afternoon in rather inclement weather (heavy rain squalls) the more intrepid members and friends went on a 9km walk from Govetts Leap to Beauchamp Falls via Evans lookout. The path was precipitous, wet and slippy but was one of the moderate tracks compared to others in the area.

Alongside the path *Drosera binata* forms ("T" form, *dichotoma* and *multifida*), some in flower, were encountered growing on anything from gentle slopes to vertical walls in sandy gravel awash with clay. The location of the plants had obviously resulted from the lodgment of a seed in moss which germinated and took root. Some small *Drosera binata* were observed growing in a small patch of moss that was clinging to the exposed surface of a large rock. The colours of the *Drosera binata* leaves ranged from green to bright scarlet. The scarlet colour was only found on leaves and parts of leaves that were fully exposed to the sun although exposure to full sun did not always result in the brilliant scarlet colouration, indeed some leaves fully exposed to the sun were quite green. Several *Drosera spatulata*, all scarlet, and about to flower were observed also.

Two species of *Stlyllium* in flower with pink flowers, one with serrated petals were found alongside the track. It was observed that the trigger mechanism of *Stlyllium* does not respond to artificial stimulation when it is raining.

The Govetts Leap area, with its many, trails is definitely worth visiting on a fine day but you must be fit as the gradient is almost vertical in places and not be afraid of heights as in places some tracks cling to small ledges alongside a precipice overlooking the Grose valley. Going down is easy so look at the plants on the way down. You cannot hope to see all in one day though.

Some of those present at the picnic on 10/12/1995 with a selection of traded plants in the Govetts Leap Car Park.

Editorial Note:
Each photograph varies from copy to copy as 36 photos were taken and multiple prints requested at the time of developing the negatives. If one or more of the persons in the preceding photograph are not smiling in your copy or indeed acting in some other antisocial manner then rest assured that it was not intended to "snob you" but simply they were getting tired of posing for 36 photographs taken by our slow photographer Richard Riles who having been amongst those who declined to be in the photograph was nominated photographer.

Stop press correction

Darlingtonia californica comes up as a weed in my *Byblis gigantea* seeds

Denis Daly

In the article entitled "Propagation of some Specific Species of Carnivorous Plants" published in the last issue of Flytrap News (Vol9 No1) with regard to *Byblis gigantea* I reported that:-

"New seeds germinating now after cold winter indicate possible stratification application in *Byblis gigantea* germination."

The two new seedlings turned out to be *Darlingtonia californica's*, which is in itself something of a triumph because I have never been able to germinate this species previously.

Thus while there is now no evidence to support the supposition that stratification assists *Byblis gigantea* germination there is equally no evidence to indicate that it does not.

Given the success with Gibberellic Acid with *Byblis gigantea* and *liniflora* I do not intend to investigate the possibility of stratification assisting in the germination of *Byblis gigantea* further.

In my last attempt at using frozen block method for germinating *Darlingtonia californica* [1] seeds I removed the block from the freezer on 11/6/95 and when, on the 25/11/95 the sphagnum moss was searched for seeds (in preparation for writing this article), none were found. (It would appear that all the seeds had rotted as usual.)

Following the realisation of the identity of the "weeds" in the *Byblis gigantea* seed pots on 15/10/95 a quantity (uncounted) of *Darlingtonia californica* seeds were soaked in a 1g/L solution of Gibberellic Acid for 3 days.

Sown into chopped sphagnum on the 18/10/95 the pot containing these *Darlingtonia californica* seeds was placed into a tray of water in a glasshouse.

On 25/11/95, in gathering information for this article and the article on Gibberellic Acid, the top layer of sphagnum was carefully parted to observe what, if anything had occurred.

Germinated *Darlingtonia californica* seeds (after 38 days, ≈ 6 weeks) were observed providing strong evidence that Gibberellic Acid can promote the germination of *Darlingtonia californica* seeds without cold stratifying.

Having a large quantity of last seasons *Darlingtonia californica* seeds I proceeded to estimate the quantity of seeds by counting off 50, spreading these on a sheet of paper and comparing the area covered, by the 50 seeds, with the area covered by all the seeds, spread one layer thick. In this way the quantity of *Darlingtonia californica* seeds for the next Gibberellic Acid germination trial has been estimated as 1500.

Taking these seeds I placed them in a transparent, paralleled sided, plastic, screw top container, covered with sterilised fine sand and carefully poured in 20mL of 2g/L Gibberellic Acid solution. Two seeds were dislodged and floated (hence the recommendation to use an eye dropper). The seeds were left for 24 hours and then the sand seed mix was washed onto the surface of seed raising mix that had been placed on top of orchid mix that had been placed in a 300mm x 300mm tray. The seeds were manually moved, with a stainless steel wire, to thin them out from some locations were they had collected in a groups. The seeds were then covered with live sphagnum moss. The results will be reported in a future issue of Flytrap News.

