



**S.F.V.B.S.**

**SAN FERNANDO VALLEY BROMELIAD SOCIETY**

**MAY 2018**

P.O. BOX 16561, ENCINO, CA 91416-6561

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### Elected OFFICERS & Volunteers

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Advisors/Directors: **Steve Ball, Richard Kaz –fp, Mike Wisnev –fp, Mary K.,** Sunshine Chair: **Georgia Roiz**  
Refreshments: **vacant** Web: **Mike Wisnev,** Editors: **Mike Wisnev & Mary K.,** Snail Mail: **Nancy P-Hapke**

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**next meeting: Saturday May 5, 2018 @ 10:00 am**

Sepulveda Garden Center 16633 Magnolia Blvd. Encino, California 91436

### AGENDA

**9:30 – SET UP & SOCIALIZE**

**10:00 - Door Prize drawing – one member who arrives before 10:00 gets a Bromeliad**

**10:05 -Welcome Visitors and New Members. Make announcements and Introduce Speaker**

**10:15 –Speaker : Wendell S. (Woody) Minnich**  
**Program Topic: “Bromeliads, Cacti and Succulents in Oaxaca”**

This is a new program presentation, no one has seen it before.



Woody, as he is commonly called, has been in the cactus hobby for some 45 years and has become well known for his participation in many of the cactus and succulent clubs. While traveling all over South America it is difficult not to see some of the wonderful Bromeliads.

Woody is also known for his many presentations. His photography is considered to be special and his commentary very entertaining and educational. He is a recognized international speaker and has spoken for plant conventions - organizations all over the USA, as well as in England, Germany, Australia, New Zealand and Mexico. **Don't miss this meeting!**



**11:15 - Refreshment Break and Show and Tell:**

Will the following members please provide refreshments this month: **Barbara Wynn, Colleen Baida, Steve Ball, Wesley Bartera, David Bassani, Kaz Benadom, Helen Berger, Jeanette Bond and anyone else who has a snack they would like to share.** If you can't contribute this month don't stay away.... just bring a snack next time you come.

**Feed The Kitty**

If you don't contribute to the refreshment table, please make a small donation to ([feed the kitty jar](#)) on the table; this helps fund the coffee breaks.

**11:30 - Show and Tell is our educational part of the meeting** – Members are encouraged to please **bring one or more plants.** You may not have a pristine plant but you certainly have one that needs a name or is sick and you have a question.

**11:45 – Mini Auction:** members can donate plants for auction, or can get 75% of proceeds, with the remainder to the Club

**12:00 – Raffle:** Please bring plants to donate and/or buy tickets. Almost everyone comes home with new treasures!

**12:15 - Pick Up around your area**

**12:30 –/ Meeting is over—Drive safely <**

**Announcements**

- **Happy Birthday** to **Jeri Hughes, May 21, Kathleen Misko May 31**
- **National Public Gardens Day** is Friday before Mother's Day on May 11, 2018.
- **LBVBS Bromeliad One Day Show and Sale** 10:00 – 5:00 pm. – Sat. May 12 at Live Art Plantscapes. For additional info contact Peter Speziale at [peter.speziale@gmail.com](mailto:peter.speziale@gmail.com) or at the meeting, or (860)384-2141 Live Art Plantscapes, 1323 W. 130<sup>th</sup> St., Gardena, CA
- **Advertisement** - Should SFVBS send a \$60.00 add in memory of *Max Wurzel and Bob Friedman* to BSI?
- **Message from San Diego Bromeliad Society .....**  
<http://www.sandiegobromeliadsociety.org/world-conference.html>  
*Hi fellow affiliates, hope many of you can join us at the WBC 2018 in San Diego! We have a lineup of wonderful speakers: Li Ping (China), Peter Waters (New Zealand), Jose Manzanares (Ecuador), Paul Isley (CA), Pam Hyatt (CA), Dennis Cathcart (FL.), Ivon Ramirez (Mexico). We hope you can join us on Mission Bay in San Diego May 29-June 3. Even if you are unable to join us, please take out an ad in the program to aid BSI in this endeavor to offer excellent conferences. If each affiliate took out a 1/4 page ad for only \$60 we would be well on our way to funding the conference and future conferences. It can be a very simple ad, such as:*  
*"Wishing you well on the BSI WBC 2018 from the Bromeliad Society of \_\_\_\_\_."*  
*Or anyone can send an individual ad from a person or an "in memory of \_\_\_\_\_ who loved bromeliads too."*
- **World Bromeliad Conference May 29 – June 3** - The opportunity to attend a BSI conference this close to home doesn't happen often. If you really like bromeliads, want to learn more about them, see some of the best specimens being grown around the world and have an opportunity to purchase one or two new hybrids..... you don't want to pass up this event. **A bus trip** from Culver City to the BSI Conference is currently being organized by Phil Kwan for **Saturday May 31**. For more info or to sign up, please contact Phil Kwan at [philkwan@ucla.edu](mailto:philkwan@ucla.edu) or (310) 206-3022.

