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Rupture Red

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

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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 - 10.00 pm
VENUE: Woodstock Community Centre, Church St, Burwood.
Venue for Social and Christmas Swap Meet to be advised one month prior to event.

Meeting Dates for 1997				
14th February	*Nepenthes* by Ken Harper		8th August	
14th March			12th September	
11th April			10th October	
13th June AGM	Tuberous *Drosera* by Ken Harper		14th November	
12th July Social	Venue and time to be advised		15rd December	Christmas ***Swap Meet.***

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Single Membership within Australia	$A17
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Chat Corner — Jessica Biddlecombe

Well Cp'ers the October meeting was a success. Justin brought his brother Adam, and it was nice to see Josey bring Sarah. We also had two visitors Kirk and Greg (possible new members). Young Steve Amoroso, with his father, came along to the meeting with some plants that needed instant attention. Everyone chipped in with opinions on what to do. (Editors note In fairness to Steve's green thumb reputation it must be pointed out that he is in year 11 and his studies are, rightly, being given priority.)

Wessley Fairhall came back from holidays to join us again. Everyone had a good time although we did become noisy with everyone trying to talk over everyone else. Kirk and Greg would like to know if everyone has a variegated *Nepenthes alata*. If you do know any make it two as I would like one as well. (Editors note. This is not a joke. I seen the photograph that Greg had of one he had to leave behind in the USA and the leaves are variegated green and white.)

On Wednesday the 30th October 1996 Denis Daly, Peter Biddlecombe and I drove down to Bundanoon. We passed the turn off and ended up south of Goulburn and had to back track (Denis was navigating). Nathan fed and watered us like the lost tribe and then took us for a little walk in the Morton National Park. I had been flat on my back for a few days with the flu and this easy walk turned out to be a "lost horizon track". As we scrambled for hand holds to help us up the rocks, Denis kept taking photos (much to the amusement of those who saw them at the November meeting). We saw *Drosera binata*, *Sphagnum*, *Drosera spathulata*, and two or three *Utricularia* species. Sliding back down the rocks I felt like an explorer (was it Wesley Fairhall who likened Peter to a Yeti in the bush!!). Denis kept taking photos (I will wrap that camera around his neck). On arriving back at Nathan's I met David. Both were Gentlemen and did not laugh at me when I locked my keys in the car and had to call the NRMA. Thanks guys.

On Wednesday 2nd October 1996, Denis, Peter and I went up to Richard Sullivan's (no detours). Richard's Sarracenia flowers were truly a rich deep colour. Beautiful to see. Then down to Lithgow to Phil Reyter's where I was lucky to get a few Drosera's I didn't have. It is good to meet up with other members who can't make it down to the meetings.

At the November meeting we met Phil Latimer (it was his first meeting since joining three years previously). It is always good to see a new face. I find the meetings are great fun and everyone has something to contribute. More members are turning up all the time.

I heard a few funny things from members of the public while I was on a stand at a festival recently:-

- The lid closes on sarra's to trap the insects inside.
- The plant burps after they digest the insect.
- A friend bought a "trifford" and it's real.
- A woman has a V.F.T. in her garden that is 3 ft (1 meter) across. (She owns a nursery)

The sad thing is that these people actually believed them.

What do others think if we have a "Buy, Trade, Swap and Sell" page in the FlyTrap News? It may be a way of letting go of some of the excess plants we sometimes acquire or you may be able to get something you have been after for sometime. Let us know what you think.

I would still like some other input into chat corner and I hope to see you all next meeting.

Your friendly CP'er
Jessica Biddlecombe

Letter to the Editor Jessica Biddlecombe

As much as I respect Denis Daly, I wish to make it clear that I do not care whether the grain in the sod of earth on the seventh strata is not round enough, if the sex life of a monotone ray of sunbeam is more active than mine. What I am interested in is what the best potting mix is or what fertiliser to use. In other words I want the bottom line, the end results. Having only average intelligence I do not want my brain turned to bored mush by a diatribe of information that would stump a university professor.

Denis is very knowledgable and a great help to all but must learn to communicate on a level everyone can understand. I envy Denis his intellect but being inundated continuously becomes tedious.

The information in the FLY Trap News are most informative and necessary to some people. Please, Please, Please can someone help Denis format the data so as the general information can be read while the technical detail can still be inserted for those that wish to refer to this can do so easily?

Denis can only be respected for the work that he does so a few ideas to simplify this information for the general reader while not loosing the details would be greatly appreciated by myself and I am sure by Denis as well.

Now before you feed me to one of my Sarra's please let me tell you that I have spoken about this to Denis many times and have ribbed him mercilessly. We have still remained friends which is more than I can say for myself and Peter as he can understand most of the technical data (as I am a Dumb Dumb!!). Denis will undoubtedly reply to this.

An example of what I am trying to say is in the last FlyTrap News headed "More Potting Mix Component Details" and Plant Materials Toxicity and Toxins", the use of the chemical symbols (I never took science) meant nothing to me. Please could you write calcium not Ca, or if it has a common name please use that (Even Peter cannot understand everything.)

Editors Reply to Jessica Denis Daly

Jessica

I always cringe when I get a letter that starts with the phrase "As much as I respect you". (Don't get the wrong idea Peter). I can assure you that even though you may not care about the muck that your plants are in, your plants do. As to what makes the best potting mix I was under the impression that Peter had been wisping the magic word in your ear Sphagnum. As to what is the best fertiliser the answer is Carni Thrive. Peter can supply you with gallons of it.

Seriously though your point is taken Jessica! Particularly with regard to the shorthand use of the chemical symbols. I have been aware for some time that a number of the members find the technical details in some of the recent articles difficult to comprehend. (However while I will give the full name in future I can not use "common names" for the chemicals as that could lead to the use of the wrong chemical if names are confused.)

In light of your praise I feel that I should clarify the point that, while I have been fortunate to have enjoyed the benefits of a scientific tertiary education, it has not been in either botany or chemistry. Thus while I can "find my way through" botany and chemistry text's in my reading/research into various matters it is not "easy going", nor do I profess to be an expert in either chemistry or botany.

I included the scientific detail in the articles for the following reasons.

To increase the members knowledge so that their plants would thrive. (Plant physiology is not a simple topic as plants are quite marvellous chemical factories.)

A number of authors of "popular press" books on carnivorous plants, each plagiarising their predecessors, perpetuated many myths without checking their scientific validity including the one that states that "no fertiliser should be used on carnivorous plants". They were accorded expert status by gullible enthusiasts and their advice was blindly followed for years, and still is by some persons we all know, with less than satisfactory cultivation results.

Upon trying to discover the scientific basis of such claims the scientific evidence revealed that the authors of these Carnivorous Plant books have, by their written advice, not shown that they possess an adequate understanding of plant physiology. As a consequence I now consider all cultivation advice in these "popular press" books suspect until they have been shown to be consistent with observed and scientific facts.

The penultimate example of absolute rubbish surfaced recently on the Internet. Some carnivorous plant enthusiasts in the United States of America recommend that you catch (or buy at a pet shop) spiders, crickets and other assorted insects, stun them in a refrigerator, then feed them to carnivorous plants. They even raved on about keeping the insects in a freezer just long enough to stun but not kill them and ways of taking precautions to avoid being bitten by an irate spider. Wild plants do not have "room service", they catch their own. It would be laughable if they weren't serious.

This has led to my second reason for providing scientific information even though some members are having difficulty in fully understanding it.

