JOURNAL

OF THE BROMELIAD SOCIETY

VOLUME 64(1): 1-60 JANUARY - MARCH 2014

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email contact information: editor@bsi.org
PRINTED: April., 2014 by Fidelity Press, Orlando, Florida, U.S.A.

ISSN 0090-8738

PUBLICATION INFORMATION: The Journal is published quarterly by the Bromeliad Society International. All scientific articles are peer reviewed, and author guidelines are available from the Editor. Authors are requested to declare any article they intend to, or have already published elsewhere.

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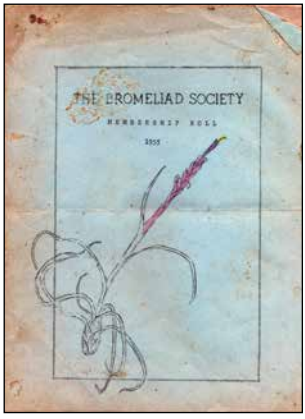

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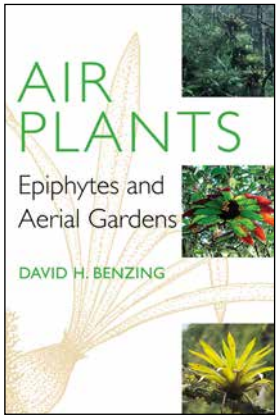

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President's Message: New Quarterly Publication Schedule

Bruce Holst & Jay Thurrott

All of you, no doubt, have been troubled by the increased costs associated with daily life. The BSI is no different and in recent years has attempted to strike a balance between publication and mailing costs of the Journal and annual membership dues. No one wants to see an increase in dues, but we are facing still another rise in postal rates with no end to continued increases in sight. The Board of Directors discussed ways to 'hold the line' at their annual meeting and were firm in their desire to not increase annual dues and not reduce member benefits. At the same time, they also recognized the need to reduce operating expenses associated with production of the Journal and arrived at the decision to reduce the number of issues/year of the Journal while maintaining the same amount of content. What this means is that beginning with the new year (2014) you will receive the Journal on a quarterly basis rather than 6 times/year, however, each issue will be larger so that you will be receiving the same total number of pages in those 4 issues that you received in the past in 6 issues. This will reduce both printing and mailing costs while still providing the mix of scientific and general interest articles and photos that you have come to expect in the Journal of the Bromeliad Society. Publication schedule for the Journal will be March, June, September and December with a submittal cut-off date of the second Saturday in February, May, August and November. Thank you, everyone, for your past support of the BSI and I hope that we can count on your further support as the new year of 2014 approaches!

Jay Thurrott

NOTICE OF BOARD MEETING

The annual meeting of the BSI membership will be held at the Ala Moana Hotel, located at 410 Atkinson Drive, Honolulu, Hi 96814 on Tuesday, September 9th . This meeting provides the opportunity for any BSI member to address the Board of Directors with issues of common interest and will begin promptly at 9a.m. Immediately following the membership meeting will be the annual Board of Directors meeting at the same location. Both the membership meeting and Board of Directors meetings are held annually and, during BSI World Conference years are at the conference hotel. During years when there is no world conference, the meeting is sited at a location selected by the president.

Conference Corner

Bonnie Boutwell

Aloha,

Our Hawaiian Bromeliad Society members have been working hard to design a memorable WBC 2014. If you have not registered, please read the following schedule of events and treat yourself to Bromeliads in Paradise!

- Tours included in the registration are: a professionally escorted Honolulu city tour that can be scheduled on either Tuesday or Thursday afternoon, garden tours of Lyon Arboretum, Foster Gardens and HBS member gardens on Thursday morning and Nursery tours on Friday including Sharon Peterson's, David Fell's "Hawaiian Sunshine Nursery" and the estate of David Yearin.

- The Events Schedule has been revised to accommodate additional speakers and minor time adjustments – make sure to follow the schedule dated January 2014.

- Our speakers list is growing. We welcome the following seminar speakers:

Pam Koide, Greg Brown, Geoff Lawn, Alan Herndon and Nigel Thomson. In addition to our seminar schedule, David Shiigi, Sharon Peterson and Lisa Vinzant will lead a round-table discussion on Friday titled Bromeliads – Hawaiian Style.

- We are offering professionally escorted optional tours on Saturday and Sunday that are not included in the registration fee:

Saturday – Visit Dole Plantation and the Polynesian Cultural Center. Travel on a Royal Star Hawaiian bus across Oahu to these must-see attractions.

Sunday – Spend the day on the Big Island. Fly to Hilo and travel the island in a Polynesian Adventure Tours bus visiting David Shiigi's "Bromeliads Hawaii" Nursery, David Fell's "Hawaiian Sunshine" Nursery, Nani Mau Gardens and Volcano National Park to see the Kilauea Iki Crater. This all day adventure includes snacks, lunch and all entrance fees. Cost: $100 per person, not including airfare, but does include airport transportation.

IMPORTANT: Please purchase your own transportation to Hilo: Hawaiian Airlines flight #332 – departs Honolulu at 6:50 am.
Return flight: Hawaiian Airlines #380 – departs Hilo at 5:27 pm

Optional Tour Reservations & Payment by check or money order by August 1, 2014 to:
Raleigh Ferdun, Treasurer WBC 2014
3558 B Woodlawn Dr.
Honolulu HI 96822

Paradise is only six-months away! If you have not made plans to attend WBC 2014, time is running out!

Here are some updates and a few changes to the schedule that will help you plan your trip:

We have cancelled the group reservation with Hawaiian Airlines for the round-trip fare from LAX to Honolulu. The reservation deadline was April 1, 2014 and we did not have enough reservations to fulfill the contractual obligation.

The response to the optional tour to Hilo on Sunday seems to be a popular choice. If Hawaiian Airlines flight #332 is full when you attempt to make your reservation, please secure a seat on #122 at 7:31 am which arrives in Hilo at 8:21 am. For the return, if #141 is full, please secure a seat on #381 at 6:47 pm. Airport transportation will be provided for both flights – the plan for the day will be the same!

There have been many questions about payment for the optional tours on Saturday & Sunday. The cost is $100 for each tour. Tour reservations and payments deadline is August 1, 2014.