**Please pay your 2018 Membership Dues**

**NEED TO RENEW ?.....**

**Pay at the meeting to: Membership Chair – Joyce Schumann or Treasurer - Mary Chan**  
**or Mail to: SFVBS membership, P.O. Box 16561 - Encino, CA 91416-6561**  
**Yearly Membership Dues - \$10 for monthly e-mail newsletters or \$15 for snail mail**

**Please Put These Dates on Your Calendar**

Here is our 2018 Calendar. Rarely does our schedule change..... however, please review our website and email notices before making your plans for these dates. Your attendance is important to us

Saturday & Sunday June 8 & 9	<b><i>SFVBS Bromeliad Show &amp; Sale</i></b>
Saturday July 7, 2018	<b><i>STBA</i></b>
Saturday August 4, 2018	<b><i>STBA</i></b>
Saturday September 1, 2018	<b><i>STBA</i></b>
Saturday October 6, 2018	<b><i>STBA</i></b>
Saturday November 3, 2018	<b><i>STBA</i></b>
Saturday December 1, 2018	<b><i>Holiday Party</i></b>

**STBA = Speaker To Be Announced**

**Speakers** Let us know if you have any ideas for Speakers about Bromeliads or any similar topics?

We are always looking for an interesting speaker. If you hear of someone, please notify John Martinez [johnwm6425@gmail.com](mailto:johnwm6425@gmail.com) or Bryan Chan [bcbrome@aol.com](mailto:bcbrome@aol.com) <>

**Don't forget Mother's Day Sunday May 13!!**

**Member photos.... submitted by Mary Chan.** Pictures taken during the April 21st garden tour at the home of Duke & Kaz Benadom and also at the Somis nursery shared by John Martinez and John Matthews.



Member photos... submitted by Mike Wisnev.

*Pictures of Bromeliads in Ecuador*, are courtesy of Jerry Raack.

Jerry Raack is a long-time bromeliad enthusiast (about 50 years!) who recently posted some great habitat pictures from his trip to Ecuador. See <http://botu07.bio.uu.nl/Brom-L/>. He graciously allowed his pictures to be used in the Newsletter. Thanks so much to Jerry for sharing these photos.

Last month showed Jerry's pictures of *Tillandsia portillae*. Jerry said that "*Racinaea euryelytra* and *Tillandsia ionochroma* are common companion bromeliads on the same trees." I didn't show pictures of them since I figured most club members had these species. I am kidding, since I have never heard of either – so I asked Jerry if he had pictures and he send me some. He also provided the information below. Many thanks!

*"Racinaea euryelytra* [shown here] has the long thin rather colorless inflorescence. Most *Racinaea* like this have very minute ivory-colored flowers of little significance. However, when silhouetted against a sky they can be very decorative in an architectural



sense. Some have very beautiful leaves in architectural rosettes. I believe there are still *Racinaea* out there to be published since they have not been studied in too much detail due to the lack of color in the inflorescence of many. However, there are some *Racinaea* with very beautiful blooms (*decipiens* var *tomentosa*, *biflora*, *tetrantha*, and *tripinnata* to name a few).

*Tillandsia ionochroma*

[shown here and 3 pictures below] is a more "traditional" bromeliad with a tank that holds water with an open rosette of leaves. It is variable and found over a wide area of Ecuador, always at fairly high altitude (2800 meters = 9200 feet). It can range from small plants only about a foot wide, green with spots on the lower surface of the leaves, to large plants measuring 24" in diameter with either wholly green or red, or spotted leaves.



“I have attached a number of pictures to show the variability.



“Common trait is the thick pendant red inflorescence with blue flowers. Always very beautiful no matter where you find it.

Not an easy plant even for me to raise. Part of the issue in raising things like this out of their native habitat is getting successive generations of the same plant to mature in the new environment. In doing this, they will acclimate to the new environment to some degree and become easier to raise. Trick is getting through the first, second and sometimes third generation.”



Thanks very much to Jerry Raack for sharing these photos!

# Taxonomic Tidbits:

## *The latest news on subfamily Bromelioideae*

By Mike Wisnev, SFVBS Editor ([mwisnev@gmail.com](mailto:mwisnev@gmail.com)) Photos by Wisnev unless noted.  
San Fernando Valley Bromeliad Society Newsletter – May 2018

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The Bromelioideae subfamily is one of three traditional subfamilies in the bromeliad family. All of its members have berry-like fruit and seeds that are neither hairy nor winged. Many have a tank top habit and use CAM. This subfamily includes many of the more popular genera, such as *Neoregelia*, *Billbergia*, *Aechmea*, *Portea*, *Quesnelia*, *Orthophytum* and *Cryptanthus*. The other two traditional families were Pitcairnioideae (which included *Pitcairnia*, *Dyckia*, *Hechtia*, and *Puya*) and Tillandsioideae (which includes *Tillandsia*, *Vriesea* and *Guzmania*).

