# *Far North Coast Bromeliad Study Group N.S.W.*

Study Group meets the third Thursday of each month

Next meeting March 17th 2016 at 11 a.m.

Venue: PineGrove Bromeliad Nursery

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Discussion: February 2016

General Discussion

**Editorial Team:**
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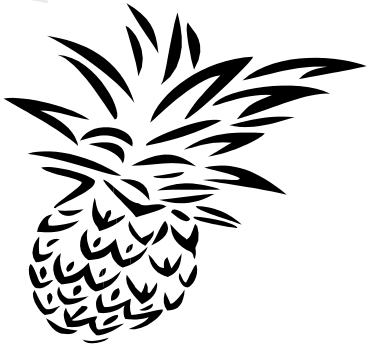

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## Meeting 21st January 2016

The meeting was opened at approximately 11.00 am
The 26 members and one visitor present were welcomed.
A total of three apologies were received.

## General Business

Ross welcomed everyone to the Meeting, whilst distributing the Newsletter he reviewed the January edition commenting on some of the notes and articles in the Newsletter. Ross drew our attention to the back page to the rules of entry and participation in our monthly Popular Vote Competition, clarifying a few of the details for our newer members.

There was also a timely reminder to clearly and correctly enter your plants in the correct format in the appropriate Class folder, placing your name under entrant's name and the plant's name under that heading, we have had some interesting variations on that theme.

To assist our members to present their bromeliads in all their glory, Jeanette has kindly agreed to present a talk / demonstration at our February meeting on how to prepare your specimen plants for scrutiny and judging at shows and monthly competitions.

Thank you again to Coral and Gary McAteer for their generous donations of all things needed and useful in the kitchen for the Groups' benefit, we do appreciate your kindness.

Ross asked that a card congratulating Natalie, from COPY THAT our printers on the birth of her son Harley Andrew Macey, the evening before our January meeting be taken care of by our editors / secretaries.

Helen reported that the Christmas Plant raffle raised sufficient funds to pay for the food purchased for the Christmas party, such as soft drinks, bread rolls, meat platters and hot chickens. We are beginning the New Year with a reasonable bank balance and will leave the next plant auction until later in the year.

## Show, Tell and Ask!

John, brought along several Ananas species including *Ananas ananassoides var. nanus*, often referred to by some people as the 'Pygmy Pineapple', its fruit attached to a long scape. The question was asked, "can you grow a plant from the pineapple top"? The answer is yes, John suggesting you dry the "top" for several days, then removing some of the lower bracts before planting in your usual potting mix.



John had *Catopsis compacta*, in flower, with its heavily scurf covered leaves. An explanation was offered by John of the function scurf plays in the plants ability to grow in exposed conditions at altitude.
John also showed two Cryptanthus, reverse crosses of *Crypt*. 'Satin Ribbons' X 'Red Tide' each showing similarities but some differences and strong colour.
John had tied the Cryptanthus pups into their pots with baler twine which held them firmly in place and can be removed when the plant is sufficiently stable.

Helen showed several interesting Tillandsias including *Till*. *harrisii* a plant that had travelled from Newcastle when Ross and Helen moved to Pinegrove, *Till*. 'Leopard', *Till*. *remota*, *Till*. *ehlersiana* and *Till*. *stricta.*
Helen also had a collection of Orthophytum including *Ortho*. *maracasense*, grown from seed supplied by Derek Butcher's mate Oscar of Brazil. Helen's other Orthophytums which had been growing under hot harsh conditions when repotted were moved to a slightly cooler, shadier position but still getting plenty of light and a little more moisture and the results are amazing, new growth, none of the bleaching and plenty of beautiful colour and patterning in the trichomes and scurf on the leaves.

A word of advice for those wishing to grow this interesting species, handle very carefully when planting or attending to them as you can so easily remove these beautiful patterns with just a few finger touches.

Marie brought in her *Nidularium amazonicum*, the result of an exercise our members had last year to grow plants from small seedlings, supplied by Trish, to flowering plants. Well done Marie! Your plant is a great specimen, true to type, white flowers with floral bracts lovely shades of gold and orangey red.