Payment by check or money order to:
Raleigh Ferdun, Treasurer WBC 2014
3558 B Woodlawn Dr.
Honolulu HI 96822
For wire transfer information and other payment questions:
e-mail: rferdun@yahoo.com.

Purchasing that special plant is certainly a thrill for all of us – but getting that plant home from a conference is sometimes exhausting. We should all know the regulations of our homeland and certainly comply as best we can. In addition, know that the growers in Hawaii are certainly familiar with the shipping of plants to customers around the world. Please refer to Sharon Petersen's detailed information in the October 2013 Conference Corner. Also, be aware that phyto. certificates are issued at the Honolulu airport. No appointment is necessary – just leave time to go thru the process before boarding your flight. If you purchase plants on Sunday the best solution may be to get your phyto. at the Honolulu airport when you leave Hawaii.

Please keep checking this web site for the very latest information on the conference. The BSI Journal will continue to have a Conference Corner, but the latest information can always be found on the web site. My Thanks to Alan Herndon for his assistance in making this possible.

See you Soon in ***Paradise*** –
Bonnie

BROMELIADS IN PARADISE

Ala Moana Hotel - Honolulu, Hawaii

Bromeliad Society International - World Conference

Schedule of Events– Revised January 2014

Monday Sept. 8

Arrivals / Hotel Check-in	

Tuesday Sept. 9

8 am – 9 am	Board Registrations & Continental Breakfast
9 am – 9:30 am	BSI Annual General Meeting
9:30 am – 5 pm	BSI Annual Board Meeting
9 am – 5 pm	Judges School #2
12 – 1 pm	BSI Board & Judges School Luncheon
1 pm – 4 pm	City Tour – Included in Registration
6:30 pm	Board Cocktails & Dinner

Wednesday Sept. 10

8 am – 5 pm	Conference Registration, Hospitality & Aloha Baskets
8 am – 3 pm	Plant Sale Vendor Set-up
9:30 – 10 am	Welcome Address: Jay Thurrott, President
10 am – 3 pm	Plant Show Entries Accepted
10 am – 11 am	Seminar #1
11 am – 12 pm	Seminar #2
12 – 1 pm	Box Lunch – All Registrants
1 pm – 2 pm	Seminar #3
2 pm – 3 pm	Seminar #4
3 pm – 4 pm	Seminar #5

Thursday Sept. 11

8 am – 5 pm	Conference Registration, Hospitality & Aloha Baskets
8 am – 2 pm	Plant Sale Vendor Set-up
8 am – 9 am	Plant Show Late Entry / Judges & Clerks Continental Breakfast
9 am – 12 pm	Home/Garden Tours – Included in Registration
9 am – 5 pm	Plant Show Judging
12 pm – 2 pm	Luncheon – All Registrants

1 pm – 4 pm	**City Tour – Included in Registration**
2 pm – 9 pm	**Plant Sale Open to Registrants Only**
7 pm – 9 pm	**Plant Show Opens to Registrants Only**

Friday Sept. 12

8 am – 5 pm	**Conference Registration, Hospitality & Aloha Baskets**
9 am – 5 pm	**Plant Show Open to the Public**
9 am – 5 pm	**Plant Sale Open to the Public**
9 am – 5 pm	**Secure Auction Holding & Packing Room Available to Registrants**
9 am – 10 am	**BSI: Website & Journal - Evan Bartholomew**
10 am – 12 pm	**Round Table Discussion: Bromeliads - Hawaiian Style**
12 – 1 pm	**Box Lunch – All Registrants**
1 pm – 5 pm	**Nursery Tours – Included in Registration**
1 pm – 5 pm	**Auction Items Accepted & Set-up**
6 pm – 7 pm	**Auction Preview – Cash Bar**
7 pm – 10 pm	**Rare Plant Auction**

Saturday Sept. 13

9 am – 3 pm	**Plant Show - Open to the Public**
9 am – 3 pm	**Plant Sale - Open to the Public**
9 am – 5 pm	**Secure Plant Holding & Packing - Phyto Certificates Issued**
9 am – 5 pm	**All Day Optional Tour – Additional Cost to Registrants**
6 pm – 10 pm	**Cash Bar & Banquet**

Sunday Sept. 14

All Day Optional Tour to Hilo – Additional Cost to Registrants

BROMELIADS IN PARADISE

SEPTEMBER 8-14, 2014

ALA MOANA HOTEL
410 ATKINSON DRIVE
HONOLULU, HI 96814

Registration Fee: (in United States Dollars)

BSI Members who registered for the BSI 2012 Orlando Conference:

- $225.00 if postmarked on or before March 15, 2013

BSI Members who did not register for the BSI 2012 Orlando Conference:

- $250.00 if postmarked on or before December 31, 2013
- $275.00 if postmarked between January 1,2014 through August 15, 2014

BSI reserves the right to establish the registration fee for those who register after August 15, 2014 or registrations paid at the door.

If you are not a current BSI member your annual membership fee must be paid, in addition to, the above Conference registration fee as follows:

- USA residents add $45 single and $60 dual membership (add $10 for 1st class delivery)
- Other countries add $50 single and $65 dual membership (includes airmail delivery)
- You will automatically become BSI members with the added fee.
- For status of your membership please contact the BSI Membership Secretary.

Please Print Clearly Below:

Name(s): _____

Address: _____

City: _____ State: _____ Country: _____ Zip: _____

Telephone: _____ Fax: _____ E-mail:_____

Name on Badges (membership will be verified) _____

BSI affiliate (if any) _____ **Amount due**: _____

Payment by check in U.S. dollars to WBC 2014 – or - Credit Card: Visa or MasterCard

Credit Card #_____/_____/_____/_____ Expiration date :_____/_____(mm/yy)

Name as it appears on credit card (print):_____

Signature: _____ Today's date: _____

Refunds of 1/2 the Registration Fee are available thru 2013. After Jan. 1, 2014 refunds will be given only in the event of illness or death.

Please mail to: Annette Dominguez, BSI Membership Secretary 8117 Shenandoah Drive - Austin, TX 78753-5734
Membership status inquiries to: annette.dominguez@att.net or Phone: 512-619-2750.

