



BROMELIAD SOCIETY OF GREATER CHICAGO

THE BSGC NEWS

September, 2014

President	Lori Weigerding	(630) 978-7340
Vice President	Martha Goode	(815) 459-1623
Treasurer	Paula Dering	(847) 295-2559
Secretary	OPEN	
Newsletter Editor	Steve Goode	stevegoode1@ameritech.net

WEB SITE
Webmaster

<http://bromeliad-chicago.org>
Lori Weigerding

Please note that the next meeting date has changed. We will meet September 21st at 2 pm in Annex 1 at the Chicago Botanic Garden. The tram for the Bright Encounters Tour was not running on the August 10th meeting date so we postponed it until our September meeting. We will meet in Annex 1 first and after our discussion will then go and get our tickets which the Club will pay for. Then we will walk over to the boarding area in front of the Regenstein building.

President's Column

Well I don't know about you, but we certainly enjoyed the vegetables that Charlotte brought to the meeting for us to sample! Oh how I enjoyed those tomatoes and beets. Jeff enjoyed the onion and we both enjoyed the yellow pepper. I was certainly sorry to see the end of them! I want to thank her again for exposing us to such a delicious treat!

Well we've certainly had a great mixture of weather this past month. Soaring heat, pouring rain and now searing cold! For us the pouring rain caused a real big problem as our 12 year old sump died and maybe the ejector pump too! We're still going thru lots of boxes. I pray everyone else has a dry basement and is doing well.

Well the long awaited tram ride will be this month! It's a great chance to see other parts of the garden that you might not get a chance to walk to. We'll meet in the annex first and then go to the pick up point for the tram. We hope that you'll all come and enjoy the tour. The meeting this month is on September 21st, 2014 at 2 PM. Hope to see you there!

Lori Weigerding



Waterfall in Maui

Since we were unable to take the tram tour we saw the seminar, “Ecuador, Land of Bromeliads” that Jose Manzanares gave at the Australasian Conference in New Zealand. One of the reasons that there has not been a lot of exploration in the area of the Condor Mountains is because of the number of land mines that are still in the area. Also, you are required to get permission from the

authorities which requires a lot of paperwork. One thing he talked about was the use of a “black stone” which is used in case of snake bites since getting to a hospital can take several days. Being treated with anti-venom quickly is the best treatment. The use of a ‘black stone’ has its origins in Africa where it was used by witch doctors. The ‘stone’ is a small rectangular piece of fire-charred and blackened cow bone that is filed into the right shape and smoothed by rubbing. The porous ‘stone’ sticks to a drying clot and when immersed in water afterwards produces bubbles as air escapes from the small pores in the bone. This is what caused people to think the ‘stone’ had special properties.

Priscilla asked about telling the difference between different genera. In the 2003 BSI, “Bromeliads, A Cultural Manual”, it says that the genera are grouped according to shared characteristics such as the form of their foliage and inflorescence. In Harry Luther and David Benzing’s book Native Bromeliads of Florida it says that there used to be three major subgroups. They note that with the use of DNA structure which was used beginning in the 1980's, the relationships of bromeliads has changed. Many plants will be moved to different genera. In the future, the plants will be classified according to their genetic relationships. When I looked up the definition of taxonomy, I found the following: biological classification based on characteristics derived from shared descent from common ancestors. When I asked Eric Gouda, a curator at the University Botanic Gardens in Utrecht, Netherlands, I received the following answer:

This is a difficult subject, because some Genera are accepted by one Taxonomist and rejected by others. For example Pepinia was accepted by several

Taxonomists, like Harry Luther, but rejected by others, including me. Each taxonomical group, including the genus level, should be a natural group with one common ancestor for the whole group. New techniques like molecular phylogeny helps to find out what natural groups are and what not and Pepinia turns out to be polyphyletic (not having a common ancestor).

So it is important to find out what the natural groups on genus level are and how to distinguish them morphologically from other genera. Those characteristics can be presented in an identification key, that should make it easier to find closely related species.