If you follow these Newsletters, you know that DNA studies (actually called phylogenetic studies) have dramatically impacted bromeliad taxonomy. The biggest surprise is the traditional *Pitcairnioideae* subfamily has been broken into six subfamilies. It no longer includes the very similar looking *Puya* and *Hechtia*, each of which belongs to its separate subfamily.



Compare this clump growing at HBG, with the one on shown on the next page. Can you tell which is a *Dyckia* and which is a *Puya*? It seems hard to believe they aren't in the same sub-family of bromeliads.

Species of the other three subfamilies are rarely seen. More details can be found in the Sept. 2014 SFVBS Newsletter online.



### Is this a *Dyckia* or *Puya*?

While the *Tillandsioideae* subfamily is valid, *Tillandsia* and *Vriesea* have been reorganized significantly. Though each is still a huge genus, some former *Vriesea* and *Tillandsia* species were broken into about ten new genera (*Pseudalcantarea*, *Barfussia*, *Lemeltonia*, *Wallisia*, *Josemania*, *Goudaea*, *Jagrantia*, *Lutheria*, *Stigmatodon* and *Zizkaea*). Others are now in the *Cipuropsis-Mezobromelia* complex that includes the some former members of the *Mezobromelia* genus. (The same study moved 4 other former *Mezobromelia* members into a new *Gregbrownia* genus.) The *Racinaea* genus, first described in 1993 and then consisting of about 46 former *Tillandsia* species, was confirmed, and now has over 70 species. The *Tillandsia* subgenera have been revised significantly. For more details, see the Dec. 2016 and Jan. and Feb. 2017 Newsletters.



*Tillandsia cyanea* is one of the few bromeliads I had before I joined the club. It is commonly sold at cactus and succulent shows, but I don't see it as much at bromeliad shows and sales. It had been the well-known *Tillandsia cyanea*, but now the name is *Wallisia cyanea*, a small genus of similar species.



This article focuses on some fairly recent DNA studies that focused on the Bromelioideae subfamily generally, as opposed to specific genera within it. Let's start out with the bottom line. The good news is that no, we don't have to change our labels.

Nothing definitive has come out on most genera. The bad news is that this is about the only good news. While there is no doubt that is a valid subfamily, studies to date suggest that very few genera will remain unscathed! This actually isn't a surprise to most botanists in the bromeliad world.

How do these studies work? Basically, however, each study samples the DNA of various species, and then uses statistical analyses to infer which species are related to each other. They create a kind of evolutionary tree. A genus is considered monophyletic if all the sampled members of a genus fall on one branch (including side branches), and there are no other species of a different genus on that branch. Otherwise, the genus needs to be broken up in some fashion: at a minimum, one species has to be moved in or out of the genus. More drastically, various genera may be split up, disappear, be combined into other ones, and new ones might have to be created. While the determination of whether a genus is monophyletic is objective, there is some subjectivity in deciding how to fix the problem.

One key point is that these studies involve sampling. First, none of the studies test every species – they sample some of them in a variety of different genera. Second, they don't come close to testing all of the DNA. Rather they test a few markers out of the thousands or millions available. The results of different statistical analyses are compared, and tested using other statistical methods. Depending upon the results, and how well they correlate with morphological features, the study may suggest one or more changes in classification.



Not labelled, this looks a lot like *Neoregelia carolinae*. Surprisingly the results of one study found *Neoregelia carolinae* wasn't it isn't a *Neoregelia*. I suspect this is not correct, and likely due to not enough DNA sampling. If it does turn out not to be a *Neoregelia*, the genus may need a new name since it is the type

species for the genus.

Studies have found the Bromelioideae subfamily is the youngest subfamily and it has exhibited many morphological changes, it has apparently changed very slowly from a genetic standpoint. This extremely slow rate of change has made it difficult to get very good resolution in many cases. For this and other reasons, the authors of the studies have not proposed any changes to the genera. Nonetheless, one would expect at least some of these results will prove accurate.

# *Aechmea paniculata*



Figure 5. A portion of the inflorescence of *Aechmea paniculata* seen in Fig. 4. Photo by Eric Gouda.

66(1) JBS 23 (2017). *Aechmea paniculata* is the type species of the genus. First described and illustrated (with enormous spines!) in 1802, it wasn't in cultivation or found again until Prof. Eric Gouda recently found it in habitat in Peru. The illustration is shown in the July 2016 Newsletter.

Because this is the type plant, it will remain an *Aechmea* no matter how much that genus is broken up, or how many species are in the associated group. The only way this wouldn't happen is if *A. paniculata* is moved into an older genus or someone applies to keep the *Aechmea* name with another group and it is approved.