Cool Broms On Display

Andrew Wilson

Figure 1. *Neoregelias* bask in full sun in the Auckland Botanic Gardens

Two years ago (Maloy, 2011) described the success being achieved in the growing of vrieseas in northern New Zealand, so the announcement of the Cool Broms conference in Auckland got my attention a year later. Having just attended the 17th Australasian Conference on Bromeliads in March this year, I can confirm the aptness of the moniker. The mild and, by tropical standards, cool climate of the area makes the growing of fine specimens of *Vriesea* as well as *Alcantarea* and *Neoregelia* possible in both shade and sun. It was worth going there just to see them.

While placing emphasis on 'cool-broms', the conference covered the full range of plants and topics that can be expected from a major meeting on bromeliads. With a cast of international speakers the oral sessions provided highlights for the conference. Interesting and important as they were, they represent topics too diverse to be summarized here. Instead, we focus on the bromeliads being grown in the gardens and nurseries of greater Auckland and those exhibited at the conference.

In Gardens and Nurseries

New Zealand's North Island is subject to the tempering influence of the Tasman Sea and the Pacific Ocean. In Auckland and further north the effect is particularly strong. Humidity levels remain steady, rarely becoming low. Winters in many areas are generally frost-free and summertime temperatures rarely exceed 30C (86F). Rain is plentiful, with 1250 mm (50 in.) annually in the Auckland region, and occurs in all seasons. Under such conditions many bromeliads thrive.

Figure 2. *Ananas* growing out of rock at Te Puna quarry

Figure 3. *Neoregelias*, *Billbergias* and *Alcantarea* at Te Puna

Figure 4. Specimens of *Alcantarea imperialis 'rubra', A. extensa* and *Vrieseas* on raised beds

Figure 5. *Neoregelia melanodonta* growing between logs

Figure 6. Left foreground, *Vriesea hieroglyphica* and *Vr. altodaserrae*; right background mature specimens of the Kanuka, *Leptospermum ericoides*

Figure 7. *Nidularium* 'Litmus'. Bracts change from red to blue after flowering. The parentage is uncertain; for discussion about *N. antoineanum* and/or *N. procerum* in its background see Journ. BSNZ, 46(1):17 (2006)

To get some appreciation of how bromeliads have adapted to gardens in those areas Dan Kinnard, Eloise Lau and I visited a number of them in the greater Auckland area, up to 100 miles (160 km) from the city center. Several were private and shown to us by their owners who grew the plants and did much, if not all, of the garden maintenance themselves. Two of them were public but one of these had been developed and tended by volunteers. Another of the gardens was part of a commercial enterprise. In addition, we visited the nursery where many new hybrids have been developed. It would have been enjoyable to have spent longer and seen more of the country. There were more horticultural treasures to be seen, for even in the greater Auckland area we came across unannounced gardens where stands of *Aechmea* species were used like shrubbery and surprises like *Ochagavia carnea* emerged from the undergrowth. However, we must not detour from the main path of our journey.

The Auckland Botanic Gardens was a useful site to get an impression of the range of flora, indigenous and exotic, that was cultivated in northern parts of the country. Native epiphytes, ferns and climbers were abundant in places, an indication that bromeliads might find a friendly home there but it came as a surprise to find a few of the native conifers (*Podocarpus totara*) bearing epiphytic neoregelias and aechmeas. Fortunately, and unlike so many of the plant species introduced to New Zealand, bromeliads have shown no inclination to spread invasively into the wild and those perched on branches of the giant totaras had been placed there. Not boasting

Figure 8. *Alcantarea vinicolor*

Figure 9. A bed of *Vriesea* hybrids, some with *Vr. hieroglyphica* parentage

a major bromeliad collection, the gardens included a beautiful display area to demonstrate to children how these plants survive on bare tree branches or on rock surfaces. The display was particularly effective with neoregelias, vrieseas and some dyckias exposed to direct sun all day (Fig. 1). It was surprising that there was no sign to indicate to children (and adults) that there are few places in the world lying well outside the tropics (36ºS) where such plantings could succeed so well.

Southeast from Auckland we encountered the Te Puna Quarry gardens near Tauranga. There, a former hard rock quarry had been converted by residents of the area into a number of gardens that included plants of the floras of South Africa and Australia. They had also created a garden for bromeliads, and what a surprise it was! The site is warm because it faces north, is a few miles inland from the coast and is protected from the south by steep, rocky cliffs. Humid air rolls in from the Bay of Plenty. An exceptional drought had prevailed for months and the plants were growing in porous rock and receiving no irrigation. Nobody was present and there were no sprinklers, but billbergias, ananas, vriesas, aechmeas and neoregelias looked bright and attractive (Figs. 2, 3) on that hot, sunny day. The gardens, developed and maintained by local residents, are open to the public at no charge. They are quite informal in design and thus require less work to maintain at an acceptable level. Situated in a rural area, the gardens are testimony to skill, knowledge and dedication of its gardeners as well as to its benign climate. Their choice of bromeliads, especially those from south-eastern Brazil, to occupy the site seemed appropriate to the conditions. The use of abandoned quarries to grow

Figure 10. *Neoregelias* enjoying the afternoon sun

Figure 11. *Vriesea* "Vulcan Summer"

Figure 12. Specimens of same clone showing leaf variation that gradually vanishes

Figure 13. A personal favorite

Figure 14. *Alcantarea vinicolor* and *Neoregelias* contrasted with *Echeverias*

Figure 15. Sub-tropical landscape in the Coyle garden

Figure 16. Try to tend these each day?

Figure 17. More room overhead

Figure 18. Pink predominates on a Conference display table

Figure 19. *Vriesea* 'Golden Legend'

wonderful plants, both exotic and native, is not limited to the Te Puna site. Others exist throughout the land, some close to or within the city of Auckland. The sites provide the public with attractive informal gardens. The approach is instructive.

Back in the Auckland area there were two private gardens we also visited before the conference began. One belonged to Graeme Barclay who, within less than a single year, had created an attractive display in a native woodland setting. He had also constructed an open-sided greenhouse, primarily to stave off cool wintertime rains from his young plants or those being prepared for exhibition. Close to his residence he was growing alcantareas and vrieseas in raised beds. Elsewhere in the garden species were growing, either terrestrially among native shrubs or epiphytically on decorticated tree trunks and branches (Figs. 4 - 6). A maritime country, New Zealand experiences strong winds. In this garden bromeliads were protected from them by its woodland setting.

