"C.P. GROWING the UNIQUE WAY"
"—REPORT from DOWNUNDER—"

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The love of nature has been within me as far back as I can remember—beginning at the age of 5 or 6, I started off with collecting butterflies, dragonflies, bees and other insects. Then, when approaching teenage years, fish-keeping became a part of my life.

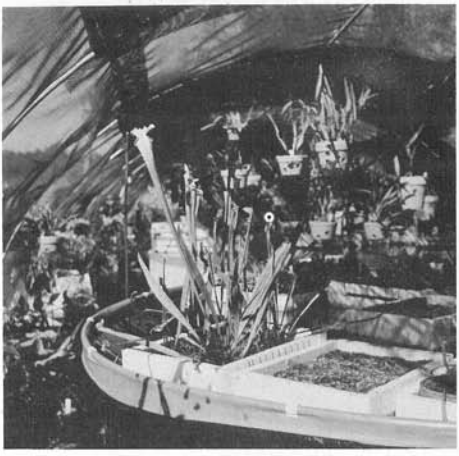
I can still remember very vividly how enchanted and spellbound I was at my first encounter with the sun dew—*Drosera spathulata* during a trip to the countryside collecting little fish for my aquarium. That was my most joyful trip, still as a preteen boy, coming home with my hand and knees covered with mud and a pocket full of glittering living jewels. However, my happiness was very short lived, because of lack of knowledge, all my beautiful sundews soon died. I tried several more times since then, but met with the same sad results. Soon, it was all forgotten.

By the time World War II was over, my interest in plants had grown from cacti and succulents to much wider fields. Upon my first visit to the glass house in our Hong Kong Botanic garden, I saw for the first time a *Nepenthes,* [it was *N. mirabilis* which is also a native to the Hong Kong larger islands]. Once again I was completely captivated by its strange but lovable appearance. The memories of my pocket full of sundews flashed back vividly again. Since then C.P.s have become one of the most treasured items in my collection of plants.

Since 1952, I extensively toured all over South East Asia for tropical fish and plant collections as well as photographic assignments. One of the most impressive sights I ever encountered was up on the highlands in the Philippines. Driving along the narrow mountain road, looking over on one side was a drop of thousands of feet while on the other side of the road was the mountain face completely covered with ferns and *NEPENTHES ALATA*. Here and there one would also see a dash of mauve—azaleas and a sparkle of brilliant yellow-orange—rhododendrons. This was indeed a paradise that catered to botanists and horticulturists of all diversities.

Now I still go out to collect fish whenever chance permits. Although *D. spathulata* is no longer a constant residence in my CP collection, I never fail to stop to admire them where ever & when ever they come in my path. The fascination & enchantment they bring me is just as strong & intense now as when I met them for the first time when I was a little boy 40 years or so ago.

Since I settled down here in Brisbane, tropical fish and aquatic plant cultivation have become my livelihood. Even though my *bush* house has a 50% shade cloth over it, my pools of fishes and plants in the *bush* house still receive too much light, particularly during the summer months; and the water turns green too quickly and would not clear up. Duck weed was used to provide extra shade but proved unsatisfactory because it grew too fast. Soon the entire pool was completely covered. Too much time was needed to thin them out at regular intervals. Another method was then used and proved to be most successful. Simply by floating pieces of coolite sheets [polyurethane] on the surface of the water did the trick. In the mean time my CP collection is growing; and since I grow my CPs in coolite [polyurethane] trays which are unsinkable, one by one they have replaced the coolite sheets that float on my pools. These CP trays provide shade and in turn, the pool provides moisture and seems very close to the natural bog enviroment! My *Nepenthes*, on the other hand, are all grown in clay pots hanging above the pools. The following pictures and captions to each picture will give a much better idea.