Earlier studies generally on tested one or two markers and relatively few species. The more recent studies have increased the number the species studied, as well as the number of DNA markers. This article reviews some of the findings of three of the more recent studies, all of which sampled more than 100 of the roughly 900 Bromelioideae species.

These three studies are:

1. **2015 Study**. The latest paper was designed to provide a framework for the Bromelioideae genera, with emphasis on some of the earliest lineages and *Aechmea*. See Evans, T.M., R. Jabaily, A.P. de Faria, L.O.F. de Sousa, T. Wendt, and G.K. Brown. 2015. Phylogenetic Relationships in Bromeliaceae Subfamily Bromelioideae based on Chloroplast DNA Sequence Data. *Systematic Botany*, 40(1):116-128.
2. **2014 Study**. This study investigated two features of Bromeliads believed to account for their extraordinary diversification: the tank habit and *CAM*. Silvestro, D., G. Zizka, and K. Schulte. 2014. Disentangling the effects of key innovations on diversification of Bromelioideae (Bromeliaceae). *Evolution* 68: 163–175.
3. **Aechmea Study**. The earliest study was in 2010 and was primarily about *Aechmea*. Over half of the species studied were *Aechmea*. See Sass, C. and C. D. Specht. 2010. Phylogenetic estimation of the core Bromelioids with an emphasis on the genus *Aechmea* (Bromeliaceae). *Molecular Phylogenetics and Evolution* 55: 559–571.

This article focuses on the 2015 Study, both because it is the latest and is designed to provide “a broad framework upon which to develop a reliable, phylogenetically based taxonomy for the subfamily.” 2015 Study at 117-118. Unless indicated otherwise, the information below is all derived from the 2015 Study.

Before continuing, note an unusual aspect of this article. It was finished in November 2015, but never put it in a Newsletter. Instead of rewriting it to reflect new studies on some specific genera, it seemed more interesting to leave it as is to see how accurate these earlier studies have been. So the rest of the article hasn't been revised, other than to add [Updates, marked as such and printed in blue](#).

[Update 1](#). As far as I know, there have been no newer major studies of this subfamily. The more recent studies are on individual genera, or related ones. Presumably after these are worked out, some will study the relationships within the subfamily. *Aechmea* will no doubt be the hardest.

## *Aechmea chantini*



A lovely display of *Aechmea chantini* at Live Art Nursery.

The studies above suggest this will remain an *Aechmea*.

Assuming you have some interest in the status quo, if for no other reason than not having to learn more names, the news couldn't be much worse! While the 2015 Study involved 28 genera, seven were monotypic (which means the genus has only one species) or only had one species studied. The results for three genera were inconclusive. Of the remaining 18 genera, only two of them were good as then constituted: *Bromelia* and *Cryptanthus*. One analyses found *Ananas* (the pineapple genus) was good, while the other was inconclusive. But the 2014 Study and other ones have found that *Cryptanthus* and *Ananas* aren't valid, so that really leaves only *Bromelia*.

The other 15 genera were problematic in varying degrees. In some cases, it looks like the genus will probably be preserved with a few changes. In others, rather drastic changes are likely.

## *Neoregelia eleutheropetula*.



*Neoregelia* is likely a good genus, though some species may be end up stripped out.

Currently there is more than one *Neoregelia* subgenus, like the one shown to the left in subg. *Hylaeaicum*. Some or all species (like *N eleutheropetula*) in those other than subg. *Neoregelia* will likely need to be moved to other genera.

***Billbergia***. This genus also fared reasonably well. While most of the species sampled fell together in both the 2015 Study and the *Aechmea* Study, a few others fell into different branches. However, the division into two subgenera, based on floral characteristics, may be a problem.



labelled *Billbergia* sp. Brazil, this plant seems to be either *Bill. zebrine* or *Bill. porteana*, which are closely related species in *Billbergia* subg. *Helicodea*. The flowers are rather different in a number of ways from those in subg. *Billbergia*.

It isn't clear yet if this subgenus will remain intact, or even if some *Billbergia* might be moved to other genera.

***Hohenbergia***. There are two *Hohenbergia* subgenera, distinguished in part by geography. All of the studies have found they are not a single genus. It seems likely each subgenera will be its own genus, perhaps with some other species mixed in. [Update 2. \*Hohenbergia\* subg. \*Wittmackiopsis\* is now in the resurrected \*Wittmackia\* genus, which also includes four former \*Ronnbergia\* species and the so called \*Aechmea lingulata\* complex members. See the August 2017 Newsletter for more details.](#)

## *Hohenbergia correia-araujoi*

*Hohenbergia correia-araujoi* - probably the most well-known member of the genus. Over half of the *Hohenbergia* were recently moved into the resurrected *Wittmackia* species, but they are rarely cultivated. The rest are likely to remain together, perhaps with some *Aechmea* or species of other related genera.