The other garden belonged to Chris Paterson. He was busy renovating his house when, unannounced, I appeared one day. In spite of that, he generously spent time to show me his collection. Developed over a number of years, the garden was densely populated with bromeliads of many genera. Near the entry *Nidularium* 'Litmus', (Fig. 7) whose bracts change from red to blue after flowering, nestled in an area crammed with *Neoregelia* hybrids. The lower area of the garden was dominated by *Alcantarea* specimens set among dozens of vrieseas and neoregelias (Figs. 8-10). Chris said that the garden experienced no frost in winter as cold air drained off quickly. Many of the plants were protected from rain by a transparent, plastic awning and a light shade cloth. The whole garden was bathed in bright light; the foliage coloration was excellent, with ruddy shades dominant.

Tours of two gardens and two nurseries, arranged by the conference, were well attended. The first nursery visited was that of Andrew Maloy, located northwest of Auckland. It was impossible to walk through the aisles of the lightly shaded houses without being impressed by the thousands of *Vriesea* hybrid specimens. How could so many be grown without defects and blemishes? It is true that variations in foliage were apparent within a given clone if you looked carefully. This occurs on young plants as they are being grown on (Fig. 11 or Fig. 12) but the differences diminish with time. With so many named hybrids everyone had their own favorites. That day mine was a laterally-banded specimen (Fig. 13) with no trace of red.

Next stop was at the nearby garden of Peter Coyle. This was a horticultural *tour de force*. The garden overlooked one of the many water inlets that characterize the New Zealand littoral. Bromeliads provided a major, but not dominant, feature of these gardens. They were set in a backdrop of ferns (both arborescent and epiphytic), tree aloes, orchids, vireyas as well as cacti, agaves and nolinas from Mexico. In such a setting specimens of *Alcantarea* (*A. imperialis* and *A. vinicolor*) provided a strong presence among attendant swaths of *Neoregelia* and *Vriesea* hybrids (Fig. 14, 15) to create a semi-tropical scene. However, according to Peter, the garden does

Figure 20. Best in Show *Tillandsia tectorum*

receive nighttime frosts each year. Water sprinklers on those nights afford adequate protection to the plants and, perhaps surprising, the frozen water causes no damage to the plants while it thaws the following morning.

The last garden to be described belonged to Peter and Jeannette Waters, Conference Convenor and his wife. Not large and without lawns to occupy space, it was packed with bromeliads. Their bright colors assailed you from all directions, the flaming foliage of neoregelias, the blooms of aechmeas and the vrieseas and alcantareas that stopped you in your path. (Fig. 16, 17) or caused you to glance upward at epiphytic specimens on low branches. It was a town garden, surrounded by other small gardens, but it also offered an open view of an ocean inlet from which temperate breezes blew. These provided mild, moist conditions that permitted the bromeliads to thrive under full sun exposure. With the high density of planting it presumably received year-round care and was certainly not a garden for the weekend specialist.

Back at the Conference

Plants on general display in the conference center provided yet more highlights. The massed exhibit in the foyer was splendid. It was noted by observers that many specimens assumed a decidedly pinker cast than commonly seen elsewhere (Fig. 18). Perhaps this is due to the light conditions in New Zealand, with less shading needed

Figure 21. Best *Billbergia, B. vittata* 'Domingo Martens'

Figure 22. Best New Zealand Hybrid, *Vriesea* 'Summer Fever'

under the cool, temperate conditions. At the center of the exhibit was *Vriesea* 'Golden Legend' (Fig. 19). This hybrid had been introduced to New Zealand by Dave Anderson a few years before, grown on and distributed there to enthusiasts. The specimen by Graeme Barclay shows how well it is suited to local conditions.

The central exhibits of the convention were at its plant show. Set in a room with muted lighting, plants were displayed with localized, bright illumination. They contrasted strongly with black table covers and dark red background drapes. The result was most effective. My only complaint on the layout was the tight spacing; a larger show area would have been justified. Champion of the Show was *Tillandsia tectorum* (Fig. 20) by Natalie Simmonds. The Best Vriesea was *Vr.* 'Tasman Rose', and Best Neoregelia was *Neo.* 'Garnish', both by Peter Coyle. For Best Billbergia the prize went to *Bill. vittata* 'Domingo Martens' (Fig. 21) by Judy Graham. Top Aechmea was 'Pickaniny' (*Ae. orlandiana* X 'Bert' X *fosteriana*) by John Mitchell. We display images of several winners, including the specimen for the Best NZ Hybrid Prize, *Vriesea* 'Summer Fever' by Andrew Maloy (Fig. 22).

How cool were the Broms?

Importation of plants to (and export from) New Zealand is tightly controlled. Costs to import and export are high and quarantine periods are lengthy, ranging up to six months. Thus, entries in the show were limited to those from New Zealand. For

those unfortunate reasons there were no entries from its nearest neighbor Australia, where similar controls are enforced both on entry and exit. Fortunately, the entrance and departure from the country by humans, while tight, does not involve quarantine. As a result, attendance at the conference showed a majority percentage of foreign participants, led by Australia's contingent. In addition, the judging panel for the show was composed entirely of foreigners.

The conference provided information that would allow you to satiate yourself for weeks touring the gardens that were open for display. We could not visit them all nor even describe all those we did visit. There's no question about it, the apparent ease with which displays could be arrayed was testament to both the climatic conditions and skills of the country's gardeners and nurserymen. The number of hybrids of aechmeas, quesnelias or tillandsias may be a little shorter than in other countries where bromeliads are grown. Severe restrictions placed on imports may be to blame for this condition. If so, domestic hybridization has succeeded in compensating for the deficiencies.

Bromeliads were flourishing in all the places we visited and interest in them was not limited to the attendees at the conference. A pertinent memory is the quizzing I received from two strangers while we traveled by taxi between conference and airport. Both were New Zealanders; one was a farmer, the other a designer of software used in the cultivation of citrus. They were seeing more bromeliads on display in gardens and in large stores and wanted to know more about them, about their cultivation needs and about the bromeliad floral industry. Their interests extended beyond the bright colors and dramatic profiles seen at Cool Broms. Answering some of their questions and enjoying their enthusiasm, my own was raised. Perhaps the world of bromeliads had been enlarged by the event.