One of the most important parts of a species description is the diagnose in which the new species is compared with its most closely related relative. A specialist will know to what group the new species belongs or will find out which species is the most closely related one and that will determine in which Genus it will be placed.

It would be most practical to create natural groups that are not too large, otherwise identification of species will be more difficult. Large genera could be split into subgenera.

Hope this helps,
Eric



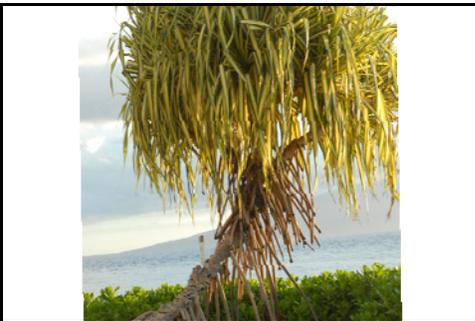
Another Waterfall in Maui

To see the taxon list by Eric Gouda & Derek Butcher, go to <http://botu07.bio.uu.nl/bcg/taxonList.php>

In the May issue of the New York Bromeliad Society's Newsletter, Herb Plevier had the following article:

Our Plant Family Bromeliaceae by Herb Plevier

At recent meetings, I have noticed that our members have only a vague idea of how the Bromeliad Family with its more than 3,200 species is organized. Understandably, they are concentrating on the challenge to grow plants that come from (sub)tropical or desert, low or high altitude, hot or cold, dry or wet environments in their indoor apartments or homes. Moreover, many once popular species are not well known today and are hard to find because of the explosion of attractive hybrid cultivars that has swamped the bromeliad world. We do need discussion and information about horticultural techniques (about which very little is written), but a basic understanding of the family is also essential for a grower's education. Family *Bromeliaceae* (Bro-meel-ee-ay-see-ee) is a part of the flowering plants (angiosperms) subdivision of the the Plant Kingdom. All of its species are monocotyledons (monocots), that is to say that each seed initially has only one leaf. Dicots have two seed leaves. Until about 4 years ago the family was divided into three sub-families: *Pitcairnioideae*, *Tillandsioideae* and *Bromelioideae*. Now taxonomist have converted former sub-family Pitcairnioideae into 6 new sub-families: *Brocchinioideae*, *Lindmanioideae*, *Hechtioideae*, *Navioideae*, *Pitcairniodeae* and *Puyoideae*.



Screwpine(Pandanus) on Maui

Another question that came up during the meeting was, what is tissue culture. I found the following explanation on the web.

Plant tissue culture is a collection of techniques used to maintain or grow plant cells, tissues or organs under sterile conditions on a nutrient culture medium of known composition.

Plant tissue culture is widely used to produce clones of a plant in a method known as micropropagation. Different techniques in plant tissue culture may offer certain advantages over traditional methods of propagation, including:

The production of exact copies of plants that produce particularly good flowers, fruits, or have other desirable traits.

To quickly produce mature plants.

The production of multiples of plants in the absence of seeds or necessary pollinators to produce seeds.

The regeneration of whole plants from plant cells that have been genetically modified.

The production of plants in sterile containers that allows them to be moved with greatly reduced chances of transmitting diseases, pests, and pathogens. The production of plants from seeds that otherwise have very low chances of germinating and growing, i.e.: orchids and...

We discussed the show and were happy with the results. Paula had sent me the report which I shared that showed we made a profit of \$529.51. We were happy with our displays which showed the public many ways to show off their tillandsias. We were very happy to have Ann at a table with her display and plants for sale. She did a great job of explaining to people about the care of bromeliads especially of tillandsias. We hope she will be back again next year. One thing we would like to have is a sign that has Bromeliad Society of Greater Chicago by our display. Since the Garden doesn't want us to put our own sign up, we will need to make sure we request a sign from them.



No Coqui Frog on Maui (they are on Hawaii!)