Picture 1: *S. leucophylla*

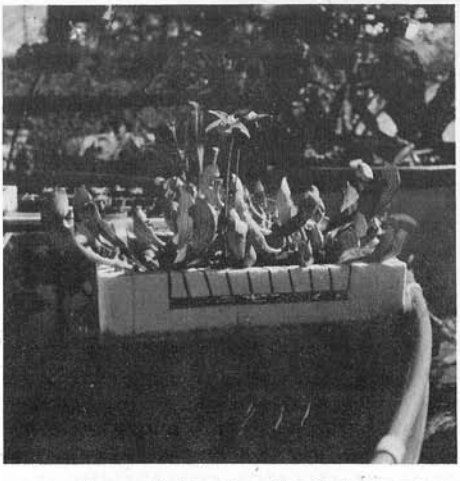
Picture 3: *Dionaea muscipula*

Pictures 1 & 2 show some of my *Sarracenia*. Top picture 1] being *S. leucophylla* and bottom pic. 2] being a hybrid—*S. alata* x *S. psittacina*. One of the two seed pods shown yielded 125 seeds. The other one being an off season flower produced no seed at all.

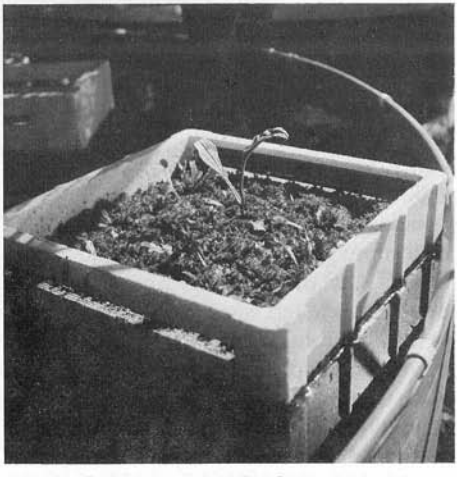
Pictures 3 & 4 show two of my several trays of Venus Fly Traps. Top pic. 3] is one of my new experimental potting mediums in which the V.F.T. are grown. Also a new type of moss was planted in that tray but it can hardly be seen because of the small size and amount. I am hoping to find a kind of moss that will form a very soft, low carpet covering the potting medium. Sphagnum moss is very nice but it grows too tall and fast so that it soon takes over and covers up all my V.F.T. Bottom pic. 4] shows exactly what I mean! Note that there is also a *Nepenthes* growing in there. This is how and where I stick my *N. kampotiana* during the summer months. That piece was stuck there for only about three weeks and was just starting to root.

Pic. 5 & 6: Pic. 5] shows my tray of *Pinguicula primuliflora* which I started off with only one plant two years ago. 24 months later they covered the entire tray. The inside measurement of the trays are 17" X 12". Pic. 6] shows some of my *Sarracenia* seedlings protected from heavy rains by glass.

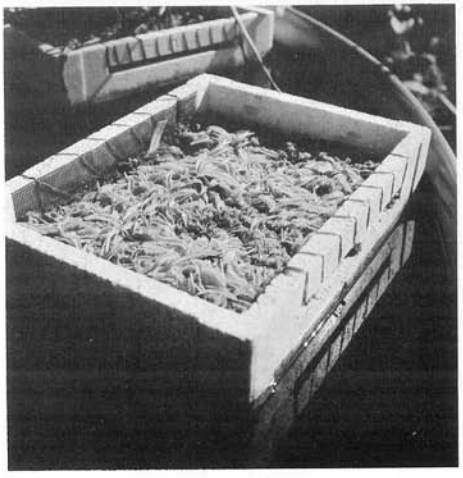
Pictures 7 & 8 show some of my *Nepen-*



Picture 2: *S. alata x S. psittacina*



Picture 4: VFT. in sphagnum

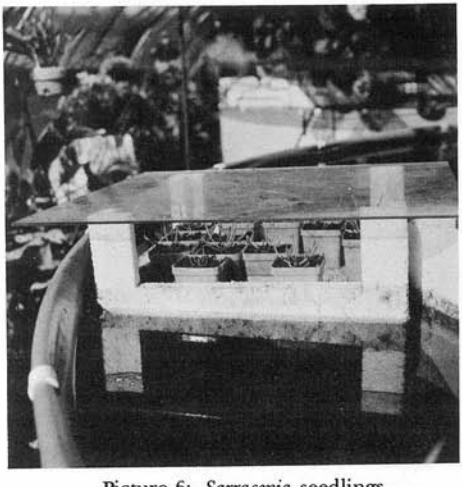


Picture 5: *P. primuliflora*

Picture 7: *Nepenthes* Sps.

thes hanging over the pools.