Presenting the scientific details in the article will prevent "self styled experts" from using their perceived reputation, (justified or not), to falsely, incompetently or maliciously, claim that the information presented in FlyTrap News is incorrect. By presenting the scientific basis of the information presented any critiques will also have to be based upon scientific facts.

If they find a scientific error then well and good for the mistake is corrected and we all, including myself, learn form it. Knowledge is power. Bullshit, destroys knowledge.

I am available to explain to members any points that they feel confused about. I would welcome such correspondence so that I might be aware of those points that need explaining in more detail or in simpler terms so that all members will be able to understand the information presented and benefit by improving their cultivation techniques.

I used to have one of those ..... Russel Dixon

Venus Fly Traps (*Dionaea muscipula*) are easy plants to grow provided a few simple rules are followed. VFT''s enjoy bright light, preferably full sun for half the day. This can be reduced in summer as an excess causes the plant to die back; leaf size and production is reduced, typified by growth with small traps and broad petioles (leaf stems). Plants may become dormant during the cooler months dying back to a "bulb" composed of leaf bases. In both cases remove any dead or blackened growth, and reduce watering during winter dormancy.

Don't feed your plant insects unless it is actually growing; even so it is probably better to let the plant feed itself. Be careful with fertilisers, I don't feed my plants, but should you desire to, use at about 1/8 strength or less during active growth. Triggering traps weakens the plants causing loss of vigour and possible death.

The greatest cause of death in VFT's is over watering. Keep the mix damp, not wet. In summer my plants, which sit in water-filled trays, get flooded each morning. By the end of the day they are just damp. Winter sees my plants with enough moisture so dry areas are observed on the top of the pot. The water tray is filled when necessary, left for an hour, then drained completely.

My plants are always watered from a tray (i.e. below) as I find this negates the effect of chlorine in tap water. VFT's are temperate plants, not tropical. In their native habitat temperatures drop to -20°C in winter, hence the dormant state. Lastly potting medium consists of:- German Peat 2 parts, Coarse sand (2 - 4 ∅ mm) 1 part, Perlite (sieved) 1 part.

That's my experience with VFT's; hopefully this information will help you not to repeat the title!

Postscript:- Many VFT's die soon after purchase, often the incorrect cultural techniques applied by general nurseries. Choose a healthy plant from fresh stock, or buy from an enthusiast or C.P. nursery.

Reprinted (with alterations and additions by the author) :- from the July 1996 Newsletter of the Species Orchid and Carnivorous Plant Society of the Illawarra with the permission of the author (and past President of the Species Orchid and Carnivorous Plant Society of the Illawarra), Mr Russel Dixon.

Observation on "Crumbs" and N:P:K in "Wild" Soil Denis Daly

Have you ever wondered why the fine particles in "top soil" have not, over eons, washed into the spaces between the larger particles and set the soil to a consistency varying between jelly and cement as is often the case with "clay" sub soil?

An examination of the soil from a "wild site" that has not been disturbed, or that from a previously cultivated site that has not been disturbed for many years will reveal a porous structure that is easily broken apart in your hand. Closer examination will reveal that the soil comprises of particles grouped together into aggregates or crumbs[4] which are held together leaving spaces between for aeration and drainage. The physical structure tends to become like that of coarse sand.

A note of caution. When a soil is disturbed the physical structure, which may have taken several or even hundreds of years to form, is damaged. If the disturbance is severe enough, the physical soil structure will be destroyed. Continued walking upon the soil is sufficient to destroy its physical structure. (Hence the construction of walk ways by National Parks over sites visited by tourists to prevent soil damage.)

Crumbs range in shape and size from the clumping together of a few clay particles to massive clumps (or clods). A good soil structure has a range of crumbs from 0.2 to 3.0 mm [4]. The scientific term for these crumbs is **peds** and a soil with a good crumb formation is said to be a highly **pedal** one. Soils that when moist have no crumbs are said to be **apedal**.[4]

Crumb formation is enhanced by increasing the organic content, iron and aluminium (don't go mad with iron or aluminium additions or plant toxicity will result), and in sandy soils, by the addition of clay (yes! clay! but a little not a lot), and calcium.[4]

Crumb formation is retarded by excessive sodium (salt) and to a lesser extent magnesium [4] (but remember plants need some magnesium in chlorophyll to photosynthesise).

Organic matter and microbes are essential to crumb formation. Soil microbes secrete slime as they feed on organic matter. The slimes bind together the mineral particles of the soil. Bacteria in the gut of worms also leave slime binding "worm casts" together. The sticky strands (hyphae) used by fungi to feed also bind soil particles together. Anything that encourages microbes increases crumb formation[4]. When we use excessive amounts of chemicals we kill the "friendly" as well as the "unfriendly" microbes and fungi.

Organic matter low in nitrogen (e.g. straw and sawdust) will take a long time to break down and crumb formation will be delayed unless they are supplemented by nutrients. (e.g. green manure crop, partially matured compost, etc.,) [4]. The addition of nitrogen in mineral form (e.g. sulphate of ammonia, or a complete fertiliser) will also help decomposition and crumb formation.

Roots pushing through the soil, and then enlarging, push the particles close together to form crumbs. Cycling wet and dry causes soils to expand and contract pushing crumbs together. [4]

Plant roots are continually dying and being discarded by plants providing organic matter to decompose into humus deep within the soil or subsoil leaving passages through which water, air, microbes and nutrients may gain access to areas deep within the soil.

Plant roots of the tougher plant species (the ones we would consider as weeds) will encroach upon a barren patch of soil and commence to rejuvenate the soil by providing organic humus from fallen leaves, discarded roots and deceased individuals of the species, as well as building the physical soil structure by sending their roots to mine for nutrients in the sterile devastated area.

Roots can penetrate and commence to "open up" massed clay sub soils or even into a volcanically sterilised region, (e.g Mt. St. Helen's), and encourage the microbes that dwell in the region around roots (rhizosphere) to follow and populate the area.

While organic matter forms crumbs they can be easily broken apart. Some clay is necessary to increase the binding together of the crumbs. But high clay content binds too much into clods without organic matter to limit the crumb size to below that of a clod. [4]

Anything that encourages plant growth assists crumb formation.[4]

Good structured soil will have a moderate amount of organic matter (around 3%), some clay, and calcium. It will have been left undisturbed (no cultivation, no traffic .. feet or wheels) for several years. This will invariably be pasture, bushland or forest.

A large amount of added organic matter will be needed to overcome the structure damage caused by continual cultivation and ensure that a good soil structure is maintained in your garden.

Creating and maintaining a good structure in a pot involves the use of "non soil" materials and sand to try to approximate the porous nature and adhesion of the particles of "wild soil". When the organic components of the potting mix decompose the physical structure in the pot will break down and the plant roots will suffocate.

During a recent visit to Richard Sullivan at Bathurst he took me on a field visit to an area where *Drosera peltata* and *Drosera peltata ssp auriculata* grew together. This area is an excellent example of virgin bush with a highly pedal soil with well developed "soil crumbs [4]". On Sunday 3rd November 1996 Richard and myself together with Peter and Jessica Biddlecombe visited the site again.

Highly Pedal clay soil in virgin bush of the Bathurst Region. Photograph by Denis Daly 3/11/1996

The photograph on the preceding page is a close up of the structure of soil photographed on the side of a water course that traverses the area. This soil is certainly over 80%, possibly over 90%, clay and yet over the years it has been transformed into a fertile, porous structure. If you look carefully at the photograph you will see the fine crumb structure along with signs of mechanical damage that has destroyed the structure and converted the immediate region of the damage to "gluggy clay".

The area was covered with diverse native flora, including eucalypt, banksia, *Stylidium*, native orchids, etc., that had provided the roots and humus that developed the soil over several decades.