Footnote:-

There is no doubt that in the wild *Darlingtonia californica* seeds germinate in spring after cold stratification during winter. This has been confirmed by Richard Sulivan [2] at Kelso (near Bathurst) where *Darlingtonia californica* seeds are left out all winter and subjected to daily cycles of freezing followed by partial thawing. In the spring *Darlingtonia californica* seeds germinate in profusion for Richard. Indeed the frozen block method, devised by Fred Howell, was motivated by Richard's experiences and works for Fred in Adelaide but I have not yet got it to work in Sydney although I once thought it had but what looked like germinating seeds soon proved to be weeds. (I would be interested if anyone else has got the frozen block method to work.)

References

[1] Correspondence from Fred Howell.
[2] Conversation with Richard Sulivan, of Kelso.

The use of Gibberellic Acid in seed germination

Denis Daly

Having tried all the previous "sure fire", and totally useless techniques recommended over the years such as, setting a fire on top of the seeds, etc., I was despairing of ever being able to get *Byblis gigantea* to germinate. Desperate I decided to try another "certain" method that advocated the use of Gibberellic Acid. Eureka! This time it worked so I set about finding out about Gibberellic Acid. What follows is a result of my preliminary investigations and experiments.

Gibberellic Acid is a member of a "gibberellin" group of naturally occurring plant growth regulators. (Other plant growth regulator groups are the auxins, kinins, and inhibitors). The gibberellins were discovered in Japan in the 1920's during research into a rice disease that produced a characteristic excessive growth of the rice plants. The rice disease was caused by the fungus *Gibberella fujikoroi*. [2] (All the gibberellins are classified as acids by the chemical definition of an acid. However they are extremely weak acids and any comparison of their properties compared to strong acids such as hydrochloric or sulphuric [battery] acids is to be avoided, by those without chemical experience, as it will only lead to confusion. Gibberellic acid is not going to burn a hole in your skin but it can be absorbed through the skin and it is poisonous.)

The separation of gibberellin from an accompanying inhibitor, fusarinic acid, was achieved in 1935 in Japan [2]. However the gibberellins did not come to the attention of the western world until the early 1950's when world wide research on the gibberellins commenced. [2]

By the 1960's nine separate gibberellins (GA_1, GA_2, ... GA_9) had been identified, six from the fungus *Gibberella fujikoroi* and three from higher plants. Of these Gibberellic Acid (GA_3 .. generally found to be the most active gibberellin) is found in both the fungus (most abundant fungal product) and plants. [2]

While GA_3 is in general the most active, GA_1 is also highly active (certainly with rice seedlings). Other gibberellin's may produce better results with particular plant species than GA_3 or GA_1. [2]

Application of additional gibberellin to plants (e.g. painted onto leaves or grow seedlings in gibberellin solution) usually produces dramatic growth. Application of gibberellins to dwarf pea plants can overcome the dwarfism whereas auxins do not. As a natural plant hormone gibberellins are involved in control of growth and in development factors such as dormancy, flowering and responses to temperature and light. Gibberellins can substitute for light to break dormancy in some seeds they but can also overcome the inhibitions of growth imposed by light on some plants [2]

The levels of gibberellins occurring naturally in plants were observed to increase then decrease during fruit development, being greatest prior to the period of greatest fruit growth. Induction of fruit set by application of gibberellins has also been observed. [2]

Gibberellins are involved in the seed maturing process and are present in the germinating seedling with the gibberellin levels rapidly declining within a few weeks after germination. [2]

It is believed that in dormant seeds and tubers the gibberellin content is low as gibberellin treatments break some forms of dormancy (i.e. can substitute for cold in breaking dormancy) and gibberellin content rises with emergence from the dormant condition. [2]

Gibberellin treatments can induce flowering in some photo periodically sensitive and cold requiring plants [2].

As Reference [2] is some 31 years old it is highly likely that considerable progress has been made in research into gibberellins (and indeed other growth regulators) in that time that would be of importance to the propagation of Carnivorous Plants but given the pressures of the timetable to publish the current Flytrap News such investigations will have to wait for another issue.

Gibberellic Acid is not cheap. It costs around $25 for a 100mL bottle but 100mm should last you a long time. However 100mL bottles may not always be available and the next size, a one litre bottle, costs close to $250. Definitely a case of share with a number of others in its purchase. (Note that as it is poisonous and flammable when dissolved in methanol it therefore cannot be sent through the post.)

In the commercially available bottle of Gibberellic Acid that I purchased (ProGibb GA manufactured by Abbot Australia, Agricultural Products Division, 47 Epping Road North Ryde NSW 2113. Tel. 02 888 0099) Gibberellic Acid GA_3 (solute) have been dissolved in methanol (solvent) such that in the resultant solution (solute + solvent) there are 100g of Gibberellic Acid (solute) in each litre of solution (solute + solvent). Note that the 100ml bottle contains 10 grams of Gibberellic Acid.

To obtain a dilution to provide the "standard" seed treatment concentration [1] of one gram of Gibberellic Acid per litre, mix one part (volume) of Gibberellic acid solution with 99 parts (volumes) of water. (i.e. a 0.1% w/v solution as 1 gram ≈ 1/1000 or 0.1% w/v of a litre of water at STP.)