Michelle brought in two well grown Neoregelias requiring identification, the first was suggested as being *Neo*. 'Red Macaw'. The second of Michelle's plants for identification was agreed upon as being *Neo*. 'Jaws'.

Gloria was asked to alert the members to the recently discussed bacteria, Xylella fastidiosa that lives in the xylem vessels of plants and is spread by sap-sucking insects, has currently caused alarm bells to ring amongst growers who import Bromeliads. George Stamatis has informed us this pathogen had only occurred in the Americas but has now popped up in Italy where it decimated olive plantations and has been found in *Tillandsia usneoides*. The pathogen has also been found in Asia and the Middle East where it appears to be spreading and adapting to different hosts. Australian Quarantine Services have tightened import regulations so much that we may unfortunately have to accept what we already have in this country as our genetic resources is all we can have. Importation of seed isn't affected.

Kay brought along *Neoregelia* 'Dream Baby' with an albino pup, mostly pale pink, asking what to do? It was suggested that Kay remove the pup as the mother plant may not produce further pups while this pup is attached. To assist in the pup's survival, it was further suggested that Kay use molasses mixed into the potting mix as this will encourage the pup to develop roots and to absorb nourishment when slowly photosynthesising its food.
Kay showed a Hohenbergia she was offering for the raffle which she has grown from seed collected off *Hohenbergia* ..... J&G 85214.

Another bromeliad Kay was asking for correct identification of was her *Aechmea servitensis*, Ross explained there are sub species / varieties and that her plant could possibly be *Aechmea servitensis* var. *exigua*.

***Aechmea servitensis*** var ***servitensis***
Scape-bracts and lower primary bracts ample, strongly serrate.
Type. *Andre* 1197 (holotype, K; photo GH), Servitti, Meta, Colombia, 12 Jan 1876.
Distribution: epiphytic and saxicolous, 240-1040 m alt, Colombia.

***Aechmea servitensis*** var ***exigua*** L. B. Smith, Phytologia 4: 358. 1953.
Scape-bracts and lower primary bracts narrow, obscurely dentate.
Type. *Foster* 2217 (holotype, GH; isotype US), Las Mesas, 1350 m alt, Narino, Colombia, 22 Nov 1946.
Distribution: known from the type locality only.

## Misnamed Bromeliads, N0. 8 by Harry E. Luther

Journal Bromeliad Society 41(4): 167-8. 1991

***Aechmea penduliflora*** Andre**.**

This commonly cultivated Aechmea has a wide distribution in tropical America from Nicaragua south to Peru and Brazil. Several now-synonymous names have been applied to various populations with one, *Aechmea schultesi-ana,* still occa-sionally used for cultivated plants.

The most commonly grown form of *Aechmea penduliflora* is apparently of Co-lombian origin. These plants have relatively thin, very sparsely serrate, red-dish leaves. The inflorescence is unimpressive.

In the mid-1970s a bright green, spiney-leafed plant from eastern Ecuador was introduced by the German horticulturist Hermann Prinsler. This "new" bromeliad quickly became very popular because of its rapid growth and bril-liantly colored inflorescence. It was eventually identified as *Aechmea servitensis* var. *exigua* by



Wilhelm Weber. It has become very common under this name in American and possibly Australian collec-tions. It is not *Ae. servitensis* var. *exigua,* unfortu-nately. The correct name is *Ae. penduliflora.* Perhaps a cultivar name should be given to the Ecuadorian plant to distinguish it from its less beautiful relatives. The front cover photograph shows a form very similar to the Prinsler introduction but from Limon Cocha in eastern Ecuador.

True *Aechmea servitensis* var. *exigua* (photo right) ► is very rare in cultivation. In Florida it is difficult to grow well as it dislikes high temperatures and is prone to leaf spotting. It is native to southeast Colombia and northeast Ecuador generally above 1000 m elevation. In contrast, *Ae. penduliflora,* in all its myriad forms, rarely grows above 500 m. elevation.

Bob Wands for Selby Gardens

Jewels of the Jungle, Bromeliaceae of Ecuador
Part 1 - Bromelioideae, José M. Manzanares, 2002.