### *Aechmea*

Botanists have long suspected that this genus isn't a good one. It has been divided into eight subgenera, distinguished in part by various features of their inflorescences, and many felt these were unlikely to be valid either. These suspicions have largely been borne out by the studies. It seems extremely unlikely that *Aechmea* will survive in any way close to its current groupings. In fact, *Aechmea* showed up on 12 different branches! For that matter, the subfamilies most likely won't survive either as they currently exist.



## *Aechmea distichantha*



*Aechmea distichantha* is fairly common, and makes an excellent landscape plant if you have room for it. This is a large clump of it at HBG. Based on studies to date, it seems unlikely it will remain an *Aechmea* – it seems more closely related to some *Quesnelia* like *Q arvensis*.

Moreover, these different branches of *Aechmea* are scattered all over the tree. To put this in a different perspective, assume the results of the 2014 Study or the *Aechmea* Study turned out to be completely correct, and for some reason the authors wanted to keep every *Aechmea* in that genus. (Recall that there are different ways to solve these problems which range from creating a super-genus to making lots of little ones.) To do so, it would be necessary to merge all of the following genera into *Aechmea*: *Billbergia*, *Neoregelia*, *Nidularium*, *Quesnelia*, *Hohenbergia*, *Portea*, *Canistrum*, *Canistropsis*, *Edmundoa*, *Wittrockia*, *Lymania* and a few more. The 2015 Study is even worse – in addition to including all of these in *Aechmea*, you would need to include *Orthophytum* and *Cryptanthus* and others.

One subfamily that might survive is the *Ortgiesea* subfamily, which is characterized by their connate sepals with long mucros. The type plant for subg. *Ortgiesia* is *Ortgiesia tillandsioides* which is now the very well-known *A recurvata*, shown below.

## *Aechmea recurvata*



(This is also an excellent landscape plant that can take a lot of sun.) In particular, the 2014 Study and some others have supported this as a valid group. While the 2015 Study stated none of the subfamilies were valid, the three species of this subfamily were grouped together.

Update 3. Given the large number of species and the fact they show up all over the tree, it will likely take an enormous study to fully revise *Aechmea*. As noted above, some *Aechmea* have been moved to the new *Wittmackia* genus; the same study moved twelve other *Aechmea* into the related *Ronnbergia* genus.

In addition, based on limited sampling, the *Aechmea* Study noted that there was a clade consisting of *Portea*, three *Aechmea* and a *Canistrum* species. A much more extensive 2015 study on this group confirmed this result. See the Jan. 2016 Newsletter. This study showed at least at least three *Aechmea* will most likely moved into *Portea*. More importantly, the roughly 25 *Aechmea* species formerly considered *Gravisia* (along with at least 3 *Canistrum*) would likely either be moved into *Portea* or a new genus. They said more studies were needed finalizing these changes. To my knowledge, no changes have been in this regard.

## *Aechmea blanchetiana*

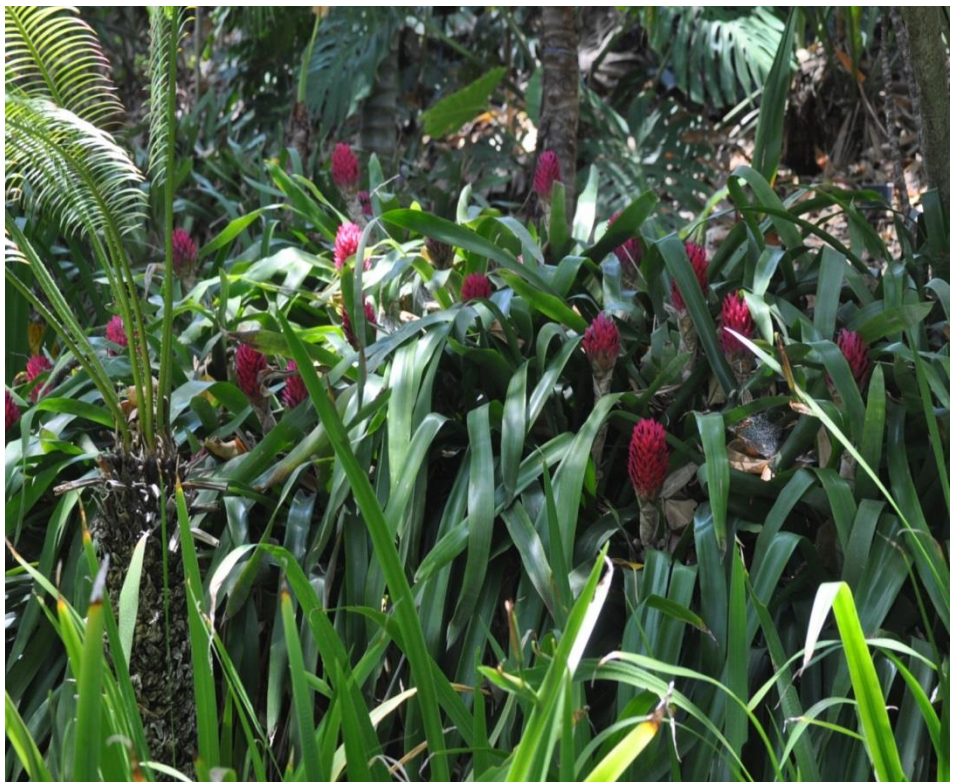


The well known *Aechmea blanchetiana* will likely end up as a *Gravisia* or perhaps even *Portea*.