An alternative supply of Gibberellic Acid "GROCELL GA" is manufactured by ICI in packets of ten 1gram tablets or as a 100gram per litre liquid. This is GA_3. [4]

The dilution rates quoted on the packet of tablets are suited to a farmer or orchardist filling a very large tank (e.g. 10,000 litres) with spray for immediate use. The recommended method to mix the spray is to initially dissolve one 1gram tablet in a litre of water (10 tablets in 10 litres) and then add this concentrate to an appropriate quantity of water in the spray tank to make up the required concentration for the intended use. The tablets contain an efflorescing agent to assist in dissolving the tablet (technique also used with "Soluble Aspirin".)

The tablets are not suited to minimum quantity usage as once diluted in the water Gibberellic Acid will "break down" after 7 days [4], and the agent should be asked to order ICI's GROCELL GA in liquid form which has been stabilised by the addition of precise quantities of propriety stabilisation chemicals [4] and which makes it possible to readily measure out the small quantities of Gibberellic Acid required for our purposes of treating small quantities of seeds.

While the tablets can be dissolved in methanol the stability of the resultant solution cannot be maintained without the addition of the stabilisation chemicals. The combination and particular stabilisation chemicals used by the manufacturers are propriety secrets. However while the chemical technique of stabilisation would be familiar to experienced chemists, it is just not worth bothering about, unless you have access to experienced chemists at, say, a University.

It is possible to grind the GROCELL tablets into a powder and using an accurate set of scales (accurate to at least ±1 milligram), weigh out 0.02g (20 milligrams) and then dissolve the powder in 20mL of water. Somewhat time consuming and in the simple approach above I did not take into account the weight of the efflorescing agent in the tablet. Such accurate scales could cost several hundred dollars. (Forget it and stick with the liquid form of GROCELL [4] or ProGibb.)

Purchase a calibrated eye dropper (0.2, 0.4, 0.6, 0.8, 1.0 mL [milli litres]) and a 40 mL medicine "glass" from a chemist, indelible mark them as **"Poison Gibberellic Acid"**. For each batch of seeds a volume of 20mL will be more than ample, indeed several small bottles for several seed batches may be serviced with 20 mL of solution. Draw up 0.2 mL (the first mark on the calibrated eye dropper) of the commercial Gibberellic Acid solution (which contains 0.02g of Gibberellic Acid) and place it into the medicine glass, fill to the 20 mL line with water. The resultant solution has a concentration of 1 gram of Gibberellic Acid per litre.

Use the calibrated eye dropper only for removing Gibberellic Acid concentrate from the bottle. Do not contaminate it when using or use it for any other purpose. Only wash it out when you have finished drawing Gibberellic Acid from the concentrate bottle so that it may dry between use.

For half strength (0.5 g/Litre) add 40 mL of water to 0.2 mL of commercial Gibberellic Acid solution while for double strength (2 g/Litre) add 10 mL of water to 0.2 mL Gibberellic Acid solution or use 0.4 mL (2nd mark on calibrated eye dropper) Gibberellic Acid solution to 20 mL of water.

At 0.2 mL Gibberellic Acid solution per seed pack treated the 100 mL bottle should be sufficient for 500 treatments or 5 cents per treatment which is of course negligible compared to the costs of the seeds and potting mix.

Once diluted (mixed) with water the balance of stabilisation chemicals is disturbed with the result that they no longer act to stabilise the Gibberellic Acid which "breaks down" in about 7 days. Thus only sufficient diluted aqueous solution for use at the present time should be mixed. The bottle of Gibberellic Acid should be kept in a refrigerator when not in use to assist in maintaining stability.

A typical minimum soaking time is 24 hours [1] and there is no point exceeding 7 days. While the concentration may be doubled or possibly quadrupled in strength for difficult seeds the use of extremely higher concentrations of Gibberellic Acid (or methanol) might kill the seeds and there is no point wasting it. In any case the "soaking time" would not be decreased as the diffusion through the micropyle, absorption through the testa and absorption by the endosperm is a slow process that is unlikely to be significantly affected by the concentration of Gibberellic Acid.

It should be noted that the concentration used to treat seeds (1g per litre) is a far higher concentration than that recommended for spraying onto foliage.

For seeds with a hard testa (seed coat) it could be an advantage to CAREFULLY cut away or abrade the outside coat (testa) of the seed to speed up absorption of the Gibberellic Acid by the endosperm from that which would normally occur if the Gibberellic Acid has to first diffuse through the micropyle (microscopic hole) and testa.

These seeds with the coat "nicked" or abraded to expose the endosperm, husked seeds, and those without hard coats (e.g. Nepenthes) would probably absorb sufficient Gibberellic Acid to trigger germination from a lower concentration of Gibberellic Acid (and lower concentration of methanol if applicable) within the solution and/or a "soak" period somewhat shorter than 24 hours. (Further experimentation is required.)

The gentleman I spoke to on the ICI technical help line feel that there if the concentration of methanol (a 100 to 1 dilution is still a 1% alcohol solution) is too high the seeds could be sterilised by the methyl alcohol. He informed me that ICI's liquid GROCELL does not use methanol. [4] While the methanol based ProGibb has been successfully used by Allen Lowrie [1], as well as myself on a number of species, it may be appropriate to try GROCELL Gibberellic Acid on seed types that have not responded to ProGibb Gibberellic Acid.