Another suggestion was to have a Facebook Page before the show with some pictures of bromeliads.

Charlotte brought vegetables from the organic farm where she has been working this summer in the Grayslake area. We all took home some vegetables including beets, tomatoes, green peppers, garlic, cucumber and a few others. The Sandhill Family Farm is a food share farm where you sign up for a share in the harvest. To find out more go to their website: www.sandhillfamilyfarms.com. Charlotte, thanks so much for the fresh vegetables. They were delicious.

We hope Paula and Marjorie are having speedy recoveries.

We would like to welcome the three new members who joined at the Show, Margie and Peter Rodriguez and Rao Subbarao.

Bromeliaceae and its eight sub-families

by Derek Butcher

Yes, you thought there were only three, namely Pitcairnioideae, Tillandsioideae, and Bromelioideae, known by their winged seeds, plumose seeds, and fleshy fruits, respectively. But for the last 10 years much research has been conducted to test whether this classification reflects actual evolutionary history, as reconstructed based on variation in the DNA carried by their chloroplasts.

Things are now taking shape and you should be aware of where things are heading. Thomas Givnish and his team at the University of Wisconsin recently published a paper in 2007 in *Aliso*, where the proceedings of the Third International Congress on Monocot Evolution (held in California nearly five years ago) have appeared in two special issues.



Alcanterea on Maui

Remember we are considering how bromeliads evolved millions of years ago, when North and South America were separated, when the Venezuelan highlands were lowlands ready to be pushed up, and when the Amazon drained through Lake Maracaibo!

Givnish and his colleagues sequenced *ndhF*, a rapidly evolving gene found in the chloroplast, in 35 bromeliads and 16 closely related monocots to infer relationships among present-day bromeliad genera. They found that the long-recognized subfamilies Tillandsioideae and Bromelioideae were each monophyletic - that is, each subfamily included all the descendents of a single ancestor. Surprisingly, however, Givnish et al. showed that the subfamily Pitcairnioideae was strikingly paraphyletic, with both tillandsioids and bromelioids arising from within it. Given the ladder-like family tree the investigators recovered, they found it necessary to recognize EIGHT subfamilies, if each were to be properly monophyletic and easily diagnosed in terms of recognizable morphological characters.

As a result, they described four new subfamilies, recircumscribed Pitcairnioideae and Navioideae, sunk *Ayensua* into *Brocchinia*, and described a new genus *Sequencia* (named after it having been recognized initially based on its

DNA sequence). The subfamily Brocchinioideae is basal-most, sister to all other subfamilies, followed by Lindmanioideae; both of these groups are restricted to the ancient Guayana Shield of northern South America. Above these subfamilies is an unresolved, three-way branch involving Hechtioideae (from Central America), Tillandsioideae, and the remaining bromeliads (involving subfamilies Navioideae, Pitcairnioideae, Puyoideae, and Bromelioideae, in their respective order of branching).

Based on the extent of genetic divergence found among present-day bromeliads, calibrated against the amount of such divergence among various groups of monocots, Givnish and his colleagues inferred that bromeliads arose roughly 70 million years ago, as terrestrial plants with C3 photosynthesis, on moist infertile sites in the Guayana Shield. Subsequently, they spread centrifugally in the New World, and reached tropical West Africa (in the form of *Pitcairnia feliciania*) via long-distance seed dispersal some 10 million years ago.