Excerpt from page 192:

OBSERVATIONS:
The variety *exigua* is distinguished from the typical one in its cylindric (versus triangular) inflorescence, red primary and peduncule bracts 1.5 cm wide (versus 5 cm long and pink) and the undersides (abaxially) of the leaves reddish (versus green). It is found only above 1000 m elevation in the province of Sucumbios. It is easily confused with *Ae. penduliflora*, from which it differs in the smaller floral bracts and sepals and the leaves ascending with the undersides reddish and partially covered with white trichomes.

## Alcantarea - A Brief Insight

by Gloria Dunbar 2016

Gloria gave us a very informative and interesting talk on Alcantareas. She began by outlining their history in the family Tillandsioidaea, Class Vrieseas. They were then reclassified into Class Alcantarea, of which there are now 38 species.

The most familiar species in Australia are *Alcantarea extensa*, *regina*, *imperialis, imperialis* 'rubra', *odorata, vinicolor, geniculata, glaziouana, australiana, heloisae, nahoumii, patriae* and many hybrids and cultivars of these species.

*Alcantarea geniculata*

The more popular hybrids / cultivars being *Alcantarea* 'Raymond Red Specks', 'Raymond Golden Brown', 'Whyanbeel', 'Silver Plum', 'Divine Plum', 'Aladdin', 'Vampira' and many more.

Alcantareas grow in Brazil mostly in the States of Minas Gerais, Rio de Janeiro, Espirito Santo and Bahia in the coastal ranges at altitude, rupicolously (amongst rocks) or saxicolous (on rocks) in exposed situations.

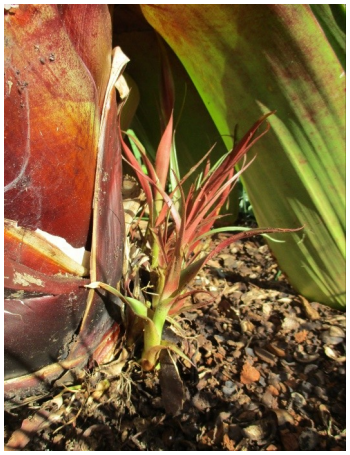
*Alcantarea*
'Raymond Golden Brown'

Alcantareas require good drainage, in pot culture a quality potting mix and large pots are required for good healthy specimens, they also grow extremely well when planted directly in the ground. To obtain the best colour, shape and healthy growth, most Alcantareas need to be grown in bright light to full all day sunshine and fed regularly with a quality slow release fertiliser.

Photos by Ross Little



Alcantareas may be reproduced or increased in numbers by removing the small adventitious pups or hair pups from around the base of the plant or by the larger pups which grow in the leaf axils. When removing hair pups treat them with honey before transplanting, the honey protects the small pup from infection and initiates root growth. The best method of producing great numbers of plants is to grow them from seed, when they have reached a sufficient size, transplant them to community pots and grown on until large enough to be grown in individual pots. Through this growing-on process, feed the seedlings with a dilute soluble fertiliser which will enhance their growth.



Adventitious / hair pups

Most Alcantareas produce adventitious / hair pups around their base and regular pups within the plants leaf axils. However *Alcantarea* 'Silver Plum' is one that is an exception to this rule as it is less inclined to produce either form of pup which means it is mostly reproduced from seed.

Gloria demonstrated the removal of hair pups from *Alcantarea* 'Whyanbeel' using a knife, Gloria located the knife between the pup and the parent plant gradually levering the tiny pup away from the parent, some with roots some without. The pups without roots do quite well and quickly grow roots when placed in their community pot with the other hair pups. These pups need protection, a shade house or a position which is warm but not in direct sun, to be kept moist and fed regularly with dilute soluble fertiliser.

Ross was asked to give a demonstration on the removal of regular pups from his *Alcantarea* 'Aladdin'. After removing several adventitious pups he removed the lower skirt of the plant, which involved the removal of many layers of leaves to access the large regular pups. These pups were large enough in size to be individually potted, their removal will hopefully allow the mother plant to produce several more pups.