In mid September 1996 I had received, amongst other items, in a package from Richard Davion (Tilbrooke) a Sudbury Soil Test Kit [3]. (The Sudbury Soil Test kit is manufactured by Sudbury Lawn and Garden Products of Phoenix, Arizona in the United States of America.)

I had previously observed these kits on sale but had never bothered to purchase one. I must say that I am not impressed by the tiny size of bottles containing the testing chemicals and the fact that the results are quoted as the N:P:K ratio (undoubtedly in USA ratio) of the recommended fertiliser to use. There is no indication of the target soil N:P:K ratio that the testing kit uses as a reference or target. Also lacking from the instruction book was the failure to clearly point out how quickly phosphorous could reach toxic levels if applied with great abandon.

In desperation to find something to "try it on" I tested a Bathurst "soil crumb" sample. The results recommended the addition of a fertiliser of USA N:P:K ratio 2%:4%:8% which translated to the Australian ratio [2] is 2%:1.75%:6.6%.

The phosphorous recommendation is somewhat suspicious as, based on USA conditions, it is unlikely to take into account the Australian condition of minimal phosphorous with native plants evolving to be efficient "miners" of phosphorous [1].

Thus the Sudbury Soil Test Kit is advising that a very weak fertiliser is required to bring the soil N and K up to the unknown target set by Sudbury.

The area in question is rich in humus and undoubtedly has sufficient phosphorous and nitrogen. The higher requirement for potassium can be interpreted as possibly in need of a bush fire soon to replenish the potassium in the soil. It will be interesting to take a soil sample after a bushfire to reassess the potassium.

Who said carnivorous plants grow in nutrient deficient soils?

References:-
[1] DALY Denis, Plant Minerals Toxicity and Toxins, p14, **FlyTrap News, Vol 10 No 1**, The Carnivorous Plant Society of NSW. July, August, September, 1996.
[2] DALY Denis, Translating USA N:P:K to Australian N:P:K, p25, **FlyTrap News, Vol 9 No 1**, The Carnivorous Plant Society of NSW. April, May, June, 1996.
[3] Sudbury Soil Test Kit Instruction, 9A1, Sudbury Lawn and Garden Products, Phoenix, Arizona 85013, USA.
[4] HANDRECK Kevin A. & BLACK Neil D. **Growing Media for Ornamental Plants & Turf**, 1994 University of NSW Press. ISBN 0-86840-333-4.

Why Plants are basically Green

Denis Daly

subtitle:- Better Dead than Red

Simply put, plants are green because chlorophyll, the magic chemical behind photosynthesis, is green. (For those of you who would like to delve into the scientific details read on. Jessica jump to the last paragraph.)

A green plant is green because chlorophylls do not absorb any significant portion of those wavelengths of light that human eyes perceive as green but rather reflect or transmit the vast majority of green light or green yellow light that falls upon it. (i.e. the light passing through a leaf is green.) Over 90% of the blue and almost 90% of red and orange light is absorbed by chloroplast pigments of the plant. [1, p 212]

Visible light is a tiny portion of the energy that is referred to as "electromagnetic radiation". Other electromagnetic radiations include X rays, radio waves, television transmissions & radar. In order to explain why light does the things that it has been observed to do science has attributed both a wave nature and a particle nature to light.

The wave nature of light is used to quantify the frequency or colour of light which is often expressed in the wavelength. (Light is a combined movement of electrical and magnetic energy fields. These magnetic and electric energy fields alternate in strength and direction, returning to a particular strength and direction once each cycle. Light does not require a physical substance such as water or air to transfer mechanical energy and travel from one point to another, as is the case for ripples in a pond or with sound travelling through the air. Wavelength is the distance the light travels during the time its alternating energy fields take to complete one alternating cycle.)

Each "particle of light" is postulated to have a exact value (quantum) of energy which is dependent upon its specific wavelength (i.e. specific colour). This theoretical light particle is referred to as a photon. (The quantum theory is highly mathematical and difficult to get an "instinctive feel" for. It is used in science in order to apply mathematical analysis to experimental observations of the behaviour of various phenomena, including light.)

The human eye, (with its three colour receptors tuned to red, blue and green light,) and brain perceive light that has a range of wavelengths from 380 to 500 nano meters to be blue and violet. (A nano meter is one 1000 millionth, or billionth, part of a meter. The peaks in the ripples of blue and violet light are 0.00038 mm to 0.0005 mm apart.) Red and orange light has a wavelength of between 600 and 700 nano meters. (In very dim light human vision uses light receptors that are more sensitive than the normal colour receptors but can only differentiate brightness not colour. Thus in very dim light we see in "black and white".)

With light particles (photons) the energy is proportional to the frequency or colour of the light or inversely proportional to the wavelength. The intensity (brightness) of a light source (e.g. sunlight, grolux fluorescent tube, incandescent lamp, mercury or sodium vapour lamps, etc.,) is proportional to the number of photons emitted by that source in a given time and is a measure of the power of the light source. (Power is proportional to energy multiplied by time. Kilowatt hours that are recorded on your electricity meter are a measure of how much power you use for how long.)

Violet and blue light photons (short wavelength) are more energetic than the red and orange photons (longer wavelength).

It is not possible to simply illuminate plants with the more energetic blue light to get them to grow big. The electron energy levels and photon energy must be precisely matched or the electrons will not be energised at all or will be energised to a higher or lower energy state.

When light is absorbed one "absorbing" molecule can absorb only one photon exciting one of its electrons at a time and this is the energy that is available for photosynthesis.

After excitation with blue photon the energy of the chlorophyll electron falls rapidly (in a billionth of a second or nano second), by releasing heat (heats up your plant), to a lower energy level. However a red photon can excite the electron to this lower energy level without excess energy that must be expended heating the plant. [1, p 212] From this lower energy level the electron can release energy and return to its normal energy state by either causing additional heating of the plant, by causing chlorophyll fluorescence (plant glows), or photosynthesis (plant grows).[1, p 212]

Plants can use the energy in photosynthesis only if that energy in the excited electrons in the various pigments can be transferred to a chlorophyll "reaction centre".[1, p 212]

As well as green chlorophyll, the xanthophylls and most of the carotenoids (including β - carotene) pigments can transfer excited electron energy to chlorophyll reaction sites [1, p 212] in order that the plant can extract energy from light to photosynthesise. They act as "antennae pigments" absorbing blue and violet light and transferring the electron excitation energy to the reaction centres in the chlorophyll. [1, p 215]

As these pigments (xanthophylls and carotenoids) absorb blue and violet light and reflect and transmit green, yellow, orange and red light they thus appear yellow or orange to the human eye. They also protect the chlorophylls against oxidative destruction by oxygen when the plant is in very bright light. [1, p 212]

Chlorophyll fluorescence caused by the rapid decay of the excited electrons produces a deep red light [1, p 212]. This has been demonstrated under laboratory conditions using concentrated solutions of either chlorophyll ***a*** or chlorophyll ***b*** or a mixture of chloroplast pigments illuminated by blue or especially ultraviolet radiation. [1, p 212]

In a leaf chlorophyll fluorescence is weak because the excitation energy is used in photosynthesis.[1, p 212] (That is what happens in a normal healthy plant.)

I have noticed the commencement of what I fear will be a protracted discussion on how to keep your red *Dionaea* plants ALL red in other CP forums and so before concluding this article I offer the following observations that hopefully will lead to a scientific analysis of the problem, if indeed it is a problem. (The last thing we need are more myths and ridiculous cultivation techniques, produced in profusion.)