However as *Nepenthes ventricosa*, *N. gracillis* and *N. mirabilis* seeds treated (24 hour soak) with a 1g/litre solution of the methanol based ProGibb Gibberellic Acid have just germinated I do not believe that it is likely that many species of seeds would be sterilised by 1% methanol.

For seeds that are normally cold stratified it is recommended that any application of Gibberellic Acid occur immediately after stratification and after any pre soaking that may be necessary but immediately prior to sowing. (However it should be noted that the use of Gibberellic Acid could render cold stratification unnecessary as appears to be the case with *Darlingtonia Californica*.)

Place seeds that float in a jar, cover them with fine dry sand and carefully apply, with an eye dropper if necessary, (so that the sand covering will not be disturbed, letting the seeds float to the surface), just sufficient of the diluted Gibberellic Acid solution to cover the sand with a film of solution. At the end of the soak time sow the resultant seed sand mix. There is no point in attempting to separate the seeds from the, now, wet sand.

The sand/seed mix can be washed out of the "soaking" container with a hand held mist spray directly onto the surface of the seed raising mix. (The use of a paralleled sided, transparent "soaking container" will assist in this "wash out".) If the seeds are sown into sphagnum just let the sand find its own way to the bottom of the pot for in attempting to "wash the sand away" a number of the seeds will be washed away also. (When obtained the sand should be washed thoroughly, left to dry completely, and then when required sufficient of this dry sand for immediate use can be sterilised in a microwave oven.)

Mix fine seeds mix with fine dry sand (in container by gentle shaking/rolling) prior to adding the final layer of sand (to stop any seeds on or close to the surface from being disturbed and/or floating when the Gibberellic Acid is added).

An alternative to using sand, suggested by Helmut Kibellis, is to wrap the seeds in paper (possibly tissue paper, blotting paper or even the plain paper that the seeds from certain vendors come wrapped in), place in a sealable plastic bag and apply a small quantity of the desired concentration of Gibberellic Acid solution onto the paper. On completion the seeds could be washed off the wet paper directly into a pot with a hand held mist spray. [3] (However ensure that the paper does not react unfavourably with the Gibberellic Acid.)

The above method, of Gibberellic Acid treatment, was utilised at the Christmas Picnic on 10th December 1995, to treat some *Byblis liniflora* (Darwin koonamab) seeds given out to members.

For those seeds that require a long soak (e.g. *Drosophyllum lusitanicum*), with or without float retaining sand, use a known quantity of water (e.g. 20mL) at the commencement of the pre soak so that the correct quantity (e.g. 0.2 mL) of Gibberellic Acid may be added 7 days to 24 hours prior to sowing. (Just add the Gibberellic Acid, there is no need to mix, as it will quickly diffuse throughout the water.)

Seeds already sown, or those requiring an additional application of Gibberellic Acid, can have the diluted Gibberellic Acid solution applied to the surface of the soil with an eye dropper. (Pinguicula grandiflora seeds left in a pot for 6 months germinated in less than 4 weeks after 1g/L Gibberellic Acid was added.)

Spraying the diluted Gibberellic Acid solution onto the seed trays could be viable if large quantities of seed pots require treatment where the over spray and waste in the bottom of the sprayer, are insignificant. (But remember that the concentration is much higher than that required for spraying on foliage.)

As outlined in the last edition of Flytrap News (Vol 9 No.1) in the article entitled "Propagation of some Specific Species of Carnivorous Plants" I outlined tests that I intended to conduct with some *Byblis liniflora* (Darwin koonamab) seed. The result, to date, of those tests is as follows:-

100 seeds sown direct with no treatment	200 seeds soaked in Gibberellic Acid at 2g/L concentration for 24 hours	100 Seeds left in smoked filled jar for 12 days.
Seeds sown direct showed no sign of germination after 27 days.	Germination commenced within 12 days rising to 25% germination achieved after 27 days.	Did not show any sign of germination 41 days after sowing.

Given that seeds treated with Gibberellic Acid had germinated within 12 days and considering the experience (detailed in the last issue of Flytrap News Vol 9 No 1) with the parent plant (of the seeds used in these tests) being the only one of many seeds to germinate I decided to apply Gibberellic Acid to the pots containing the "ungerminated" directly sown and smoked seeds. The subsequent results were:-

Seed originally sown direct with no treatment after 1g/L Gibberellic Acid applied to pot.	Smoked seeds after 1g/L Gibberellic Acid applied to pot.
20% germination occurred within 30 days of being treated in the pot with Gibberellic Acid.	No result to date. *

* As of date of publishing the smoked seeds that were treated with Gibberellic Acid on the 12/11/95 and 25/11/95 have not shown signs of germination. The possibilities are either that the seeds have already succumb to fungal attack or the 12 days in the smoke filled jar killed them.