At the Kula Garden on Maui

Modern genera and subfamilies began to diverge from each other 19 million years ago, implying a great deal of evolution (and most likely, a lot of extinction) during the 51 million years of time since the ancestor of all bromeliads (and only bromeliads) arose 70 million years ago. Bromeliads appear to have begun invading drier areas in Central and South America beginning roughly 15 million years ago, at the same time as bromeliads underwent a major adaptive radiation involving the repeated evolution of epiphytism, CAM photosynthesis, impounding leaves, several features of leaf and trichome anatomy, and an accelerated rate at which new genera subsequently appeared. Givnish and his team call this the "bromeliad revolution", and it appears to have occurred just after the uplift of the northern Andes and the shift of the Amazon to its present course. They suggest that epiphytism may have accelerated speciation by increasing the ability of bromeliads to colonize along the length of the Andes, allowing bromeliads to occupy a cloud-forest landscape punctuated frequently by drier valleys. Avian pollination (mainly by hummingbirds) appears to have arisen at least twice about 13 million years ago, at about the time hummingbirds themselves were diversifying; insect-pollinated, relatively small flowers (like those in *Brocchinia* or *Lindmania*) were ancestral. Despite their representing three different lineages, members of *Hechtia*, of *Puya*, and of *Abromeitiella*-*Deuterocohnia*-*Dyckia*-*Encholirium* have

evolved a suite of several different leaf and trichome traits in parallel, apparently as convergent adaptations to drought.

The new subfamilies with their genera are as follows

Brocchinioideae Givnish, subfam. nov.-TYPE: Brocchinia J. H. Schultes.

Included genus: Brocchinia

Lindmanioideae Givnish, subfam. nov.-TYPE: Lindmania Mez.

Included genera: Connellia, Lindmania

Hechtioideae Givnish, subfam. nov.-TYPE: Hechtia Klotzsch.

Included genus: Hechtia

Puyoideae Givnish, subfam. nov.-TYPE: Puya Molina.

Included genus: Puya

Navioideae, descr. emend.

Included genera: Brewcaria, Cottendorfia, Navia, Sequencia, Steyerbromelia

Pitcairnioideae, descr. emend.

Included genera: Abromeitiella, Deuterocohnia, Dyckia, Encholirium, Fosterella, Pitcairnia

KEY TO BROMELIAD SUBFAMILIES

1. Fruits indehiscent, baccate Bromelioideae
Fruits dehiscent, capsular
2. Seeds plumose-appendaged Tillandsioideae
Seeds winged or naked
3. Flowers dioecious, plants of Central America Hechtioideae
Flowers perfect, or rarely monoecious or polygamodioecious, or dioecious
and plants of the Brazilian Shield
4. Petal blades showy, tightly spiralled after anthesis, broad and distinct from
claws Puyoideae
Petal blades remaining free after anthesis, or if slightly coiled, then not
clawed

5. Petals large and conspicuous or, if minute, then sepals imbricate and anthers basifixed, linear Pitcairnioideae
 Petals minute and sepals cochlear, or petals and bracts various and sepals convolute
6. Sepals convolute Lindmanioideae
 Sepals cochlear and petals minute
7. Leaves entire, stellate chlorenchyma abundant Brocchinioideae
 Leaves toothed, stellate chlorenchyma absent Navioideae



Limahuli Garden Kauai

Am I being premature in bringing these proposed changes to the notice of the layman? I think not, even though the study of DNA is in its infancy it is revealing some interesting results that we should all be aware of. I have used these findings to create a new Key to the Bromeliaceae genera which these days seems to be a yearly chore because of changes. In fact it is a never-ending story. Currently, an international consortium involving labs in the US, Austria,

Germany, England, Panama, and Australia are compiling data on several different chloroplast genes and nearly 100 bromeliads to test the new classification.

Acknowledgments

The author would like to thank Tom Givnish in helping him try to understand the technical parts and present it in a more readable form!

Literature cited

Givnish, T. J., Millam, K.C., Berry, P.E., and Sytsma, K.J. 2007, Phylogeny, adaptive radiation, and historical biogeography of Bromeliaceae inferred from ndhF sequence data Aliso 23, pp. 3-26, Rancho Santa Ana Botanic Garden

Steve and I had a great trip to Hawaii. We visited Maui, Kauai and Oahu where the World Bromeliad Conference was held. Here are a few pictures from our trip. We will have many more in the next Newsletter.



Grand Hyatt Resort on Kauai



Lisa Vinzant, hybridizer with an almost sold out table at the first night of sales at the Conference!