*Neoregelia* ‘Julia’
1st Open Jennifer Laurie

*XVriecantarea* ‘Inferno’
Judges Choice Kay Daniels

*Vriesea splendens* hybrid
1st Novice Ted Devine

Mounted Tills - *Tillandsia stricta*
1st Decorative Laurie Mountford



*Neoregelia* ‘Red Macaw’
grown by Michelle Hartwell

*Vriesea* ‘Gruby Tiger’ unreg.
grown by Laurie Mountford

*Tillandsia ehlersiana* and *Tillandsia harrisii*
grown by Helen Clewett

*Neoregelia* ’Gee Whiz’ X
’Pride of Ipswich’

*Ananas ananassoides*
var. *nanus*

grown by John Crawford

*Catopsis compacta*

Photo’s by: Ross Little

## New Species -- *Alcantarea australiana*

by Rob Smythe BSc. hons Chem. MSc 2015

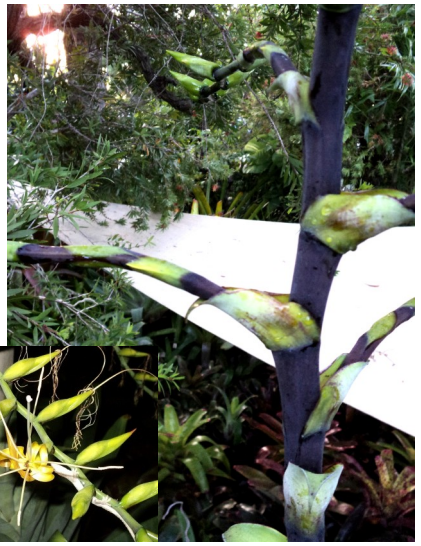
Recently published Bromelias-Gigantes Do Brazil by Versieux & Wanderley. Text is in portuguese, sketches diagrams and pictures detailed in English. Diagnosis of new species *Alcantarea abacta*, *aurantiaca* and *australiana* in English. *Alcantarea australiana* by Versieux and Smythe is found on pages 58-61.

This article is not a translation of the published article. With the original plant I had to do a 3000 klm round trip to study it, only to find no flowers were open. Ross Little organised a herbarium specimen while Don Beard detailed the flowers. I currently have a pup of this original plant in flower in the tropics so I can now submit my own photos here. The species name was very fortunate, just like Terra Australis means Southern land, the core of our chosen name came from this plant being the most southern species in the extensa complex in Brazil. Matching gender of species and genus finishes off the name.

This Alcantarea was collected as seed from near Campos, which is at Santo Antonio do Imbe near 21°58'S, 41°53'W in Rio de Janeiro State close to the border with Espirito Santo State. It was collected by Alan Carle in 2004 and grown in Australia by Bruce Dunston. Samples described below were from plants grown directly from these wild collected seeds. I could see that this was a new species to science so I collaborated with Professor Doctor Leonardo Versieux - a well known *Alcantarea* taxonomist living in Brazil. I would like to thank my friend Leo Versieux for making this dream of mine possible. I received nothing but support and encouragement from him. Well done Leo.

Now to help you find it in your collection:

1) It is circulating under a couple of names but has 'Imbe' on its name tag. I am not aware of anyone crossing it but you should wait till your plant flowers to be sure.



2) A very striking black scape supporting its inflorescence. I have seen somewhat similar colourations with other Alcantareas but they are not as strongly coloured and the colour is less permanent.



3) Stamens are exceptional. They can fold way back forming a wheel of anthers with filaments looking somewhat like wheel spokes.



4) Grown in the sun for a long time I could not tell *Alc. australiana* from *Alc. glaziouana*. After seeing a picture of a possible plant of *Alc. australiana* grown in a garden in Brazil (an old plant with few remaining leaves which were obviously triangular) I realized as my plant matured that this feature allowed me to separate it from *Alc. glaziouana* before flowering. Look for mature leaves that are more triangular rather than tongue shaped.