First let us consider what advantage is gained by the ALL red plant, in the light of what is really important to the plant, namely, the survival of itself and of its progeny.

First let's brainstorm the possibility that being ALL red increases the plant's ability to lure insects into the trap.

What is really important to an insect is the survival of itself and of its progeny.

First let us consider insects that either eat plants or derive nourishment from exudates produced by the plant (i.e. nectar and pollen). The plant must be either a source of food, a place to meet the opposite sex or a place that provides food and shelter that is suitable to deposit its young or eggs in order to lure the insect to it. Evolutionary selection has ruled out all other possibilities.

Because plants are so variable in form insects rarely use vision in locating a particular plant although vision is probably used to ascertain the direction to travel to locate a likely area that contains the sought after plant. [2, p 26]. (i.e. the insects should travel toward a group of plants not away from them.) Smell may also indicate to the insect the location of a particular plant [2, p 26]

Once the insect is on the plant then smell and contact chemoreception will be the dominating lure to the insect. [2, p 26]. Then the insect will use the sensilla on its mouth pieces to probe the plant in order to determine if the plant will provide a good source of food for itself or its eggs. [2, p 26]

Carnivorous insects catch prey by either sitting and waiting for it to blunder past them or by chasing it. [2, p 28] While vision is of primary importance to predators, any predator species that waited until plants blundered past or chased plants would have become extinct long ago.

The suggestion that predator insects will see red as red meat is inconsistent with the fact that very few insects are red and thus the possibly that evolution has pre-programmed a predator insect with the instruction "attack red for food" is remote to say the least.

Flies will land on a piece of red meat to feed and lay eggs but flies do not seek out red objects simply because they are red. An object does not have to be red to attract flies.

"Fly strike" on sheep is initiated by the fly's being attracted to the damp region created by urine soaked wool. Obviously smell is the major cause of attraction of the flies.

Flies are attracted to your food and that food does not have to be red. If flies were attracted to red because it is red then all fly strips for hanging outdoors near a bar-b-que should be red, but they are not. Flies do not suicide in the red fire at your bar-b-que.

Bush flies will bite you whether you are sunburnt or not.

Most flower pollinating insects prefer blue or yellow flowers or ones that reflect ultraviolet light, while birds pollinate most red flowers, such as in the tropics [2, p 662].

There is no practical observation nor indication in the reference book cited that red is a greater attracter of insects than any other colour. Indeed there are indications that the reverse might apply. Thus an ALL red carnivorous plant cannot be said to have an advantage in luring prey to itself.

Consider the millions of years of carnivorous plant evolution and yet not in even one species of carnivorous plant do we find that the typical form is ALL red. This indicates that being ALL red is not favoured by evolution and indeed would seem to be a fatal disadvantage. Some obvious scientific reasons for this are elaborated in the following section as we consider the probable physiological reasons why a plant could be ALL red and review any advantages or disadvantages created.

If your plant is very red all over it will have a reduced chlorophyll content in those parts that a typical plant of its genus and species uses to conduct photosynthesis, such as leaves. Thus its capacity to photosynthesise will be minimal or in the extreme case non existent. (Note that hormones and sugar eliminate the need for plants in tissue culture to photosynthesise.)

The redder it is the less will be its chlorophyll content and thus the less will be the capacity for photosynthesis. If its capacity for photosynthesis is too low it will not be able to produce sufficient of the complex organic chemicals it needs to live and set seed. It would become extinct. (I recall that there were a number of reports in other literature relating the difficulty of getting all red *Dionaea muscipula's* to set viable seed.)

Is the plant red because it is producing anthocyanins and other flavanoids or is it red because of chlorophyll fluorescence or both? Is it a beet root [1, p 325] or has it discovered the pleasures of betalain addiction?

Usually if plants produce anthocyanins and other flavanoids they do so in organs (i.e plant parts) that photosynthesise little or not at all, such as flower petals and autumn leaves. [1, p 460] Flavanoids, including anthocyanin, absorb ultra violet radiation and it is now believed that flavanoid production is a way that plants protect themselves from ultra violet radiation.[1, p 325; p 461] It is therefore likely that the plant is going completely red because it is "sunburnt".

You could eliminate (or confirm) chlorophyll fluorescence by buying yourself a "black light" fluorescent light, identical to the type they use in disco's, and examine your plant in the dark (i.e. at night) to determine if it will fluoresce dark red when illuminated with near ultraviolet light. If it is red because of the formation of flavanoids or some other reason such as chlorophyll destruction then the ultra violet light will be absorbed and the plant will not fluoresce and be hard, if not impossible, to see in the dark.

Maybe the chlorophyll is being destroyed under high light levels [1, p 325] and only the reddish pigments remain. The plant, or plant part, could be going or gone dormant (autumn leaf syndrome of *Sarracenia's*), being discarded by the plant (possibly because of damage) or it may be deficient in nitrogen, phosphorous or sulphur [1, p 325], or is genetically challenged.

All of the preceding possibilities, that I have been able to discover to date in the scientific literature, point to either unfavourable environment (light and nutrients) or a genetically inferior individual that cannot even "feed itself" properly. (For those who believe in plant euthanasia there is truth in the old cold war propaganda adage "better dead than red" after all.)

Of course if the plant is not really red but more yellow or orange it could have a lot of xanthophyll and carotenoid pigments. These pigments will act as photon antennas and then transfer the excited electron energy to chlorophyll reaction sites. [1, p 212] Such a plant would be able to photosynthesise if it had sufficient chlorophyll reaction sites. One would expect to see some trace of the chlorophyll green though. (Alternatively a yellow or orange plant may be simply one that is deficient in mineral nutrients.)

However in the end the vigour of the plant (after the effects of colchicine or other growth boosters applied, or "food reserves" built up "in vitro" have been allowed to wear off) would, in itself, indicate if the condition was compatible with the plants "quality of life" or whether the plant is "Better Dead than Red". Evolution did not favour the plant that is ALL red all the time as it does not photosynthesise.

For the Carni who is **really into red** there are other "sure fire" mechanical methods of making plants red other than using spray paint, such as, at least for *Heliamphoria's*, partially rupturing all the pitcher walls, in the same manner, but a little lower down, than that of the pitcher shown in the cover photograph of this issue and wait while the plant recovers the mineral nutrients leaving the pitcher 'Ruptured Red'. However this method cannot be recommended to those who would like a vigorous plant.

So while some chase red pots at the end of rainbows, sit back and enjoy your healthy green plants as they grow big and thrive and look forward to the autumn when, as your plants in preparing for dormancy, put on a spectacular display of autumn colours, as they relocate the valuable nutrients in their leaves to their various storage organs.

References

[1] SALISBURY Frank B. & ROSS Cleon W., **Plant Physiology**, Wadsworth Publishing Company, Fourth Edition, 1992, ISBN 0-534-15162-0.
[2] CHAPMAN R.F., **The Insects Structure and Function**, Hodder and Stoughton Educational, Third Edition, 1982, ISBN 0-340 26453 5

Closure of Dingley Home and Garden

Denis Daly

Colin Clayton has decided to close his retail nursery. However Colin will still be offering Mail Order Carnivorous Plants from premises at 257 Perry Road, Keysborough, Victoria 3173, Australia.

Those of you who are on Colin's mailing list will undoubtedly receive details of the new phone and facsimile numbers in due course. If for some reason you do not, or you wish to ask for a current price list, then from the new year onwards you should write to the address given in the paragraph above.