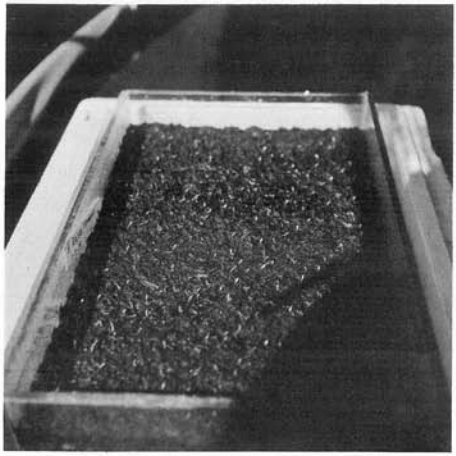
Pictures 9 & 10: Pic. 9] shows my two trays of North Queensland *Drosera.* They are kept in the coolest and shadiest part of the *bush* house to meet their requirements. The tray on the bottom contains *D. prolifera;* and the on the right, with elevated glass cover, contains *D. schizandra* which is, as far as Queensland geological conditions are concerned, a high altitude plant. Perhaps the best way to grow *Drosera schizandra* successfully is to first understand their natural habitat. They are found growing along the sides of a creek in very heavily shaded area close by a waterfall by the name of Windon Fall somewhere on Mt. Bartle Frere. The mountain is over 5,200 ft [1,730m] high—the highest mountain in Queensland. With this high altitude [a midget in comparison to some mountains in other parts of the world], the plants grow in a very moist and heavily shaded area. They also have to be grown cool. I use a growing medium of 2 parts german peat and one part of Queensland peat, which is more of a leaf mold rather than peat, and contains a bit more nutrients in it. In fact, I use this mix for all my CPs except for *Nepenthes.* Here, I use 1 part fine grain charcoal, 1 part perlite, 2 parts crushed sphagnum moss and 2 parts of this peat moss mixture. I get excellent growth. I plant live sphagnum



Picture 6: *Sarracenia* seedlings

Picture 8. More *Nepenthes*

Picture 9: N. Qld. *Drosera*



Picture 11: *N. rajah* seedlings

moss around all CPs for three reasons: To stop the peat from splashing all over the place when watering, to create a better acidity and to look nice.

Under the above conditions, some of my *D. schizandra* grow 3½ inches [8.5cm] in diameter. When the plant is healthy, the tentacles have all the dewy drops on the leaves; and if not happy, the leaves are still green and firm but appear dry and the dew drops are absent.

To propagate them, just cut a leaf off and lay it completely flat on the surface of a peat moss medium. The whole leaf must be in direct contact with the wet peat or otherwise the leaf will dry out very quickly. The cut leaf will stay like this for a very long time until about 35 days later the edge of the leaf starts to deteriorate and that is the time it will begin to proliferate— exactly in the same fashion as *Drosera prolifera.* A large leaf of *D. schizandra* can produce 30 or more plantlets! You must give your *D. schizandra* very high humidity and shade and cool temperatures to be successful. Pic. 10] shows 3 of my *Nepenthes* seed germinating trays. The tray on far left had its coolite wall removed to show the shallow glass frame with partition set diagonally so that one tray can house two different species or hybrids.