*Alcantarea australiana* *Alcantarea glaziouana*

5) Flowers are somewhere between *Alc. patriae* and the *Alc. extensa* complex group. Floral bracts less puffy than *Alc. extensa* and a little more puffy than *Alc. patriae*. As I mentioned before stamens are definitely not bundled like *Alc. patriae*. Floral bract and sepals more or less concoloured green, unlike the raised section of the floral bract found to be a darker burnished colour with *Alc. extensa*. Flowers at first sight appeared to me to be a golden colour with a tinge of green at times. Fully mature about 2 am in the morning, petals are haphazardly curled up somewhat like a dishevelled *Alc. patriae* flower.


My colour chart tells me that they are a shiny light brown to burnt orange at this stage.

By morning they have gone through a yellowish stage as petals unfurl. Flowers slightly secund upwards, adjacent flowers subtending an angle of 130 degrees. With newly separating buds this can be as low as 105 degrees and hence obvious when looking at the tip of a branch. Rachilla is geniculate (zig-zag see picture above) to a maximum of 130 degrees.

It is night flowering, opening at dusk. Finally, just after day break, the edges of the petals dehydrate, go orange on the edges then roll in from the sides before going flaccid. Flower can hold its shape longer on wet mornings.

6) Flower count per branch -- it is only topped by *Alcantarea trepida* within the extensa complex. My plant (right & flowering) is still flowering, it is now 270 cm tall with 59 to 67 flowers per branch which themselves are 160 cm. long, 53rd bud with last growth spurt whereas *Alc. trepida* has recorded up to 70 flowers. Otherwise *Alc. australiana* inflorescence looks nothing like *Alc. trepida*. The latter has fully erect branches to begin with. The disposition of the branches of *Alc. australiana*, like lots of alcantareas start erect but then they quickly go patent (flat). It holds this shape for a long time but eventually succumbs to the weight of seed pods and to the extreme lengths of branches thus eventually becoming very pendulous and sigmoidal in shape. There is some influence by position of the sun. My reasons being is that it seems to hold patent shape longer on the side facing the sun, also I have seen photos of plants grown in full sun and all branches have the one disposition.

All pictures used in this article were taken of my current plant flowering 2014-15. It is a pup taken from the type form grown by Ross Little at Pinegrove Nursery.

Acknowledgements: Other than those specifically mentioned in the text I would like to acknowledge Australian contributions -- photos received from Peter Tristram and Shane Barry set the wheels in motion. Greatest support was given by Ross Little, ably supported by Don Beard and Mark Paul with drawings. Ross supplied plants, herbarium specimens and answered whatever was asked of him. His efforts (other than his judgement of his plant's flowering day) were greatly appreciated.



## Crassulacean Acid Metabolism Photosynthesis: 'Working the Night Shift'

by Clanton C. Black and C. Barry Osmond

Crassulacean acid metabolism (CAM) can be traced from Roman times through persons who noted a morning acid taste of some common house plants. From India in 1815, Benjamin-Heyne described a 'daily acid taste cycle' with some succulent garden plants. Recent work has shown that the nocturnally formed acid is decarboxylated during the day to become the $CO_2$ for photosynthesis. Thus, CAM photosynthesis extends over a 24-hour day using several daily interlocking cycles. To understand CAM photosynthesis, several landmark discoveries were made at the following times: daily reciprocal acid and carbohydrate cycles were found during 1870 to 1887; their precise identification, as malic acid and starch and accurate quantification occurred from 1940 to 1954; diffusive gas resistance methods were introduced in the early 1960s that led to understanding the powerful stomatal control of daily gas exchanges; C4 photosynthesis in two different types of cells was discovered from 1965 to~1974 and the resultant information was used to elucidate the day and night portions of CAM photosynthesis in one cell; and exceptionally high internal green tissue $CO_2$ levels, 0.2 to 2.5%, upon the daytime decarboxylation of malic acid, were discovered in 1979. These discoveries then were combined with related information from C3 and C4 photosynthesis, carbon biochemistry, cellular anatomy, and ecological physiology. Therefore by ~1980, CAM photosynthesis finally was rigorously outlined. In a nutshell, 24-hour CAM occurs by phosphoenolpyruvate (PEP) carboxylase fixing $CO_2$ ($HCO_3^-$) over the night to form malic acid that is stored in plant cell vacuoles. While stomata are tightly closed the following day, malic acid is decarboxylated releasing $CO_2$ for C3 photosynthesis via ribulose bisphosphate carboxylase oxygenase (Rubisco). The $CO_2$ acceptor, PEP, is formed via glycolysis at night from starch or other stored carbohydrates and after decarboxylation the three carbons are restored each day. In mid to late afternoon the stomata can open and mostly C3 photosynthesis occurs until darkness. CAM photosynthesis can be both inducible and constitutive and is known in 33 families with an estimated 15 to 20,000 species. CAM plants express the most plastic and tenacious photosynthesis known in that they can switch photosynthesis pathways and they can live and conduct photosynthesis for years even in the virtual absence of external $H_2O$ and $CO_2$, i.e. CAM tenaciously protects its photosynthesis from both $H_2O$ and $CO_2$ stresses.