Cultivation of Carnivorous Plants at Bathurst (Part 1)

Richard Sullivan

The following notes are how I grow some of my plants at Bathurst. I am not proposing that this is the only way to grow them but that these methods work for me. I can grow plants below the temperatures suggested in many books. I hope that these notes will be of some help to other growers of Carnivorous Plants.

Drosera adelae
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by division and root cuttings.
Position:- 50% shade in my glass house.
Note. Plants are watered by a water tray. If a plant dies cut the dead parts off and new plants will come up from the roots [6].
Temperature range from 0°C to a high of 38°C.
References [1,3,4,6,9]

D. aliciae
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed.
Position:- Full sun to 25% shade.
Note. Plants are watered by a water tray. This is another plant that has gone feral in my Sarracenia trays. Plants outside have been down to minus 9°C. Most plants die but some make it through winter where they get some protection from the massed Sarracenia clumps. Seed can survive frozen.
Temperature range from 0°C to a high of 38°C.
[Survival In my glass house]
References [1,3,4,6]

D. anglica
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed and leaf cuttings.
Position is east facing with no afternoon sun. Plants are kept just moist over the winter and returned to a water tray when growth resumes.
Temperature range from minus 11°C to a high of 38°C.
References [1,2,3,6]

D. binata
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by division and root cuttings.
Position:- Full sun.
Note. Plants are watered by a water tray. Plants go dormant for a short time over winter. This plant was collected at Lithgow NSW where (I think) the plants survive the winter cold by their roots.
Temperature range from 0°C to a high of 38°C.
References [1,3,4,6,9]

D. burkeana
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed.
Position:- Full sun to 25% shade.
Note. Plants are watered by a water tray.
Temperature range from 0°C to a high of 38°C.
References [1,6]

D. burmanni
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed.
Position:- Full sun to 25% shade.
Note. I have not had much success with this plant. I think it is because of the long cold winter.
Temperature range from 3°C to a high of 38°C.
References [1,3,6,10]

D. capensis
all forms
See note 1
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed, leaf cutting or root cutting.
Position:- Full sun to 25% shade.
Note. Plants are watered by a water tray. Feral in my Sarracenia trays and glass house. Plants outside have grown down to minus 11°C with a 98% kill of the growing points of the plants. But in spring all the plants will send up new shoots from the roots and last seasons seed will grow. All plants, roots and seed are frozen solid over winter
Temperature range in glass house from 0°C to a high of 38°C.
References [1,3,4,5,6,8]

D. capillaris
(either the normal or the alba form)
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed.
Position:- Full sun to 25% shade.
Note. Plants are watered by a water tray. This plant is another feral inhabitant of my Sarracenia trays. This plant has a better survival rate in winter. Plants outside have grown down to minus 9°C.
Temperature range in glass house from 0°C to a high of 38°C.
References [1,6]

D. coccicaulis
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed and root cuttings.
Position:- Full sun to 25% shade.
Note. Plants are watered by a water tray. Is this plant the same as *D. venusta*?
Temperature range in glass house from 0°C to a high of 38°C.
References [6]

D x collinsiae
(D. burkeana x D. madagascariensis)
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed.
Position:- Full sun to 25% shade.
Note. Plants are watered by a water tray.
Temperature range in glass house from 0°C to a high of 38°C.
References [1,6]

D. communis
Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed.
Position:- Full sun to 25% shade.
Note. A nice rosette forming plant with white flowers. Plants are watered by a water tray.
Temperature range in glass house from 0°C to a high of 38°C.
References [6]

D. dielsiana

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed and root cuttings.
Position:- Full sun to 25% shade.
Note. Easy Plant to grow.
Temperature range in glass house from 0°C to a high of 38°C.
References [1,6]

D. filiformis ssp filiformis

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed, division and leaf cuttings.
Position is east facing with no afternoon sun. Plants are kept just moist over the winter and returned to a water tray when growth resumes.
Temperature range from minus 11°C to a high of 38°C.
References [1,2,3,4,6]

D. filiformis ssp tracyi

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed, division and leaf cuttings.
Position is east facing with no afternoon sun. Plants are kept just moist over the winter and returned to a water tray when growth resumes.
Temperature range from minus 9°C to a high of 38°C.
References [1,2,3,4,6]

D. glabripes

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed.
Position:- Full sun to 25% shade.
Note. Plants are watered by a water tray.
Temperature range in glass house from 0°C to a high of 38°C.
References [1,3,6,11]

D. hamiltonii

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by root cuttings.
Position:- Full sun to 25% shade.
Note. Plants are watered by a water tray. Another lovely plant to grow with large flowers.
Temperature range in glass house from 0°C to a high of 38°C.
References [1,3,4,5,6,10]

D. hybrida
(D. filiformis form filiformis x D. intermedia)

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by division and leaf cuttings.
Position is east facing with no afternoon sun. Plants are kept just moist over the winter and returned to a water tray when growth resumes.
Temperature range from minus 9°C to a high of 38°C.
References [6,8]

D. intermedia

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed, division and leaf cuttings.
Position is east facing with no afternoon sun. Plants are kept just moist over the winter and returned to a water tray when growth resumes.
Temperature range from minus 9°C to a high of 38°C.
References [1,3,6]

D. intermedia var Brazil

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed.
Position:- This plant is in my glass house with 25% shade in glass house.
Note. This plant does not go dormant for me. Plants are kept just moist over the autumn and winter and watered by water tray for spring and summer. I have not tried growing this plant outdoors.
Temperature range from 0°C to a high of 38°C.
References [6]

D. intermedia "Carolina Giant"

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed, division and leaf cuttings.
Position is east facing with no afternoon sun. Plants are kept just moist over the winter and returned to a water tray when growth resumes.
Temperature range from minus 9°C to a high of 38°C.
References [1,3,6]

D. natalensis

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed.
Position:- Full sun to 25% shade.
Note. Plants are watered by a water tray.
Temperature range in glass house from 0°C to a high of 38°C.
References [1,6]

D. regia

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by root and stem cuttings.
Position:- Full sun to 25% shade.
Note. One of my favourite CP's. I have plants that are over 17 years old. Very easy to strike from root and stem cuttings. This year in mid winter, (June/July 1996), I took a stem cutting from a 15 year old plant and in late November 1996 (in less than 6 months) it is producing a flower spike. (Usually takes 12 months.) The leaves can wrap around its prey up to five times. Plants seem to do better in a glass house rather than outdoors. A growing point can produce two flowering spikes.
Temperature range in glass house from 0°C to a high of 38°C.
References [1,3,5,6,8]

D. rotundifolia

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed and leaf cuttings.
Position is east facing with no afternoon sun. Plants are kept just moist over the winter and returned to a water tray when growth resumes.
Temperature range from minus 11°C to a high of 38°C.
References [1,2,3,4,6]

D. schizandra

Potting medium is live sphagnum.
Propagation is reported to be possible by leaf cutting [7].
Position:- Under bench in glass house in clear plastic tent (with my *Nepenthes*), with a "cut off" PTFE bottle over plant watered from above.
Note. Plant does not show much growth in the winter months.
Temperature range in glass house from 2°C to a high of 38°C.
References [1,3,4,6,7]

D. spathulata
var "rotundate"
var "lovella"

Potting medium is 50% peat moss and 50% coarse sand.
Propagation is by seed.
Position:- Full sun to 25% shade.
Note. Plants are watered by water tray. A nice group of plants to grow. Some of these plants have a deep red colour.
Temperature range in glass house from 0°C to a high of 38°C.
References [1,3,4,6]