Gibberellic Acid is an effective method of germinating *Byblis*. Gibberellic Acid also shows promise with *Pinguicula* and *Drosophyllum lusitanicum* (Gibberellic Acid added to the water a few days prior to the end of the "4 week soaking in water" period), *Darlingtonia californica* (see separate article in this issue), *Nepenthes* and *Genlisea*.

The literature reviewed to date, reference [2], Allen's advice [1] and my personal experiences, (though somewhat limited at present,) lead me to conclude that the gibberellins and other growth regulators, offer great potential for use in the cultivation of Carnivorous Plants.

I expect that the majority of research with gibberellins (and other plant growth regulators) that took place in the 31 years since reference [2] was published will have been associated with commercial crops and thus us Carni's will have to embark upon our own experimentation program to determine what carnivorous plant species can benefit from use of a gibberellin (GA_1, or GA_2, or ..... or GA_9 or .... have more been found in 31 years?). I am trying Gibberellic Acid (GA_3) with every seed I am growing this season.

Applying Gibberellins to young seedlings to "push their growth along" before they succumb to "damp off" is another potential for benefit.

I have commenced conducting experiments on application of Gibberellic Acid to the following seedlings and plants:- *P. vulgaris, P. grandiflora, Dionaea muscipula, D. schizandra, D. adalae* (red form), *B. gigantea, B. liniflora, N. maxima x N tobaica* (leaves), *N. maxima x N alata* (into pitcher only), *P. jaumavensis, P. potosieusis, Darlingtonia californica, D.hamiltonii, Cephalotus follicularis, S. purpurea venosa* (in pitcher), *S. purpurea venosa* "Louis Burke" (on leaves only), *D. petiolaris* (to try to revive plants that are dying back), *D. villosa, D. regia, H. tatei, U. reniformis, S. aerolata* (in pitcher), *Sx purpurea* hybrid (in pitcher).

I applied it at a concentration of 1g per litre. As mentioned previously this would be far in excess of that recommended to be sprayed onto foliage and is probably wasteful. However at the date of publishing the only adverse side effects observed were two leaves burnt on *D. schizandra*, several leaves burnt red on D. hamiltonii (WOW! Perhaps I have stumbled on an ingredient of Royal Zea Jelly) and the possible loss of a *P. jaumavensis*, seedling (This seedling may have been affected by a hot day and not the strength of the Gibberellic Acid solution. However it may be the combination of hot day and removal of the plants protective layer of wax by the diluted methanol.)

However it is too soon to say if any boost to growth has occurred although *P. grandiflora* the *D. schizandra* (whose leaves were burnt), and in particular the *N. maxima x N alata* where I put Gibberellic Acid into the pitcher seems to be growing faster than normal. (But perhaps that is wishful thinking, only time will tell.) However unless you have plants that you are prepared to risk I suggest that you initially dilute the Gibberellic Acid applied to foliage to 0.1 grams per litre or less and then gradually increase the concentration over several successive applications watching for any indication of problems. (Add 200mL of water which is a appropriate quantity for filling a hand mist sprayer, for each 0.2mL of 1g/L Gibberellic Acid Solution.)

The fact that the *Sarracenia*'s that had Gibberellic Acid placed in a pitcher did not respond as did the *Nepenthes* may be explained by the fact that the *Nepenthes* pitcher used was a newly opened one while the *Sarracenia* pitcher was an old one filled with insects etc that may have contributed to the breakdown of the Gibberellic Acid before it could be absorbed. [5] (More experimentation is necessary.)

Where to get Gibberellic Acid

The distributor of Gibberellic Acid that I purchased "ProGibb" Gibberellic Acid (Manufactured by Abbot Australia) from was Ace Ohisson Pty. Ltd. Stand 7 Flemington Markets. They are open only from 4am to 12noon Monday to Friday. They are also agents for ICI's GROCELL [4]

The other agents in Sydney are Organic Fertilizers Pty. Ltd. of The Northern Road Luddenham 04 773 4291 and Stockman's Horticultural Shop of New Line Road Dural 02 651 1313. [4] In the country areas most suppliers of chemicals to farmers would stock or be able to order in Gibberellic Acid.

INSIST UPON GIBBERELLIC ACID IN LIQUID FORM!

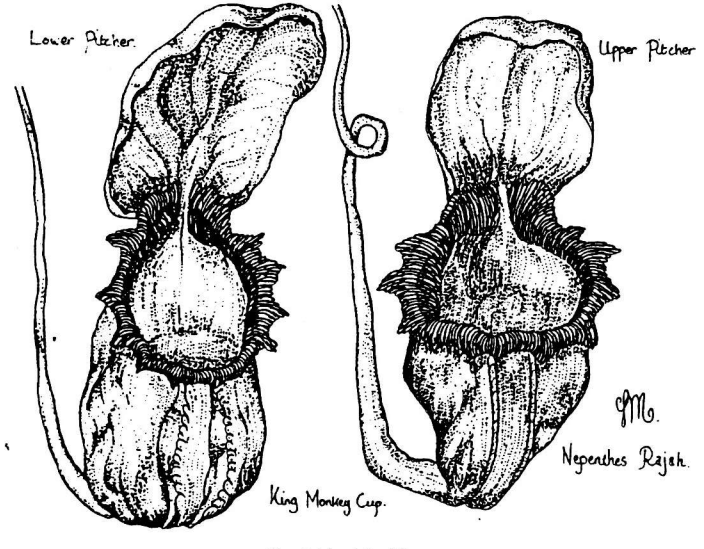
Other chemicals that may assist in Germination of seeds.