Abbreviations:
CAM – Crassulacean Acid Metabolism; PEP – phosphoenol-pyruvate;
Rubisco – ribulose 1,5 bisphosphate carboxylase oxygenase;
C3 – three carbon photosynthesis; C4 – four carbon photosynthesis;
PEPCase – phosphoenolpyruvate carboxylase

## Novice Popular Vote

| | | |
|---|---|---|
| 1st | Ted Devine | *Vriesea splendens* hybrid |
| 2nd | Dave Boudier | *Neo.* 'Lady Leonie' |
| 3rd | Keryn Simpson | *Neo*. 'Rosatina' |

## Open Popular Vote

| | | |
|---|---|---|
| 1st | Jennifer Laurie | *Neoregelia* 'Julia' |
| 2nd | Laurie Mountford | *Vriesea* 'Gruby Tiger' (unreg.) |
| 3rd | Kay Daniels | X*Vriecantarea* 'Inferno' |
| 3rd | Gloria Dunbar | *Vriesea* hybrid |

## Judges Choice

| | | |
|---|---|---|
| 1st | Kay Daniels | *XVriecantarea* 'Inferno' |

## Decorative

| | | |
|---|---|---|
| 1st | Laurie Mountford | 'Mounted Tills' |

## Comments from the Growers:

Jennifer obtained her *Neoregelia* 'Julia' from Len and Cheryl Waite of Caboolture. Jennifer grows her bromeliads under 70% beige shade cloth, they receive sunlight most of the day, watered with creek water, it was repotted when first purchased in 2014 and fed with slow release fertiliser.

Laurie grows his *Vriesea* 'Gruby Tiger' (unreg.) in his shade house which is served with an automatic watering system, the plant receives good light most of the day which helps develop the strong colour of the foliage. This hybrid is the result of Ross' crossing of *Vr. ospinae* var. *gruberi* with *Vr*. 'Tiger Tim' circa. 2008. Laurie fertilises his plants regularly, checking for pests and diseases.

Kay obtained her X*Vriecantarea* 'Inferno' as a pup from our Christmas party Gift Swap several years ago. As the large flower spike emerged its brilliant colour caught her attention. Kay has done an excellent job of preparing her plant for competition with members commenting on her presentation.

Gloria obtained her hybrid Vriesea from Melissa Dilling as a gift, it is grown in an area which is relatively humid and receives excellent light which enhances the colour and glow of this Vriesea. Gloria maintains the relative humidity with regular watering and feeds her plants with a quality slow release fertiliser.



Ted's *Vriesea splendens* hybrid is grown in his garden under shade cloth as protection from the hottest sun of the day, obviously enjoying these conditions indicated by the size of the flower spike. Ted uses Confidor for pests and diseases and slow release fertilizer regularly.

Dave and Keryn grow their bromeliads outdoors under large trees and have the elements of Nature to deal with. They have developed a potting mix that matches their environment. Watering when nature does not send the rain and spraying with Confidor for pests and disease along with keeping a problem rodent population under control with baits and traps. (that's farm life).

Laurie has amassed quite a collection of Tillandsias over the years and has found that his large clumps gradually fell apart with age. To overcome this he used a large rectangular piece of cork and covered it with *Tillandsia stricta.* These boards are quite a sight when many of the plants on them flower simultaneously.