Darlingtonia californica

Potting medium is live sphagnum
Propagation is by seed, division, rhizome cuttings and by detachment of stolons.
Position:- East facing with no afternoon sun. Seed is planted in 50% peat moss and 50% coarse sand and left out all winter sitting in a water tray temperatures that fall to minus 9°C. (Seed is frozen in excess of 15 times.) Seed comes up in spring as with Sarracenia.
Temperature range from minus 11°C to a high of 38°C.
References [1,2,3,4,5,6]

Dionaea muscipula

Potting mix is 50% peat moss and 50% coarse sand. I change the potting mix every two years.
Propagation is by seed, division and leaf cuttings.
Position:- I have grown this plant in the glass house and outside. Full sun to 25% shade is best [6]
Plants in the glass house are kept just moist over the winter and returned to a water tray when growth resumes.
I have trouble with mould over the winter.
Plants outside are (for most of the time) sitting in water and are frozen numerous times over winter. There is less trouble with mould in the winter with the plants that are outside.
Temperature range from minus 9°C to a high of 38°C.
References [1,2,3,4,6]

Drosophyllum lusitanicum

Potting medium is 50% peat moss and 50% coarse sand in 200 mm (8 inch) terracotta pot.
Propagation is by seed. The seed is soaked in water (8/2/95) for one week then sown (on the 15/2/95). First seed is up on the 5/3/95 (18 days) with a second up on the 12/3/95.
Position is full sun. (If not plant will reach out to the light.) Plant is watered from above. The plant has a sweet odour. I suspect that this helps to attract prey.
Temperature range from 0°C to a high of 38°C.
References [1,3,4,6,7]

Heliamphoria tatei
Mt. Hurchamakari

Potting medium is live sphagnum.
Position:- under bench in glass house in clear plastic tent (with my *Nepenthes*) and watered from above.
Temperature range from 1°C to a high of 38°C.
References [6,7,12]

Note 1 I have a number of variants of Drosera capensis viz:-
D. capensis "narrow hairy leaf, large flower"
D. capensis "giant plant to 60 cm tall"
D. capensis "long narrow reddish leaf"
D. capensis "merry-go-round" "inflorescence spiralled upwards, wide leaf". (This plant has not lived up to its name. Plants are two years old. and all the flower spikes are straight.)
D. capensis "narrow leaf"
D. capensis "crestate". (This plant did not live up to its name. This year, 1996, in October, the plant started to show splitting but did not.)
D. capensis 'alba' "white flower"
D. capensis "red plant"
D. capensis "elongated stem"

Note 2 All my Drosera in the glass house all plants are watered by water trays in spring and summer but over autumn and winter the trays are let dry somewhat such that the plants are just moist.

Note 3 My glass house is located on the southern end of my house. All of it receives morning sun. The section containing my sundews gets sun all day. My pygmy Drosera love lots of hot afternoon sun.
I use an electric fan to circulate air in order to try to keep the mould down and stop any frost settling on the plants in winter. I also use an oil filled electric convection heater set to low heat to maintain the temperature at or above 0°C. The low setting usually is good enough to keep the temperature going below freezing and keep the costs down but is turned up if the weather report is bad.
I entertain my plants, 24 hours a day, with a radio tuned to the local radio station although on occasions, when the plants look crook, I tune the radio to the ABC so that the plants may get some free fertiliser (verbal diarrhoea) when Parliament is broadcast

References:-

[1a] SLACK Adrian, **The Carnivorous Plants**, 1979, Alphabooks, ISBN 0 589 50142 9
[1b] SLACK Adrian, **Insect Eating Plants and how to grow them**, 1986, Alphabooks, ISBN 0 906670 35 7
[2] SCHNELL, Donald E., **Carnivorous Plants of the United States and Canada**, 1976, John F. Blair ISBN 0 910244 90 1
[3] PIETROPAOLO, James and Patricia, **Carnivorous Plants of the World**, 1986, Timber Press, ISBN 0 88192 356 7
[4] CHEERS, Gordon, **A guide to the Carnivorous Plants of the World**, 1992, Colins, Angus and Robertsons, ISBN 0 207 16186 0
[5] Conversations with Allen LOWRIE
[6] Personal Observations
[7] Conversations with Denis DALY
[8] Conversations with and correspondence with Fred HOWELL
[9] Conservations with Phillip REYTER
[10] ERICKSON, Rica, **Plants of Prey**, 1982, University of Western Australia Press, ISBN 0 85564 099 5
[11] Conservations and correspondence with Russell DIXON
[12] DALY Denis, Propagation of some Specific Species of Carnivorous Plants, **FlyTrap News Vol 9 No 1**, July/August/September, 1995, The Carnivorous Plant Society of NSW, ISSN 1323-8159.

Editors note:-

Richard is able to get his plants to thrive in a region of great extremes of temperature with very cold winters. So for those of you who have concerns about living in a region with bitterly cold winters take heart.

Richard has kept a detailed diary of his cultivation activities (failures as well as successes). I am sure that everyone will be eagerly awaiting Parts 2, 3, etc., etc., that will be presented in subsequent issues of this newsletter. Richard is always willing to offer advice based upon his experiences. For contact details refer to Richard advertisement in this issue.

Letter to Sir James Smith President Linnean Society, from James Macbride

Sir,

Your remarks on the economy of the Sarracina in your "Introduction to Botany," lead me to think of making this communication; and I was emboldened to undertake it from having observed in your prefatory remarks on the study of this science, a spirit of peculiar liberality and disinterestedness. My object to lay before you the results of my observations on the insect destroying process carried out on by the tubular leaves of these plants.

It will hardly be necessary to inform you that the Sarracenia Fava and S. Adunca (S. Minor of Walter, and S. Variolaris of Michaux,) grow in the flat country of this state in great abundance. With the latter my experiments have been chiefly conducted. If in the months of May, June or July, when the leaves of these plants perform their extraordinary functions in the greatest perfection, some of them be removed to a house and fixed in an erect position, it will soon be perceived that flies are attracted by them. These insects immediately approach the fauxs of the leaves, and leaning over their edges appear to sip with eagerness something from their internal surfaces. In this position they linger; but at length, allured as it would seem by the pleasure of taste, they enter the tubes. The fly which has challenged its situation, will be seen to stand unsteadily; it totters for a few seconds, slips and falls to the bottom of the tube, where it is either drowned, or attempts in vain to ascend against the points of the hairs. The fly seldom takes wing in its fall and escapes; but this sometimes happens, especially where the hood has been removed to assist observation. In a house much infested by flies, this entrapment goes on rapidly that a tube is filled in a few hours, and it becomes necessary to add water, the natural quantity being insufficient to drown the imprisoned insects. The leaves of the S. Adunca and S. Rubra of Walter might well be employed as flycatchers; indeed I am incredibly informed they are in some neighbourhoods. The leaves of the Flava, although they are very capacious, and often grow to the height of three feet or more, are never found to contain so many insects as the leaves of the species above mentioned. The spreading fauces and erect appendices of the leaves of this species render them (I suppose) less destructive.

The cause that attracts flies is evidently a sweet viscid substance*, resembling honey, secreted by, or extruding from, the internal surface of the tube. On splitting a leaf it may readily be discovered in front, just below the margin, and in greatest quantity at the termination of the ala ventralis. From the margin, where it commences, it does not extend lower than one fourth of an inch. During the vernal and summer months it is very perceptible to the eye and touch; and although it may sometimes not discoverable to either, yet the sensation of sweetness is readily perceived on applying the tongue to this portion of the surface. In warm and dry weather in becomes inspissated, resembling a whitish membrane.