Literature Cited

Maloy, A. (2011), J. Brom. Soc., 61(3), 132-135.

Portraits Of Hechtia (Bromeliaceae: Hechdioideae): *H. isthmusiana* Burt-Utley

IVÓN RAMÍREZ MORILLO [1,3], GERMÁN CARNEVALI1, CARLOS JIMÉNEZ NAH[1], AND JUAN P. PINZÓN [1,2]

Figure 1. *Hechtia isthmusiana* in habitat (Photograph by Juan P. Pinzón).

Abstract

Hechtia isthmusiana Burt-Utley was recently described from Oaxaca, Mexico. Here we provide drawings and images to help in the identification of the species. This species is diagnosed by its caulescent habit, the relatively small vegetative size, rosettes in a star-like shape, the proportionally short leaves, which are succulent, spiny, green or reddish, sparsely white lepidote adaxially, densely white lepidote below, with an erect central inflorescence, greenish pistillate flowers and white staminate flowers, the infructescence erect, and congested cylindrical branches. We provide images of similar species in the genus in order to help with identification of *H. isthmusiana*.

Hechtia Klotzsch is a bromeliad genus endemic to Megamexico (Rzedowski 1991) and thus distributed from Southwestern USA (Texas) to northern Nicaragua, with ca. 95%

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[2]Department of Systematic and Evolutionary Botany, Faculty Centre of Biodiversity, University of Vienna 14, A-1030, Vienna, Austria.

of the species confined to Mexico. Members of *Hechtia* are terrestrial, dioecious (all but *Hechtia gayorum* Lenz, a species with pistillate, staminate, and bisexual flowers on the same individual, a so called polygamomonoecious species), flowers are usually fragrant, especially staminate ones, and pistillate flowers featuring a sessile, simple erect stigma.

The taxonomy of the genus has been complicated, probably due to several factors. A lack of sufficient herbarium collections, which are often fragmentary at best, dioecy and the associated floral dimorphism are strongly related with the poor knowledge of species limits and geographical distributions. Further complicating our ability to understand the species of *Hechtia* is the fact that many species were described based only on staminate flowers whereas fewer were based upon pistillate or complete material; most frequently, those taxa described from pistillate plants were based upon fruiting specimens, since infructescences last longer (and are often more conspicuous) than any other reproductive structure on the plant. Moreover, it is very rare to find herbarium specimens with pistillate flowers, probably due to the low ratio of female/male individuals in *Hechtia* populations, as commonly found in many dioecious plants. Also, because blooming periods last no more than just a few days (*e.g.* an inflorescence of 100 flowers on *Hechtia stenopetala* Klotszch remains in anthesis just 3-4 days), and flowers quickly develop fruits upon pollination (or not!), it is rare that flowering specimens collected from both sexes of a population are represented in botanical gatherings. And yet the problem is that some species differ from other in just one of these structures making vital to have all of them to tell species apart.

Espejo *et al.* (2004) indicated that *Hechtia*, with 49 species, is the second most diverse bromeliad genus in Mexico after *Tillandsia* L. with 192 species. Recently, as many as nine new species of *Hechtia* have been added to the Mexican flora (Espejo *et al.* 2007b, 2008, López-Ferrari *et al.* 2009, Martínez-Correa *et al.* 2010, Ramírez 2008, Ramírez *et al.* 2011, 2012a, 2012b, 2013, Burt-Utley *et al.* 2011, Burt-Utley, 2012). However our studies suggest that there are at least ca. 67 species with 20 still undescribed (Ramírez *et al.* unpublished) for the genus. These high numbers are not surprising since many *Hechtia* species frequently occur in as yet unexplored regions, mostly in xerophytic shrublands in Mexico, often featuring narrow geographical distributions.

The present contribution is a continuation of an effort toward a monographic revision and phylogenetic analysis of the genus (Ramírez *et al.* in prep.). The information here provided should allow for the unambiguous identification of this beautiful species.

***Hechtia isthmusiana* Burt-Utley, Phytoneuron 69: 10. 2012.**

Distribution and habitat:— Espejo *et al.* (2004) reported 14 species of *Hechtia* for Oaxaca; this number went up to 20 just in three years (Espejo *et al.*, 2007a) and five more have been described since then [*H. colossa* Martínez-Correa, Espejo & López-Ferrari (Martínez-Correa *et al.*, 2010), *H. complanata* Burt-Utley, *H. ixtlanensis* Burt-Utley, *H. isthmusiana* Burt-Utley (Burt-Utley 2012), and *H. oaxacana* Burt-Utley, Utley and García-Mendoza (Burt-Utey *et al.*, 2011)].

Hechtia isthmusiana has been collected thus far in a very restricted area at the southern extreme of the Tehuantepec Isthmus, Oaxaca State, District of Juchitán. This area encompasses the vicinities of the villages of Nizanda and La Mata. There, *H. isthmusiana* grows in xerophytic shrublands (Figure 1) on exposed limestone outcrops or, less

Figure 2. *Hechtia isthmusiana* (pistillate plant) in cultivation (Photograph by Ivón Ramírez).

commonly, on schists. The general area is covered by a matrix of dry deciduous forests interspersed with rocky outcrops and cliffs, which harbor xeromorphic communities including *H. isthmusiana*. The entire area is located between 190–220 m above sea level. *Hechtia isthmusiana* blooms during May-June and fruits are formed in the next couple of months and last on the plants for almost a year, when the fruits open and seeds are released. A second population has been observed at the Piedra Azul hill in the same general area of Nizanda, where they occur at ca. 300 m; here, leaves turn dark red mainly

due to direct sunlight exposure and the plant forms large colonies over rocks along with other species described as new from the area, such as *Encyclia nizandensis* Pérez-García & Hágsater and *Barkeria whartoniana* (C.Schweinf.) Soto Arenas in the Orchidaceae, *Agave nizandensis* Cutak in the Agavaceae, *Anthurium nizandense* Matuda in the Araceae, and *Cephalocereus nizandensis* (Bravo & T. MacDoug.) Buxbaum in the Cactaceae. Other species conspicuous in the area are *Hechtia rosea* E.Morren ex Baker, *Tillandsia concolor* L.B.Sm., *T. cucaensis* Wittmack, *T. ionantha* Planchon, and *T. makoyana* Baker in the Bromeliaceae, *Agave ghiesbreghtii* Lem. ex Jacobi in the Agavaceae, and *Mammillaria albilanata* Backeberg in the Cactaceae (modified from Pérez-García *et al*. 2001).

