BROMELIANA

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OUR SPRING PLANT ORDER

by Herb Plever

We still have some cool evenings, but it feels like Spring is one the way. I wasn't surprised that we just got another moderate snowfall, but after a very long, cold winter, I suspect we're all ready for the cheer of our annual Spring plant order.

Aechmea abbreviata

The selections are still cut down compared to the choices we used to have in former orders; most of the plants listed are small.

Here is a summary of what you can expect in the order: Among the Aechmeas we have six really small, interesting plants: *A. abbreviata, A.* 'Artichoke' (an *A. recurvata* cultivar), a dwarf form of *A. chantinii, A. correia araujoi, A. gurkenii* and *A.* 'Perez' with jet black foliage. These are plants that will fit and sit on your window sill.

Pursuant to interest expressed at the March meeting we'll have *Araeococcus flagellifolius,* 6 *Canistropsis* including four forms of *billbergioides* and *Canistrum fosterianum* and *C. seidelianum* with chocolate markings.

There are some nice Cryptanthus on the list, all either barred and/or well-marked, including the all dark purple-black *C.* 'Don Garrison'. I had hoped to include the very pink *C.* 'Arlety', but unfortunately it is not available. I have two pieces in a pot close to flowering, and when they bloom and produce pups I'll bring them to a meeting.

We'll have a sprinkling of plants from *Deuterocohnia* (*abstrusa*, formerly *lorentziana*), a few nice, tried-and-true *Guzmania* cultivars, a few small Neoregelias, three Orthophytums (be sure to order *Orthophytum navioides*, if you don't already have one), and *Pitcairnia smithiorum.*

Of course you will have a long list of Tillandsias to choose from. Where you have a choice between a small plant and a medium or large one, I recommend that you choose the larger ones despite the additional cost; you will have a better chance to establish and bloom them.

New on the tilly list are *Tillandsia lautneri* (formerly *T. capitata var. guzmanioides)* and *T. velickiana. T. lautneri* has soft, green, glabrous leaves without trichomes and looks more like a Guzmania than a Tillandsia. I treated it like a Guzmania and put in a 4" azalea pot in an east window where it got decent though not strong light. Though given separate species status, it is a part of the very variable Capitata Complex of plants.

Treat yourself to a Spring present by buying some new bromeliads at our always very affordable prices.

NEXT MEETING - Tuesday, April, 5th, 2016 promptly at 7:00 P.M. at the Ripley-Grier Studios 520 8th Ave. (between 36th & 37th St) Room 16M
PLEASE COME EARLY SO WE CAN START ON TIME.

VIDEO OF PLANT ORDER - Photos of the bromels on the spring order including closeups of their inflorescences to help you make your choices and buy great plants at bargain prices. Please bring in plants for sale and for Show and Tell.

GUZMANIA 'ORANGEADE'

by Herb Plever

I've been growing *Guzmania* 'Orangeade' for over 30 years. Normally it gets to be big plant before it blooms with a 3 ft. diameter, broad leaves and a tall inflorescence with many tiers. The underside bases of the leaves are blotched purple, and the center leaves are suffused with orange and purple when the plant blooms.

Guzmania 'Orangeade'- still growing

Inflorescence to be

The inflorescence sports intense orange bracts, made more dramatic by the purple-black apices. This inflorescence is outstanding - and it stays in color for many months. The plant shown in the photo was started as a very big pup in August, 2014. It has not had the same cultural conditions as its predecessors; it has been fertilized only with sprays of low nitrogen 5-12-26 fertilizer so it has not been pushed to fast, vigorous growth. In addition it has had to put up with a lower relative humidity than its parents since I stopped using humidifiers, as I indicated in a prior issue of Bromeliana.

So it was a great surprise to me when I discovered in December, that my *Guzmania* 'Orangeade' was starting to bloom 16 months after it was potted. At this writing on March 19th, the inflorescence is only 75% grown; the bracts have not yet spread out and yellow flowers have not yet formed. The plant is only 25" across instead of 32" to 36" and the leaves are not as wide or robust as its parent. Still, the inflorescence will be large and multi-tiered.

Guzmania 'Orangeade' is a very easy plant to grow and flower indoors, and the big, deep orange inflorescence is very rewarding and justifies the space that it takes. It is a selected cultivar from a cross of *G. lingulata* with the orange-bracted form of *G. wittmackii,* and it was named and registered with the Bromeliad Cultivar Registry by DeMeyer of Belgium in 1973. Note that I have related this history without stating who made the cross - there is a story that goes with this issue:

The late Nat DeLeon of Miami, Florida claimed many years ago that he had made that cross and that he had an arrangement with DeMeyer whereby Nat would make a hybrid cross and send the seed to DeMeyer for development and selection of cultivars. Nat specifically affirmed to me that *G.* 'Orangeade' was selected and produced from the seed he sent DeMeyer.

I don't know if Nat was initially aware that DeMeyer had registered the name as his plant. After it became a big commercial success, Nat said he was unable to get DeMeyer to acknowledge his ownership. I have never spoken to DeMeyer to get his side of the story. He was an excellent, capable hybridizer in his own right who produced many other great Guzmania cultivars such as *G.* 'Denise', *G.* '*Mini Exodus* and *Vriesea* 'Splendide'.