*Quesnelia*. While only two species were studied, they were found not to be closely related. Interestingly, *Q arvensis* was found on a branch with *A. nudicaulis*, which is consistent with some other studies. The 2014 Study had 4 *Quesnelia* species, and none of them were grouped together! Interestingly, it showed *A nudicaulis* as sister to *Q liboniana*, and *Q arvensis* was fairly far away.

## *Quesnelia*.

This is one of many large clumps labelled *Quesnelia arvensis* at HBG. It would be most unexpected if it isn't in the same genus as the very similar *Q. quesneliana*, which is the type species (as *Q rufa*). Thus, even if *Quesnelia* is broken up, these two species are likely to remain *Quesnelia*. Some studies show indicate it is fairly closely related to *A distichantha*, shown earlier, and perhaps not a shock given their long leaves and red and blue flowers.



***Orthophytum***. This genus has been informally divided into two groups – one with sessile inflorescences and the other with scapose ones.<sup>1</sup> While the 2015 study found that these two groups were valid, they did not belong together and thus may constitute different genera. However, a more extensive study of most of the *Orthophytum* species found that the sessile group needs to be broken up, perhaps into two groups, and that one sessile member grouped with scapose group.<sup>2</sup> Update 4. As discussed in the June 2017 Newsletter, 11 species of the sessile group are now *Sincoraea*. As discussed in February 2018, there are now five *Orthophytum* subgenera.



Figure 3. This photo resembles one of the commonly cultivated clones of *Sincoraea burle-marxii*, but the species is variable in appearance among wild populations. Photo by Rafael Louzada.

66(1) JBS 6 (2017).  
PREVIOUSLY  
*ORTHOPHYTUM*  
*BURLE-MARXII*.

*Cryptanthus*. As noted above, the 2015 Study found this was a good genus. However, the 2014 Study found otherwise, as did the *Orthophytum* study noted in the previous paragraph.

Update 5. As discussed at length the last two months, many *Cryptanthus* species have been moved into the new *Haplocryptanthus* (which includes one former *Lapanthus* species), *Rokautskyia* and *Forzzaea* genera.

<sup>1</sup> Studies on *Orthophytum*, an Endemic Genus of Brazil - Part I by Elton M. C. Leme in J. Brom. Soc. 54(1): 36-7. 2004.

<sup>2</sup> See Louzada, R.B., Schulte, K., Wanderley, M.L., Silvestro, D., Zizka, G., Barfuss, M.H.J., Palma-Silva, C., Molecular phylogeny of the Brazilian endemic genus *Orthophytum* (Bromelioideae, Bromeliaceae) and its implications on morphological character evolution, *Molecular Phylogenetics and Evolution* (2014).

## *Quesnelia liboniana*

A large clump of *Quesnelia liboniana* at the HBG. It looks a lot like a *Billbergia*, and together with some *Aechmea* species shows up on a sister clade to *Billbergia* on some studies. It is rather unlikely it will end up a *Quesnelia* - whether it ends up a *Billbergia* or in some other genus is unknown.



Nidularioid Complex. Elton Leme has grouped *Nidularium*, *Canistrum*, *Canistropsis*, *Edmundoa*, and *Wittrockia* in the so-called Nidularioid complex. While this complex is generally supported by all three studies, the various genera in this complex were problematic. While the studies varied in their results, it seems likely species in some of these genera will be moved around. *Wittrockia*, *Edmundoa* and *Canistrum* may have to be split up. The *Aechmea* Study and 2014 Study also show that some *Neoregelia* (like *Neo. eleutheropetula* shown earlier) may be moved into this complex, while at least one other study indicates they are more closely related to some *Aechmea* species.

**Other Results.** The 2015 Study corroborated earlier studies finding that *Bromelias*, *Fascicularia*, *Ochagavia* and *Deinacanthon* were the earliest lineages in the Bromelioideae subfamily. The precise location of each varies among different studies. It seems likely that *Fascicularia bicolor* will end up being an *Ochagavia*.