Figure 3. Pistillate plant of *Hechtia lyman-smithii* in cultivation (Photograph by Ivón Ramírez).

COMPARISON WITH OTHER SPECIES:-The rosette of *Hechtia isthmusiana* (Figure 2) is relatively small and compact as compared with most other members of the genus. Rosettes range from 20–35 cm diameter, similar in size to *H. lyman-smithii* (Figure 3), whose rosettes are 21–27 cm diameter. Under cultivation and in the field, plants of *H. isthmusiana* present sometimes a caulescent growth, with long stems covered by overlapping foliar sheaths with a rosette at the very end (Figure 4), a growth pattern absent in *H. lyman-smithii,* another native species from Oaxaca, but collected near the limits with the Mexican State of Puebla in the general area of Teotitlán, ca. 180 km NW (in straight line) from the type locality of *H. isthmusiana*. Leaves of *H. isthmusiana* are almost glabrous and shiny above, sometimes slightly white lepidote at the base, while those of *H. lyman-smithii* are more homogenously white lepidote above, apically recurved and less succulent that those of the *H. isthmusiana*.

Another species with small sized-rosettes also native from Oaxaca (vic. Teotilán-Huautla) and Puebla (Barranca Río de los Mangos) is *H. fragilis*, which shares the small-sized rosettes (22–34 cm diameter) with *H. isthmusiana* but in that species the leaves are brittle with appressed cinereous scales on the adaxial foliar surface.

Hechtia ithsmusiana was compared by Burt-Utley (2012) with *Hechtia mooreana* L. B. Sm. (Figure 5), a native from the Mexican State of Guerrero, in its caulescent habit but both species differ quickly in their leaf morphological features. The pistillate inflorescences of *Hecthia isthmusiana* resemble the one-branched panicles of *Hechtia edulis* I. Ramirez, Espejo & López-Ferrari (Ramirez *et al.*, 2011; Figure 5), from the Mexican State of Chihuahua, but the *H. isthmusiana* has pistillate inflorescences ca. 1 m long, with 7-15 branches per inflorescence, branches 4.5–11 mm long, these smooth, flowers 7–8 mm long with

Figure 4. Rosette of *Hechtia isthmusiana* showing the caulescent habit (Photograph by Germán Carnevali).

Figure 5. Pistillate flowers of (A) *Hechtia isthmusiana*, (B) *H. mooreana*, (C) *H. lyman-smithii*, and (D) *Hechtia edulis* (Photographs by Ivón Ramírez).

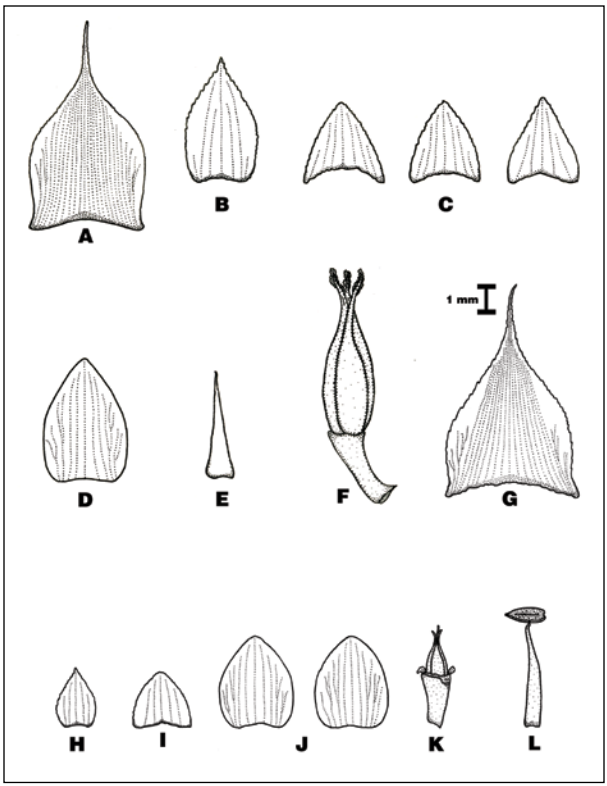

Figure 6. *Hechtia isthmusiana* - details of inflorescence and floral structures. Pistillate plant (A-F). A. Primary bract. B. Floral bract. C. Variation of sepals. D. Petal. E. Staminode. F. Ovary and sessile stigma. (Based on *Ramírez & Carnevali 1678*, CICY). Staminate plant (G-L). G. Primary bract. H. Floral bract. I. Sepal. J. Petals. K. Pistillode. L. Filament with anther (Based on *Ramírez & Carnevali 1679*, CICY). Illustrations by Carlos Jiménez.

white petals (Figure 5A), while *H. edulis* has shorter inflorescences, 51–80 cm long, 10–16 branches per inflorescences, their rachises sulcate, flowers 5 mm long with green petals (Figure 5D). Photographs of pistillate inflorescence branches of *Hechtia mooreana* (Figure 5B) and *H. lyman-smithii* (Figure 5C) can also be used to compare the different species.

Figure 6, with drawings of parts from both pistillate and staminate inflorescences of Hechtia ishthmusiana will be helpful in confirming the identity of a specimen as this species.