This conflict certainly should convey a cautionary message to those hybridizers who are still reluctant to name and register cultivars with the BSI's Bromeliad Cultivar Registry. The BCR is the only authorized Registry under the International Code of Nomenclature for Cultivated Plants (ICNCP). The BCR is the official site where all bromeliad cultivars should be registered with names and photos after they have been accredited by our Cultivar Registrar, Geoffrey Lawn and his colleagues Derek Butcher and Eric Gouda. Registration protects the hybridizer and enables growers to access the information with confidence.

Unfortunately, *Guzmania* 'Orangeade' does not seem to be available on any nursery lists. I am glad that a few years ago I was able to bring in six pieces of the plant for interested members; I kept only one piece for myself that is now in bloom. I hope that those members have had success in growing the plant and that they will report on their results in coming meetings. Since we now are unable to get *Guzmania* 'Orangeade' on our plant list, at least we should try to accumulate a stock of the plant for those members who don't have it. ❑

Crassulacean Acid Metabolism Photosynthesis: 'Working the Night Shift'

by Clanton C. Black and C. Barry Osmond

(Reprinted from the Far North Coast Bromeliad Study Group - N.S.W. Australia Newsletter, February 2016.)

(*Editor's note: Here are some basic concepts about metabolism to assist the readers to understand the technical terms in this article. Bromeliads use two kinds of metabolic processes in photosynthesis through which they manufacture food. The energy from light waves is used in a process in which inorganic carbon atoms in CO2 from the air are converted ("fixed" or assimilated) to organic acid sugars.*

Plants take in and give off water (H2O) oxygen (O2) and carbon dioxide (CO2) through their leaf stomata (pores). Low altitude broms in water sufficient, high humidity environments use C3 metabolism photosynthesis. They can keep their leaf stomata open during the day without much loss of water through respiration. Epiphytic and saxicolous bromeliads in higher and dryer environments keep their pores closed during the daytime to avoid water loss. They use crassulacean acid metabolism (CAM) photosynthesis to create sugar energy.)

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 (*a chemical reaction that removes a carbon atom from the carbon chain and releases CO2 - Ed*) during the day to become the CO2 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 CO2 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 CO2 (HCO_3^-) over the night to form malic acid that is stored in plant cell vacuoles. While stomata (leaf pores) are tightly closed the following day, malic acid is decarboxylated thus releasing CO2 for C3 photosynthesis via...Rubisco (*an enzyme present in the chloroplasts that works with atmospheric carbon dioxide during photosynthesis and in oxygenation of the resulting compound during photorespiration - Ed*).

The CO2 acceptor, PEP, is formed via glycolysis (*the breakdown of glucose by enzymes, releasing energy and pyruvic acid - Ed*) 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 H2O and CO2, i.e. CAM tenaciously protects its photosynthesis from both H2O and CO2 stresses.

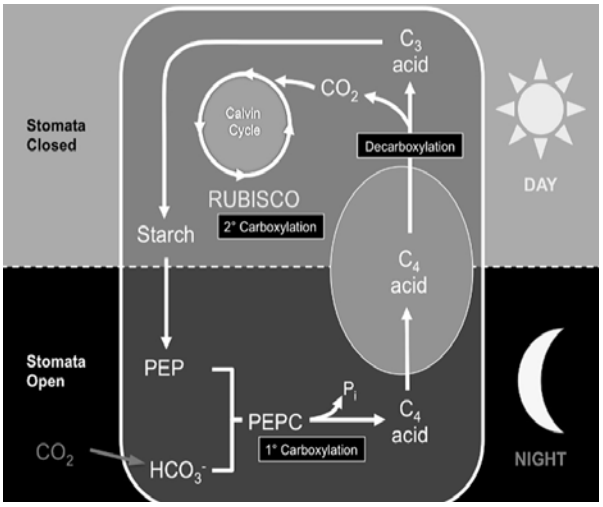
Abbreviations:
CAM – Crassulacean Acid Metabolism; PEP – phosphoenol-pyruvate;
Rubisco - ribulose 1,5 bisphosphate carboxylase oxygenase.
C3 – three carbon photosynthesis; C4 – four carbon photosynthesis;
PEPCase – phosphoenolpyruvate carboxylase ❑
(*Terms ending in "ase" are enzymes. Ed*)

CAM, Non-CAM, Genotypes and Phenotypes

by Les Higgins

(Excerpted from FNCBSG Newsletter Feb. 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 Crassulacean Acid Metabolism a phenomena not restricted to Crassulacea but found in many 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 (*mostly*) 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 CO2 (respiration waste) accumulates within the cells. The CAM photosynthetic pathway activates in darkness using the accumulated CO2 to manufacture the products of photosynthesis.

When CO2 remains in the guard cells the stomates open and photosynthesis continues by using atmospheric CO2. 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... ❑

IN MEMORIAM - Elmer Lorenz, last surviving member of the small band of bromelphiles who founded the BSI in 1950 in California, died early this year.

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