* This substance it seems was noticed by Batram the younger (see the preface to his travels). I was entirely ignorant of his conjectures respecting it, until long after I hade proved their correctness.

The falling of the insect as soon as it enters the tube is wholly attributable to the downward or inverted position of the hairs of the internal surface of the leaf. At the bottom of a tube, split open, the hairs are plainly discernible pointing downwards; and as the eye ranges upwards they become gradually shorter and attenuated, till at, or just below, the surface covered with the bait, they are no longer perceivable to the naked eye, nor to the most delicate touch. It is here that the fly cannot take hold sufficiently strong to support itself, but falls. The inability of insects to crawl up against the points of the hairs I have often tested in the most satisfactory manner. Spiders descend into the tubes, to prey (I suppose) on the entrapped insects, and ascend with impunity; but this is performed, as I have witnessed, by the assistance of their threads. Also a small species of Phalana* appears to take shelter in these tubes during the day, and enabled to ascend; but by what contrivance I am at a loss to conjecture, unless it be by some peculiarity of structure in its feet.

* This Phalanx, which is about half an inch in length, may be described by saying it is divided transversely into three equal parts, the first division including the head is black, the second dirty white, or yellow, the third is like the first: lava a greenish geometra.

In the putrid masses of insects thus collected, are always to be seen one or more maggots in a very active state. To account for their presence, and to ascertain the insect to which they belonged, I was long unable. The mystery was however unveiled in the following manner: while watching attentively some tall tubes of the S. Flava growing in their natural situations, in order to discover whether other insects as well as flies were attracted by the bait above described, a large fly caught my attention: it passed rapidly from one tube to another, delaying scarcely a moment at the faux of each, until it found, as it should seem, one suitable to its purpose: then hanging the posterior extremity over the margin, it ejected on the internal surface of the tube a lava with a black head, which immediately proceeded downwards by a brisk vermicular motion. This visuparous musca was more than double the size of the common house-fly, had a reddish head, and the body hairy, and streaked grayish. I had often noticed it before among the S. Adunca, but could never ascertain its object; the hoods probably obstructing my view.

That insects may be found in these tubes which were not allured by the bait, I have well ascertained. At the time that I discovered the origin of the larvæ, I observed a beetle (Scarabaus Carnifex, a herd being near) in its flight strike against the erect appendage of the S. Flava and fall into the tube. In the leaves of the S. Adunca, growing on the margin of a large pond, I once observed the fragments of a large Gryllus and several Gyrini. These and similar appearances have led me to suspect that our large Nepa* an extremely voracious insect, may occasionally use these tubes as storehouses. The hooked feet of this last insect would doubtless enable it to ascend against the inverted pubescence.

* Very nearly allied the Nepa Grandis of South America. It is very strong, and often destroys the Spring Frog. It inserts the claws of the two fore-feet into one of the frog's hind legs, and with the claws of its hind feet it grapples rice stubbly or some aquatic plant; the frog unable to disengage itself becomes exhausted by struggling.

What purposes beneficial to the growth of these plants may be effected by the putrid masses of insects, I have never ascertained; but I learn from a hint given in the article Donæa, in Rees' Cyclopedia, that it has been discovered that the air evolved is wholesome to the plants. I once entertained a suspicion that this air might be of such deleterious nature as to cause the precipitation of the insects exposed to it, but I have since relinquished it as entirely groundless.

The above observations were chiefly made in 1810 and 1811, and have been communicated to several persons, but never to my knowledge made public. From an examination which I made to-day on the leaf of the S. Flava about half grown, I am led to suspect that the surface, where the fly stands so unsteadily, and from which it finally drops down to the bottom of the tube, is either covered with an impalapable and loose powder, or that the extremely attenuated pubescence is loose. This surface gives to the touch the sensation of the most perfect smoothness. The use of a good microscope will determine this point.

I am, &c.

St Stephen's Parish, Charleston District, James Macbride
South Carolina, April 11, 1815

Reference:-

The Linnean Society of London Transactions Vol XII, works by James Macbride.

Editorial note:-

Jessica Biddlecombe spent a long time laboriously transcribing the text of this letter from the transactions of the Linnean Society of London at the Australian National Library. She had to wear special gloves and could only use a pencil, which soon become blunt, to copy the letter to avoid possible damage to the rare book containing the Transactions. The style of the letter, transcribed as written, with all spelling mistakes included uncorrected, is indicative of the period when the letter was written.

I find it fascinating that after careful observations one ludicrous proposition was discarded for another ridiculous conclusion, even though somewhat closer to the actual facts as we now know them, simply because Rees called his book a Cyclopedia and purported to report a "discovery". What seems to have escaped their consideration was the possibility that maybe, just maybe, the rotting insects could have been utilised in other ways other than through the gas given off. But I guess that, in 1815, anything that they could not understand was put down to "the vapours".

Report on the Bundanoon Weekend Field Trip

Denis Daly

Those members who were unable to avail themselves of Nathan Clemens and Dave Bradley's hospitality at Bundanoon Field over the weekend of 23rd and 24th of November 1996, missed spectacular walks, scenery and a chance to observe *Drosera spatulata*, *D. binata*, *D. peltata*, several *Utricularia* species (not identified) and *Sphagnum* moss in their natural habitat.

On Saturday 23th November 1996, I arrived at Nathan and David's "A" frame abode at 0800 hours with a persistent hitch hiker who sat in the middle of the road, soaking wet, to get my attention. After a couple of phone calls and a drive along David's short cut corrugated road the guest was bundled out of my car and stuck in a wicker basket, scheduled to be released the next day, after a night in the cells.

Finally after waiting for what everyone there thought was a reasonable time (30 minutes) for late arrivals we were on our way, down the "roller coaster", along Riverview Road, to the Amphitheatre. All "plastic'ed" up against the rain we were away. Going down was easy, spectacular views. One tried not to think of the return trip. However, in the end, everyone magically found abundant energy reserves for the return trip at the mention of the magic word "leaches". There were no stragglers to wait for during the ascent.

The far most dominant carnivorous plant was *Drosera binata*. Although an occasional *Drosera peltata* was seen growing out of 80 degree moss covered slopes or in moss filled crevices in the rock. *D. binata* grew in many diverse, surprising and spectacular locations. It grew upside down hanging from cliffs and under rock ledges provided that there was a minimal of water seepage. The *D. binata* chandelier overlooking the Amphitheatre is spectacular even though it was not in prime condition due to the changeable weather that eastern Australia has been experiencing this season (Spring 1996).

After the return to the top it was off to Moss Vale for lunch in the park and then out to Meryla Road in the Meryla State Forrest (SF907). David, having handed out census papers in the area advised us that there were some weird characters living in this area and that the area was reputed to where the dopes grew dope. Given the condition of the road (bumps, mud, water filled pot holes etc.,) the sight of the convoy of 55 cops (the locally reputed number), with aerial support, racing in to conduct the latest raid would have been an amusing spectacle. We never did see any dope although we did see some weird looking characters (the dopes perhaps?) driving about the area.

Alongside the creeks crossing Meryla Road *D. binata's* grew in areas so covered in ferns that the leaf stalk of the *D. binata's* grew to well over 60 cm as the plant fought its way up through the ferns to seek sunlight. Other *D. binata's* grew on the rock sides or elevated rock shelves of water courses that would often be inundated with fast flowing torrents of water. Many of the clumps on the rock shelves were beginning to collect debris and soil and forming islands. These islands were in various stages of formation and it was thus able to be deduced that these islands were most likely formed when a *D. binata* seedling germinated in a rock crevasse and, provided it was not washed away before its fibrous roots wedged into cracks and folds in the rocks, it became the "island builder" with other plants following.