Acknowledgments

We are indebted to the Elizabeth Bascom Fellowship and to the KLARF Program for the scholarship granted to the first author that allowed the study of material from several herbaria while at Herbarium MO and Herbarium K respectively. To the Deutscher Akademischer Austauschdienst (DAAD), Botanischer Garten und Botanisches Museum Berlin-Dahlem, Freie Universität Berlin, and Centro de Investigación Científica de Yucatán, A. C. for financial support to visit and study the Bromeliaceae collection at Herbarium B during 2011. Our thanks to the curators of the following herbaria: B, BM, F, GH, HEID, K, LG, LL, M, MEXU, MICH, MO, NY, OAX, RSA, TEX, UAMIZ, UC, US, VT, WU, XAL, and Z for allowing us to study the herbarium material deposited at their herbaria. We would like to thank Rodrigo Duno, Gregorio Castillo, Wilmer Tezara, Carlos Leopardi, Brian Sidoti, and Lucía Hechevarría for field assistance. José Luis Tapia, Silvia Hernández-Aguilar, and Gustavo Romero helped us with data basing, literature search and the handling herbarium loans and collections. Enrique Arcila carefully proofread an earlier version of this paper. Paola Marfil helped with edition of line drawings.

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Preserving Our Heritage

Alan Herndon

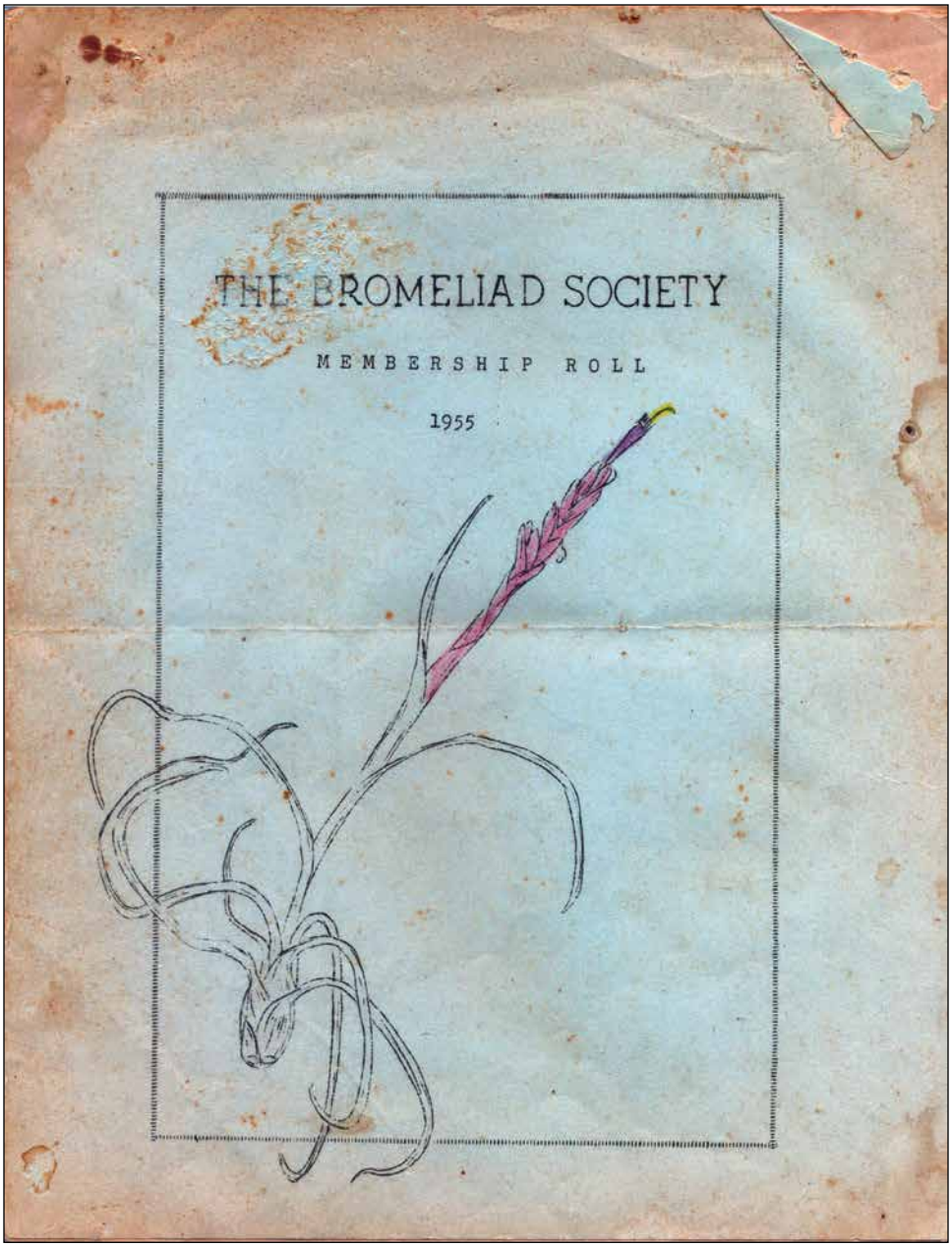


Figure 1. Front cover from the Bromeliad Society Incorporated membership list of 1955.

Figure 2. Collecting *Aechmea nidularioides* on Jack Holmes/Lee Moore expedition to collect *Aechmea chantinii* in Peru ca. 1962. Jack Holmes on right, Lee Moore above. Slide from the Jack Holmes Estate.

A need to take quick action to prevent the loss of important historical materials was highlighted at the BSI Board meeting held just prior to the 2012 World Bromeliad Conference. First order of business is to identify the materials still available and secure them for the future. Collecting this material will be an ongoing effort, but collection is just the first step. Additional steps must to taken to preserve the materials collected, and beyond that, we need to ensure the material is in a form where it can be actively used by persons interested in the history of bromeliads and bromeliad growing. To this end, historical materials, whenever possible, will be scanned into widely useable electronic formats, and made available through a historical section on the BSI web page.

As a simple example of the relevance of historical material to current BSI activities, consider the ongoing project to identify people who have been members of BSI for 50 years or longer. A lack of early membership records has been a major stumbling block in this project. We have membership lists from 1955 (Fig 1) and 1970, but a membership list from 1962, exactly the year needed to identify members who qualified for the 50 year club during 2012, has not yet turned up. Since we would like to continue honoring those members who reach the 50 year longevity threshold in the future, we are hoping to find more member information from the 1960's. Any membership list from 1962, 1963 or 1964 would make it much easier to identify those long-term members in time to recognize them at the 2014 World Conference.