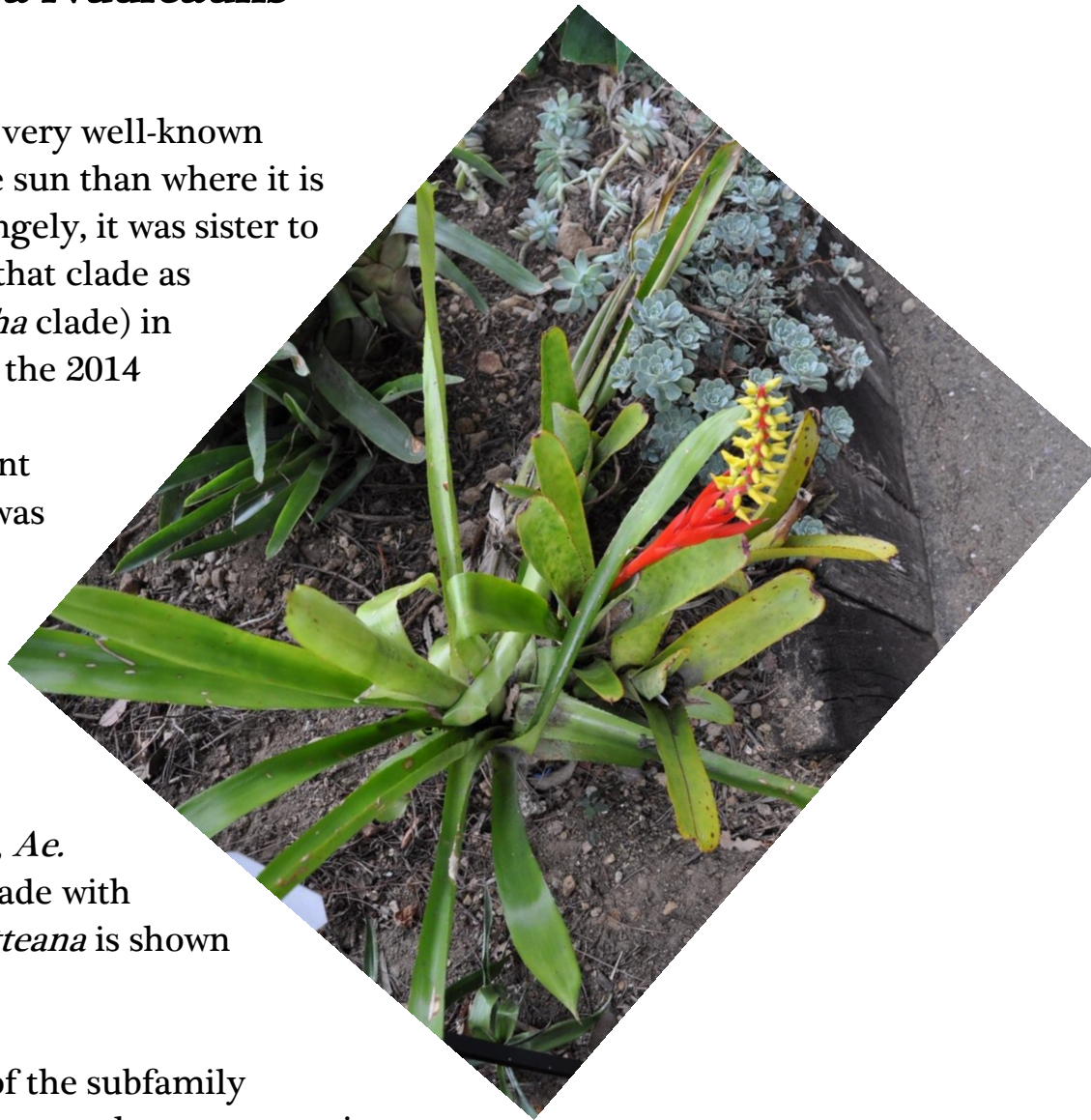
Labelled *Fascicularia bicolor*. I have had it for six years, and it hasn't bloomed yet but has pupped profusely. Studies suggest this species will become an *Ochagavia*.

These early lineages lack both CAM and a tank habit. While many have hypothesized that CAM and the tank habit were critical features driving the diversification of Bromeliads, the 2014 Study developed a new methodology to measure it. They found that “CAM physiology was found to mainly correlate with higher speciation, whereas the tank habit was associated with lower extinction.” 2014 Study at 170. Earlier studies had already found that CAM developed a number of different times in the subfamily.

Finally, the results of the *Aechmea* Study suggest that geography may be more important than morphology for taxonomic purposes. It found a number of cases where genera with a common morphology but disjunct locations should be broken up. In other cases, species of different genera found in the same general location were grouped together. [Update 6](#). The studies on *Ronnbergia* and *Cryptanthus* strongly support his conclusion – while some of the new genera had similar morphology, they were found different locations.