There are other products, suggested by the ICI technical Advice hotline, containing chemicals other than the gibberellin's that have potential for assisting in germination. These chemicals are cytokinen and paclobutrazol (i.e. ICI's Bonsai which is registered for use as a soil drench contains paclobutrazol). [4]

It seems that there may be a number of useful products out there that need investigation in their application to the cultivation of Carnivorous Plants. These will no doubt be the subject of articles in the future.

References

[1] Correspondence with Allen Lowrie
[2] Plant Growth and Development by A. Carl Leopold, Professor of Horticulture, Purdue University, 1964, McGraw Hill Book Company.
[3] Conversation with Helmut Kibellis on 6th December 1995.
[4] Advice from ICI Technical Service Hotline on 9th December 1995.
[5] Discussions with Richard Davion (Tilbrooke) on 11th December 1995.



N. rajah by John Mignano

Plant contests, displays or trading at CPS of NSW venues.

Denis Daly

Rules for individual plant contests conducted by the CPS of NSW

1 Plants shall only be eligible species (or hybrids) as listed in the particular contest's schedule.
2 Plants shall be free of disease and pests. Dead foliage should be removed. (see general notes 1 & 2.)
3 Each plant shall be labelled with its botanical name in clear legible writing (or printing) as black on a white label.
4 Each plant container shall be free of dirt on the outside and sit in a tray to collect any water run off.
5 The exhibitors number, allocated for the contest, shall be displayed in front of the container as black on white label in 20mm high lettering. A smaller tag with the same number shall be placed adjacent to the plant identification label in the container.
6 The owners name shall be written on the underside of the container in waterproof ink that contrasts with the container. It shall be placed at such a location so that it cannot be seen by the judges.
7 All plants entered in contests shall be set up in the allocated position within, and prior to the expiry of, the time period specified, in the schedule of the particular contest, as that period within which entries will be received.
8 Unless specified in the contest schedule plant containers shall not be scored in judging the contest.
9 The judges decision shall be final.
10 Plants shall only be removed from the contest venue at the completion of judging and presentation of awards and/or in accord with the specified removal time for the contest.
11 Any public domain, or common knowledge, plant entered in a contest shall have been owned by the exhibitor for a minimum period of six months (Annuals, owned for more than one month and any plants [annual or perennial] grown from seed by the exhibitor are exempt from the above provision.)
12 Any PBR'ed plant shall not be accepted for entry into contests unless they have been owned by the exhibitor for longer than one year, within which the plant has been repotted into fresh potting mix that is, in the opinion of the committee of the CPS of NSW, a typical, or standard, potting mix for the particular species (or hybrid) of plant. (These additional requirements for PBR'ed plants may be waved IF the exhibitor agrees that all contest points awarded by the judging committee for the unique feature/s that qualify the plant for the grant of PBR are stricken from the final score, allocated to his/her plant prior to determining the outcome of the contest OR all the entrants in that section of the contest are PBR'ed plants of the same species [or hybrid] and variety.)
13 Exhibitors entering plants in contests shall declare details of any substance, intended to enhance the plant, that has been introduced into the plant by any person, (including previous owners of the plant,) by any means whatsoever.
14 The Committee of the CPS of NSW reserves the right to reject any plant from competition if there is reason to believe that any substance, intended to enhance the plant, has been introduced into the plant by any person, including previous owners of the plant, by any means whatsoever and in consequence gives the exhibitor a grossly unfair advantage over the other competitors. The Committee's decision is final.
15 The Society shall take all reasonable care of plants exhibited in contests but shall not be liable for any damage to or for any loss of exhibits.

General Notes:-

1) The removal of dead foliage is a desirable thing in a contest. However ripening seed capsules should not be removed even if they are brown as they attest to the health and vigour of the plant.

2) Where the removal of dead foliage would be detrimental to the health or survival of the plant the judges shall take such peculiarities of the genus/species into account and shall not penalise the contestant for the presence of such dead foliage. (e.g. *Drosophyllum lusitanicum*).

3) Being a Carnivorous Plant Society the vast majority of plants entered into individual plant contests will be Carnivorous, however there is nothing that precludes the judging of minimal quantities of any species of plant provided that the committee responsible for the conduct of the contest believes that it is appropriate, and does, provide in the contest schedule an appropriate general (or specific) plant category class.

Plants exhibited collectively by the CPS of NSW.