## CAM, Non-CAM, Genotypes and Phenotypes by Les Higgins 2016

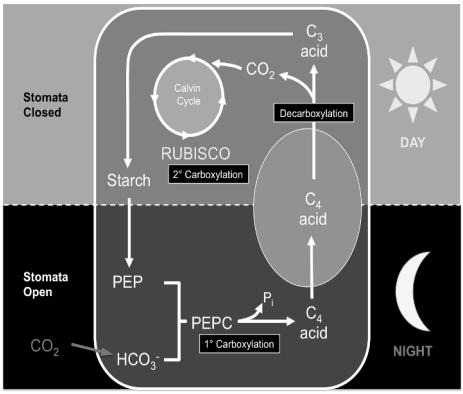
I recently had a rare CAM plant - *Cryptanthus warasii* - on our show table and it prompted me to discuss CAM and Non-CAM plants.

CAM is an acronym for **C**rassulacean **A**cid **M**etabolism a phenomena not restricted to Crassulacea but found in my angiosperms. For example Dyckias are 100% CAM. Unique types of CAM have evolved to enable plants to survive in extremely harsh conditions such as high heat and/or drought or periods of excess water. CAM enables plants to grow where "it never grows". Survival depends on nightly "Freezing Fogs". Extreme water efficiency is achieved by the stomates held closed until well into the dark and cold night thus preventing gaseous exchange. In cultivation fogging after dark is a desirable method of providing moisture to CAM plants.

CAM plants are xerophytes. Almost every CAM plant has thick and rigid leaves to contain vacuoles. Big cell size facilitates the accumulation of malic acid to a useful concentration that doesn't damage the plant.

During day-light while CAM stomates are closed $CO_2$ (respiration waste) accumulates within the cells. The CAM photosynthetic pathway activates in darkness using the accumulated $CO_2$ to manufacture the products of photosynthesis. When $CO_2$ remains in the guard cells the stomates open and photosynthesis continues by using atmospheric $CO_2$. During daylight there is active chemical action moving the product of the night into growth points and therefore CAM grow diurnally.

An Obligate (or Constitutive) CAM plant's growth depends entirely upon the photosynthetic pathway. Simply explained CAM plants are like a car. The acid battery is charged by an engine driven generator. When the car engine has stopped and the electrical circuit remains connected the battery "flattens". In CAM plants the acid within the leaf cells is charged by light, either natural or artificial and facilitates photosynthesis after dark.




A Facultative (or inducible) CAM plant has an ingenious growth technique - it's Non-CAM when water is plentiful and switches to CAM in times of drought. Many plants are able to adjust their degree of "CAMness" according to prevailing conditions. *Cryptanthus colnagoi* is a Facultive CAM plant. Two identical pups were planted into the same potting mix. The CAM grown is far smaller than the identical twin grown as a Non-CAM.

Non-CAM plants are mesophytes whose optimum growth depends upon a benign temperature and adequate moisture. Non-CAM's become easily stressed and heat damaged. Non-CAM photosynthesis is in light and only with open stomates. It was once believed that when stomates closed the plant went to sleep. An innocuous thought ! Products of photosynthesis transfer to growth areas during darkness, consequently Non-CAM's grow at night. In darkness once the stomates close the Non-CAM plant is unable to take up water.

Slow growth is a CAM penalty. Whenever possible grow a Facultative CAM plant as a Non-CAM. To grow an Obligate CAM as a Non-CAM is inviting disease. A Non-CAM when grown in CAM conditions may quickly show a changed phenotype and respond with leaf edge curl, additional pupping and finally death.

Jeanette gave me a beautiful *Cryptanthus beuckeri*, a Non-CAM specie with green Genotype (Genotype = the genetic constitution). My environment is too hot for Non-CAM's, *Crypt. beuckeri* now shows a pink Phenotype, small leaves and increased pupping (Phenotype = a Genotype modified by the environment). Other Non-CAM Cryptanthus that I trustingly purchased are 'Pale Jade' and 'Marble Green', same parents (*beuckeri* x 'Florence'), same breeder !
Same heat problems and no improvements on the parents.

Then there are phenotypes mistaken as genotypes and registered as different plants.