Pictures 11, & 12: Pic. 11] shows a full tray

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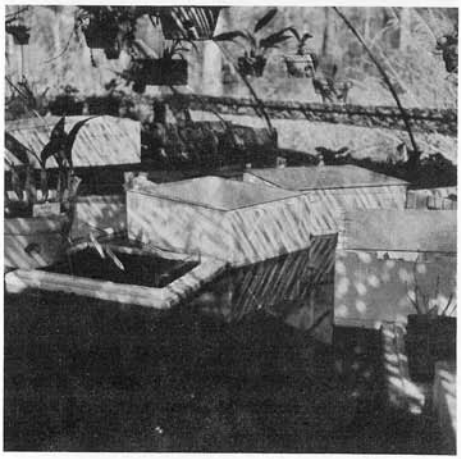

Picture 10: *Nepenthes* seed

Picture 12: *D. schizandra*

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were observed to be capable of closing rapidly enough to capture an insect and yet only 6 traps did capture prey. If we assume that the four traps that were closed but did not capture prey were triggered by prey that got away, Then only 5% of the traps were triggered by prey during 24 hours of a warm summer day. At this rate a single trap might be triggered by prey an average of once every 20 days, and capture prey once every 40 days! If there is an attractant it is not a very effective one.

An insect or spider that enters a trap is likely to be just passing through or even resting in the trap. I have seen spiders resting in untriggered traps and ants and beetles passing through. All seemed as indifferent to the trap as they might be to any other twig or leaf. The one beetle I saw pass through tripped two hairs and was captured. The clumsy beetle, which was running when caught, is the only spontaneous capture in nature I know of that has been observed. I hope other readers will report their observations on plants in the field so that a more complete picture of prey capture can be obtained.

Do raindrops close traps? The observation was made by Darwin that "Drops of water, or a thin broken stream, falling from a height on the filaments, did not cause the blades to close". Anyone who has watered a bunch of *Dionaea* plants knows that in general this statement is true, although on occasion a trap will snap shut. Darwin concluded "No doubt as in the case of *Drosera*, the plant is indifferent to the heaviest shower of rain". This has been picked up by many authors and drops of water have been treated as having mystic properties that will not result in the closure of traps. However, any stimulus that bends a trigger hair far enough to cause it to send its signal and does this twice within a few seconds will cause the trap to close—heavy rain included. Frank Lichtner and I observed 224 traps during heavy rain. In table I it can be seen that the insects, unlike the botanists, had enough sense to stay out of the rain since none were captured. [We also observed very little insect activity as compared to the dry period.) Despite this, there were 15 closures without capture, which were presumably caused by raindrops. The rain was extremely heavy and lasted all night and much of the morning. It is likely that drops which push a trigger hair far enough to cause it to send a signal are rare and that two within a few seconds are a very unlikely event. Perhaps the lack of closure of *Dionaea* in response to a single stimulus to a trigger hair is an adaptation which helps prevent traps from being closed by rain but traps are not "indifferent to the heaviest shower of rain." About 7.5% of the traps were closed during the rainy day we observed.

How are traps triggered to close? However it gets into a trap an insect must trip trigger hairs to cause it to close. Unless it is very hot, the insect must trip one hair more than once or two hairs in succession within a few seconds or the trap will not move. It is at this point that on understanding of the physiology of the trap helps us understand how capture occurs.

As long ago as 1873 Burdon-Sanderson demonstrated that pushing a trigger hair results in an electrical signal called an action potential which spreads over the surface of the trap at a rate of 10 to 20 cm a second. Since that time Burdon-Sanderson's experiments have been repeated in numerous laboratories around the world so that there is no question of their accuracy [FIG. 1]. Burdon-Sanderson and his colleague, Page, also first clearly demonstrated that more than one electrical signal is needed to cause trap closure. Their 1876 paper [which is the

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(Tsang 'CP Growing')

of *Nepenthes rajah* seedlings germinating extremely well. These seeds were planted on the 1st of Feb., 1979. The picture was taken in late March. By late April most of them had produced their first pair of true leaves. In early May I had them planted out into community pots—15 plants per pot. Now some of them are nearly an inch tall with their 4th leaves well on the way. [A picture to show the much more advanced development of these *N. rajah* will come a little later.]

Pic. 12] is a close up of *D. schizandra.*