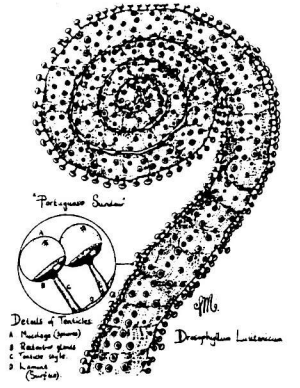
1 Plants shall only be species or hybrids listed by the display committee's schedule. (Note a number of non carnivorous plants will almost certainly be required to "set the scene" in a public display or display contest.)
2 Plants shall be free of disease and pests.
3 Each plant shall be clearly labelled with the botanical and common name in clear legible writing (or printing) as black on a dark green label.
4 Each plant container shall be capable of blending in with the flow of the display, if applicable, or shall be capable of being camouflaged within the display and/or its surroundings.
5 The display position number, if one is allocated by the display committee, shall be written in black on a white label and placed in the container. This label will be removed by the display committee as the plant is placed in position, The plant shall be entered into a manifest of plants placed in the display by the display committee.
6 The owners name shall be written on the underside of the container in waterproof ink that contrasts with the container. It shall be placed at such a location that it cannot be seen when the display has been set up.
7 Exhibitors are requested to make the plant available in conjunction with the timetable specified by the display committee that are responsible for setting up the display.
8 The display committee will be responsible for selecting the position in the display to be allocated to any plant.
9 Exhibitors are requested to remove the plant from the site of the display when, and only when, requested to do so by a member of the display committee. The exhibitor will sign the manifest for each plant as it is received from the display committee.
10 There is no restrictions upon the period of ownership for plants placed on display.
11 The Society shall take all reasonable care of displayed plants but shall not be liable for any damage to or loss of the plants placed on display.

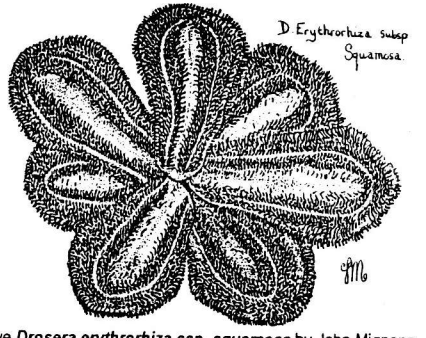
General Notes:

1) While the removal of dead foliage is a desirable thing in a individual plant contest, it is not necessarily so in a display where the habitat and habit of the various plant species are on display. Ripening seed capsules should not be removed from plants even if they are brown as they are a natural occurrence.

2) The display committee shall not request that the exhibitor perform, nor do so themselves, actions to "improve" the appearance of a plant or container when such actions would compromise the health or survival of the plant. (e.g. transplant a *Drosophyllum lusitanicum*.) The owner of the plant has the absolute veto in such instances.

3) Being a Carnivorous Plant Society the majority of plants in the display will of course be Carnivorous, however in Carnivorous Plant exhibitions non carnivorous plant species will be needed to "set the scene". (e.g. we need sphagnum moss, rushes, ferns, grasses, etc.,). (Based on lecture on "winning plant displays" given by Allan Seal, that I attended, at the Royal Botanic Gardens in late 1990.)





Above ***Drosera erythrorhiza ssp. squamosa*** by John Mignano.
Left Details of ***Drosophyllum lusitancium*** by John Mignano.

Plants traded at venues of the CPS of NSW.

1 Plants must be free of disease and pests.
2 Each plant offered for public sale shall be labelled with its botanical name in clear legible writing (or printing) on a label that can be placed between the inner edge of the container and the "soil" within. (The display of the common name of the plant on the label is optional.)
3 The price of each plant offered for public sale shall be clearly indicated with appropriate signage in clear legible writing (or printing) as black on a white. All vendors shall declare any unstruck cuttings, as UNSTRUCK CUTTINGS.
4 If a plant is to remain on display after it is sold then the vendor shall provide a label on which may be written SOLD and the name of the purchaser.
5 If the period, since the date on which the plant was last repotted, transplanted, clump split or cutting taken, is less than two months, or if the plant has not resumed active growth since that time, that date shall be displayed on signage or declared to prospective purchasers. (The committee of the CPS of NSW may, from time to time, set other periods applicable to specific species).
6 The growing conditions that the plant was subjected to over the last fortnight shall be declared to prospective purchasers and provided in writing to any purchaser by the vendor, if requested, so that the new owner may more readily adapt the plant to his environment.
7 The Society shall not be liable for any loss of or damage to any plants or containers submitted for sale.
8 The vendor of the plant shall be responsible for preventing and making good any damage (e.g. water running from pot) caused to the venue by the presence of the plant until removed from the site by the vendor or new owner.
9 The society reserves the right to inspect any plant, including removing the suspect plant from its container, and to reject from sale any plant the committee considers is not of merchandisable quality. However it must be understood that the Society shall not endorse, guarantee or warrant, the quality of any plants offered for sale. Trading terms (excluding the Society's commission, if applicable) are a private matter between vendor and purchaser.

The Hot Bleach Technique

Richard Davion Tilbrooke

The two most difficult stages in Plant tissue Culture are the disinfestation of plant material prior to culture and the weaning of cultures ready for planting out.

The disinfestation process, or attempted removal of all external microbes, can begin many weeks before any material is actually removed from the plant for culture, with a period of growth in dry air. This growth of the plant in dry air, for about four weeks, substantially reduces the load of microbes on the exposed surfaces of the plant.