## *Aechmea nudicaulis*

*Aechmea nudicaulis* is a very well-known species. It can take more sun than where it is grown here. Rather strangely, it was sister to *Quesnelia arvensis* (and that clade as sister to an *A. distichantha* clade) in the 2015 Study, while in the 2014 Study it was sister to *Q. liboniana* and quite distant from *Q. arvensis* (which was sister to an *Ae. distichantha/Ae. vanhoutteana* clade). In a 2004 study based solely on morphology, it wasn't close to either *Quesnelia*! In that study, *Ae. vanhoutteana* was in a clade with *Q. arvensis*. *Ae. vanhoutteana* is shown on the next page.



As initially noted, none of the subfamily Bromelioideae studies suggested any taxonomic changes yet. More extensive testing and sampling will hopefully provide more resolution. But it is clear that many of the morphological features currently used to delineate genera have evolved more than once. As a result, a number of genera will no doubt be broken up or combined in some fashion.

While DNA testing will hopefully provide some clarity as to which species are grouped together, it won't tell us what groups are genera vs. subgenera etc. The testing leaves plenty of room for lumpers and splitters, based on how well the groups are distinguished by various morphological features.



*Aechmea vanhoutteana* was first described and illustrated as *Quesnelia Van Houtteana* in *La Belgique Horticole* (1881) pl XVII. Despite looking much like *Q. arvensis* and *quesneliana*, it was moved to *Aechmea* a decade later.

Recent DNA studies suggest it may be grouped with some *Quesnelia* as described in more detail in connection with the *Ae. nudicaulis* photo on the prior page.

Last Update. As can be seen, these studies have been pretty accurate on the whole. They are hardly perfect. For example, while the 2015 Study correctly separated the now *Sincoraea* genus from *Orthophytum*, it indicated that *Sincoraea* is not closely related, which appears incorrect. The 2014 Study was much more accurate in this regard, showing a Cryptanthoid complex that correctly showed the relationships among *Orthophytum*, *Cryptanthus*, *Sincoraea* and *Rokautskyia*.

Looking more at the 2014 Study, it seems it was quite accurate. It correctly showed that the two *Hohenbergia* subgenera should to be broken up (and the sister relationship of one subgenus to *Ronnbergia*), that some *Aechmea* would be moved to *Ronnbergia*, and that there is a *Portea/Gravisia/Canistrum* complex.

Given the accuracy of this 2014 Study, I was curious what it showed regarding *Aechmea*. As noted earlier, there are all sorts of ways to break up a DNA tree, depending on whether related groups are treated as one group or more than one.



# *Wittmackia lingulata*



Left is *Wittmackia lingulata* in Bot Mag t.8056. 1906. Originally considered a *Bromelia*, it has been considered an *Aechmea*, *Billbergia* and *Hohenbergia*, among others. Leme and Filho grouped a number of *Aechmea* with this species in the *Ae. lingulata* complex.

These *Ae. lingulata* complex species are all now considered *Wittmackia*.

Without considering morphology (which is something a botanist would never do!) and preserving *Billbergia* and *Hohenbergia*, the results show that *Aechmea* would need to be broken into at least six genera, as follows:

1. One group with three clades – one all *Aechmea*, a second of *Aechmea* (incl. *A. luedemanniana*) and *Lymania* and a third of *Aechmea* (incl. *A. fulgens* and *miniata*) and *Androlepsis/Ursulaea*. [The *Aechmea* Study also showed a similar *Aechmea/Ursulaea* clade and *Aechmea/Lymania* clade, though they were not grouped together.]

2. One group of all *Aechmea* (and *Q. liboniana*). All but two of the *Aechmea* were in subg *Ortgiesia*. This group is sister to a group of *Billbergia* and *Quesnelia*. [The *Aechmea* Study also showed an *Ortgiesia* clade.]
3. One group of five *Aechmea*, including the well-known *A. chantini*. [Four were included in one large clade of all *Aechmea* in the *Aechmea* Study.]
4. *A. vallerandii* and *colombiana* (both previously *Streptocalyx*) are sister to a clade of one *Hohenbergia* and one *Canistrum*. [In the *Aechmea* Study, it appears *Streptocalyx* were in the clade described in paragraph 3. ]
5. As noted above, *Aechmea* belonging to the Gravisia group would be broken out or moved into *Portea*. This complex is sister to a clade with *A. fosteriana* and *bambusioides* and *Q. edmundoi* that would either be part of it or made into a 7<sup>th</sup> group. [The *Aechmea* Study also showed this *Portea/Gravisia* group, but didn't include the other three species mentioned in the sample.]
6. *Aechmea distichantha* and *turbocalyx* were in a group with *Q. quesneliana* and *arvensis*. This group was a sister clade to the so-called Nidularioid complex and quite distant from all other *Aechmea*. The *Aechmea* Study and 2015 Study also showed *A. distichantha* and *Q. arvensis* as closely related, but close to the *Ortgiesia* clade.

If more studies supported these particular groups, which would be named *Aechmea*? The name goes with the type species, which is *A. paniculata*. The 2014 study included this species, and it showed up in the third group above. So that group would retain the *Aechmea* name.