Given the limited time and the density of the bush along Meryla Road we did not try to "bush bash", thus how far from the creeks the *D. binata's* grew was not accurately determined, however given the wide range of terrain encountered along the trails in the Morton National Park, (ranging from sodden to bone dry), it is apparent that *D. binata's* would only be found where there is a permanent water source.

D. binata prefers bright light, however those plants exposed to sun for most of the day had developed the reddish colouration of anthocyanin pigments. Yet plants in the same area, with identical leaf form, that were exposed to full sunlight for part of the day did not exhibit the reddish tints that the plants exposed to full sunlight all day did. It would appear that *D. binata* also uses anthocyanins to protect itself against excessive exposure to ultra violet light. [1, p 325; p461]

The *D. binata* multifida plants located exhibited large variations in both the branching pattern in terms of bi directional symmetry and complexity of branching. Each plant's leaf pattern could well be unique. Nathan Clemens and myself discovered a *D. binata* multifida whose leaf could be described as extreme extrema in a creek that crosses Meryla Road.

The soil in the area was rich in leaf mould providing a almost limitless supply of mineral nutrients to be washed from the composting leaf litter humus by the abundant water and carried to every plant in the area. *Sphagnum* moss hugged the rock surfaces of the wetter areas. The thickness of this *Sphagnum* was minimal (less than 50 mm thick) but was bright green and growing vigorously. In several places *Sphagnum* held back the composting humus and preventing it being washed away in the water courses. *Sphagnum* moss was observed growing in full sun; there was, however, an adequate water supply. *Sphagnum* moss does not grow in areas of deep shade. (These observations are consistent with my previous experience of cultivation of *Sphagnum* moss. It loves light, water and dilute fertiliser. The phosphorous content should be low to prevent algae growing.)

At one point Merayla Road passed through a small swamp. The water moved across the road under a low bridge (virtually at water level) where the faster flow of water through the restricted culvert under the bridge exposed the edge of a floating island of *Sphagnum*. In this island grew a *D. binata*. While the edge of the *Sphagnum* island could be observed close up the extent was impossible to determine as the entire swamp was overgrown with scrub. The outline of the swamp could only be determined by the fringe of trees skirting the shore.

The next day, Sunday, we once again waited for late arrivals at the designated location for some 45 minutes before setting off. Sunday was fine and raincoats were not needed. As, except for Nathan, David and me, those who attended in Sunday had not been present on the Saturday we revisited the Amphitheatre to view the *Drosera binata* chandelier. Then it was off to lunch again at Moss Vale before visiting Meryla Road where the Sunday group was shown the interesting sites that were discovered on Saturday.

This time we drove down from Meryla Road along a steep, one car wide, trail into the Morton National Park to "the exclusive camping area" site that we had only seen from the escarpment the day before. Spectacular scenery, but there were no facilities such as water close by. The local resident with the ALL RED waistcoat seen basking in the sun in the middle of the road at the campsite did not exactly welcome us and got somewhat annoyed when we blew the horn and disturbed his sleep.

A final visit for the Sunday was to the old Erich coal mine within the Morton National Park close to Gambles rest. A 630 meter walk from the car park the sign said. Once again it was mountain goat territory. Alongside the mostly dry track, in a wet soak, a few *D. spatulata's* were observed but other than that no carnivorous plants were seen.

However the spectacular waterfall and rock pool at the bottom were well worth the ~~walk~~ climb. The mine comprised several tunnels driven almost one kilometer back into a cliff face. Had not been worked in years, no timbering seen, seemed to have had many roof falls close to the entrance, probably more further in. No one brought a torch. Decidedly unsafe.

The entrances to the old coal mine were all blocked off, although some one had tried to break in to one of the entrances by cutting the steel mesh grill at the front. The repair job by the National Park service was hardly what you could call secure.

At the bottom of the waterfall Nathan took me to a location where *Sphagnum* moss grew. The *Sphagnum* was held in place on a dry slope by ferns and was kept wet between rains by the occasional drip of water (undoubtedly laden with nutrients from the leaf litter humus emanating from the bush land above) seeping from the overhanging rocks above. The fern roots bind the powdery grey sand and anchor the *Sphagnum* while the *Sphagnum* retains moisture in dry periods (so that the ferns can survive) and prevents the powdery sand being washed away.

Above the *Sphagnum* the sandstone rock curved back and upwards. The *Sphagnum* was commencing to climb this slope to cover the rock. To the sides and below the *Sphagnum* the grey powdered sand was bone dry. The *Sphagnum* was exposed to bright light and would have been subjected to several hours of sunlight each day. It was sheltered from winds as evidenced by the absence of any grey sand settling on it.

The climb back to the car was invigorating to say the least. Then we all went back to Nathan and David's for afternoon tea before departing for home.

In concluding I would like to thank Nathan and David for their hospitality over the weekend.

References

[1] SALISBURY Frank B. & ROSS Cleon W., **Plant Physiology**, Wadsworth Publishing Company, Fourth Edition, 1992, ISBN 0-534-15162-0.

P.S. The guest was a fledgling Kookaburra. The dandy camp resident, with the ALL RED waistcoat was a red bellied black snake.

Some Basic Precautions when Repotting or Dividing Plants

Denis Daly

Water enters a plant through its roots. [1, p101] Root hairs greatly increase the water absorption capabilities of a plant by increasing the area of soil to root contact. [1, p102] Root hairs are a modified root epidermal (skin) cell. [1, p137] More root hairs are produced when the soil is drier than if it is wet, but root hairs desiccate (dry out) and die if the soil is too dry. [1, p138] Point one:- Do not pot plants into dry soil and wait too long to water the pot.

Many plants (well over 90%) have a symbiotic (intimate) and mutually beneficial association with certain fungi that in exchange for organic nutrients from the plant improve the mineral and water absorbing capacity of the roots. [1, p 138] Point two:- If potting mix or soil has to be sterilised to get rid of a heavy load of some nasty pathogenic micro organisms or bugs you will kill the beneficial micro organisms also.

A plant's roots need to replace water lost by diffusion through the stomates (leaf pores) during interchange of carbon dioxide with the air. (Transpiration that occurs during photosynthesis.)

Even though the leaf pores (stomates) are only a very small percentage of the leaf's surface (order of 1%) they transpire as much water as would evaporate from an area equivalent to 50% of the leaf's surface area as the water from each widely spread stomate can evaporate in a half spherical pattern and thus the concentration of water vapour drops rapidly permitting much more water to evaporate. [1, p70-71] (Over 90% of the water lost is transpired through the stomates.) Higher leaf temperatures make the water evaporate faster while higher air temperatures enable the air to absorb more of the transpired water. [1, p 66]

If a plant is made to actively photosynthesise by being placed in bright sunlight too soon after repotting when the fragile root hairs are damaged and plant's capacity to absorb water (and minerals) is reduced markedly, it will wilt, as the roots will be unable to "make up" the water loss from the stomates. [1, p29]

The situation is made worse if the plant is subjected to high temperatures or if it has been divided, or root pruned, and there are insufficient roots to supply water to the relatively large mass of foliage. The loss of roots may be partially countered by the removal of some of the foliage to "balance" things up.

Point 3:- All repotted/divided plants should be placed in a cool, shady and humid place to recover for a week or so before being placed in bright light.

References
[1] SALISBURY Frank B. & ROSS Cleon W., **Plant Physiology**, Wadsworth Publishing Company, Fourth Edition, 1992, ISBN 0-534-15162-0.

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