Following this procedure material is removed and is either washed for a period of hours to remove even more microbes (they are literally washed off the plant and down the sink!) or directly sterilised using a bleach solution. Many waxy plants are given a predip, prior to bleaching, in methylated spirits in an attempt to disrupt these often water-repellent layers and exudates. The bleach solution itself is usually some form of Sodium Hypochlorite solution and often entails a 1 in 10 to 1 in 15 dilution of "White King" bleach although it is suggested that CP's would probably be better sterilised using "Pool-Chlorine" (Calcium Hypochlorite) and even better using Potassium Hypochlorite, even though it is harder to obtain and more expensive. The length of exposure to the bleach varies from plant to plant and has to be ascertained by trial and error, though 15 to 20 minutes often suffices with the above mentioned dilutions. Often in the case of hairy plants the addition of a surfactant, the use of reduced pressure and the presence of agitation (magnetic stirrer) can reduce the actual contact time with the sterilant necessary to kill microbes without killing the plant.

Following potential sterilisation the cutting (explant) is flushed in sterile water to remove excess bleach that would, if not removed, eventually kill the cutting (this may be done a number of times depending on the sensitivity of the cutting to the bleach - it also dilutes away any unkilled microbes or spores left alive following a partially successful bleaching procedure). The cutting is then either directly placed onto a particular nutrient agar based medium or further reduced in size and possibly rebleached and flushed with sterile water before placement onto the agar medium. Antibiotics can be added to the bleach solution to help inactivate the microbes though at high concentrations of bleach many of the organic antibiotics can themselves be inactivated and so it is preferred that they be added to the nutrient agar based medium; although this is more difficult to accomplish since many of them are inactivated by heat and have to be added via a filtersteralisation process after autoclaving. This method is preferred because the antibiotics have an extended time-span in which to accomplish their task.

The vials containing the cutting(s) and nutrient are then incubated at temperatures around 25-32ºCelsius depending on the species and available knowledge. At these temperatures microbes grow so fast that contamination can be picked up in 3-5 days. A lot of cuttings especially those previously in close proximity with the soil (i.e. roots in particular) contain internal contaminants that the sterilant cannot normally reach. In these cases the plants are grown hydroponically to reduce soil-borne contamination and the cells are mascerated, the individual cells being released into suspension via enzymes that specifically attack the pectin-containing middle-lamina surrounding and holding together the cells. This process also releases the internal microbes which can be removed simply by dilution of the cell suspension, filtration (microbes are often many times smaller than the plant cell in question) or the addition of antibiotics.

Viruses, which are internal obligate parasites, are removed from a contaminated plant by removing a meristem since the virus usually infects cells behind the meristematic region for if it did invade and kill the meristematic initial cells it would loose its source of cells to infect and would thus die out itself.

The Hot-Bleach Technique is a simple procedure I pioneered recently at CM Laboratories which appears to dramatically increase the success rate associated with the initial induction of explants into culture. Hot water from a jug or in our case a hot-water tap (76ºC) is placed into a suitable container with some surfactant. Bleach is then added to make an appropriate dilution, in our case 1 in 15 seems to be ideal, and a sterile thermometer is then added to the hot-bleach and the temperature monitored until it falls to a desired temperature after which cuttings intended for sterilisation are added and left in the bleach to sterilise.

So far the ideal temperature of addition appears to be 50ºC for 10-15 minutes though some plant cuttings have withstood initiation at 76ºC. * (see footnote 1)

At present I have used this method to initiate a large number of stem sections of Stuart Desert Pea - previous attempts yielded ratios as low as 4 in 50; presumably due to the waxiness and hairiness of these stems sections since a thin layer of wax can be seen floating on the surface of the cooled bleach solution if a large number of sections are attempted at any one time.

I am now using the method to initiate ***Drosera whittakerii*** tubers into culture in the hope of perfecting a technique that can be widened to include rarer species of Tuberous ***Drosera*** as well as other subterranean organs such as root sections from tuberous rooted species such as ***Drosera binata***, ***D. hamiltonii*** and ***D. regia***.

Considering that many of the African and Australian plant groups use pubescence and various exudates to protect themselves from the harsh conditions exhibited in both countries it seems likely that this simple procedure will see major benefits in the plant tissue culture industries of both countries. Perhaps the method could be refined by others along the line of PCR machines that cycle between and can maintain preset temperature regimes.

Richard Davion (Tilbrooke)
Sunday 10th December 1995.

Editorial Note:

Manuscript received Tuesday 12th December 1995 via Express Post MS400344.

Footnotes:- (Added by editor after telephone conversation with the author on Sunday 17/12/95.)

[1] Further research has demonstrated that the temperature of the bleach is more important than the period of immersion in the bleach.

[2] This method has recently been used successfully to place tubers of tuberous *Drosera* (*Drosera whittakerii*) into culture. While multiplication has yet to be achieved the placement of tubers of tuberous *Drosera* into a sterile culture would be helpful in the minimisation of quarantine procedures to ensure that pests and diseases are prevented from entering any country taking receipt of tuberous *Drosera*.