Another class of items we need to concentrate on are photographs (both prints and slides) related to bromeliads and their cultivation. Of special interest are photos that were used to illustrate articles in the Journal of the Bromeliad Society (and its predecessor: the Bromeliad Society Bulletin). We do not know where most of the photos used for this

Figure 3. Blooming *Aechmea nidularioides*. Slide from the Jack Holmes Estate.

Figure 4. Jack Holmes (front) and friends exiting the Peruvian jungle with their booty. Note the large plants of *Guzmania vittata*. Slide from the Jack Holmes Estate.

purpose have gone although I have five of the six slides used to illustrate the Harold Slingerland article on the1961 Jack Holmes/Lee Moore expedition to Peru (Bromeliad Society Bulletin 14(3): 51-58. 1964). Other photographs of special historical importance are those taken on collecting expeditions into South and Central America. I have additional slides from the Jack Holmes/Lee Moore expedition (Fig. 2-4), but there were many other collecting trips undertaken by members of the BSI during the 1960's and 1970's, many described in the Journal with photographic illustrations. Can we find photo collections from some of these trips and make them available again for study? Even pictures taken in private collections of cultivated plants, or plants entered in judged bromeliad shows are historically useful. If they are dated, they can help us track the arrival and spread of new clones in cultivation. Even if the date is only approximately known, they provide a picture of what plants were available during different decades.

Figure 5. Central display from 1972 World Bromeliad Conference in Houston. This display was designed and erected by Fritz Kubisch. Photo by Marcel Lecoufle

Since photographs fade and/or change color over time, our priority is to scan any available photos and slides as rapidly as possible. We are less interested in possession of the original photos (or slides) than the opportunity to scan the originals and make the scans available through our web site. For archival purposes, we would like high resolution scans. Of course, if you wish to donate any originals, we will provide for secure storage after our scans are completed.

As a specific project, we should consider gathering material for a history of the World Conferences. This is particularly important because very few of the World Conferences were ever reviewed in the Journal, and those that were reviewed were never covered adequately. Herb Plever, who has attended every World Conference since they officially started in 1972, has already taken some steps in this direction based on his own photographs and experience. In addition, Odean Head has amassed an extensive collection of people photos from many World Conferences and is actively working on identifying participants through the years. But, surely, there is much more information available. For instance, we do not have access to the program books from all the conferences, and the whereabouts of official photographs for most conferences is uncertain. I only have a single carousel (80 slides) selected from over 360 official slides taken by George Anderson at the 1988 World Conference in Miami. It may be that these 80 slides were the only ones worth saving, but I would certainly have preferred a chance to judge for myself. However, we also have the video tour of the 1988 conference produced by Odean Head and additional photographs taken by a few other participants. We have the list of major award winners

Figure 6. Marcel Lecoufle with Mulford Foster at BromeLa during a visit to the United States in 1966. Photo courtesy of Marcel Lecoufle.

from the 1988 conference, so we can, in theory, identify any photos of those winners. Lists of this sort would be extremely useful for all World Conferences and are likely to be found in the records of the host clubs. We would like to gather such records as quickly as possible. Information on the the tours associated with each World Conference, as well as the lecture series given at each World Conference, would also be highly interesting.

Of course, more photographs in addition to the official series from each show are always welcome. For instance, Marcel Lecoufle donated scans of his slides from the 1972 World Conference in Houston to BSI some years ago, so those of us who did not even know what a bromeliad was in 1972 can still see the amazing central display (Fig 5) installed by Fritz Kubisch. Indeed, based on the frequency of photographs taken by the average visitor during recent world conferences, every plant in the show and every display must have been photographed at least 100 times. We should be able to get photos of each plant and each display from several different perspecitives.

Other items of potential historical importance are diverse. Early letters exchanged between the pioneer bromeliad growers in each country are especially important. For instance, the letters written by Julian Nally to William Morris (Australia), have been transcribed by Derek Butcher and made available on the FCBS web page. Letters from Mulford and/or Racine Foster are of particular interest given the role they played in promoting bromeliad cultivation in this country. Part of the Foster correspondence is preserved in the University of Central Florida Library, but additional pieces would always be welcome. We could also use letters from other early growers, such as David Barry, Fritz Kubisch, Ed Hummel, and people such as Victoria Padilla who played such a large

SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
WASHINGTON 25, D. C.

January 24, 1964

Air-Mail

Mr. Nat J. DeLeon
8300 Southwest 62nd Place
Miami 43, Florida

Dear Nat:

That is most interesting news that you and Ralph Davis have figured out about Androlepis. Please keep me posted on further developments.

You say you could find no pistil in the male flowers, but you do not say whether you could find any trace of stamens in the others. How about it? The only picture of the genus is plate 1851 of Hooker's Icones of A. skinneri and that shows both stamens and pistil. Maybe it is like some species of Catopsis with male flowers on some plants and apparently perfect ones on others. The male inflorescences are more branched in Catopsis also.

I hope you or Ralph or both of you will write this up when you have accumulated enough evidence. I have long suspected that there was only one species here, but from inertia have done nothing about it.

Another point occurs to me. In the male flowers is just the style missing or is the ovary gone as well? In Hechtia there are both types. Also in Hechtia there are several instances where male and female plants were considered different species. This is easy to understand because the petals and sepals of the male flowers are broadly rounded while those of the female are acuminate.

Prof. Erdtman, the pollen expert, tells me that Androlepis is the only bromel he has found so far with pollen grains in tetrads. All the others have the grains well separated.

I would not think of asking you for material now but when you and Ralph have finished, please let me have the old shoots and a leaf each as permanent vouchers for your observations.

With best regards,

Sincerely,

Lyman.

Lyman B. Smith
Curator
Division of Phanerogams

P.S. Your plant just came. There is an ovary but only a stub for a style.
L.

in female flowers stamens are [illegible] but not [illegible]

Figure 7. Letter from Lyman B. Smith to Nat DeLeon concerning, in part, observations made on Androlepis skinneri. Courtesy of Nat DeLeon.

role in early BSI history. A comprehensive collection of newspaper and magazine articles on bromeliads through the 1970's would also be useful to track the rise in publicity that ultimately led to acceptance of bromeliads as mainstream items in horticulture. Finally,

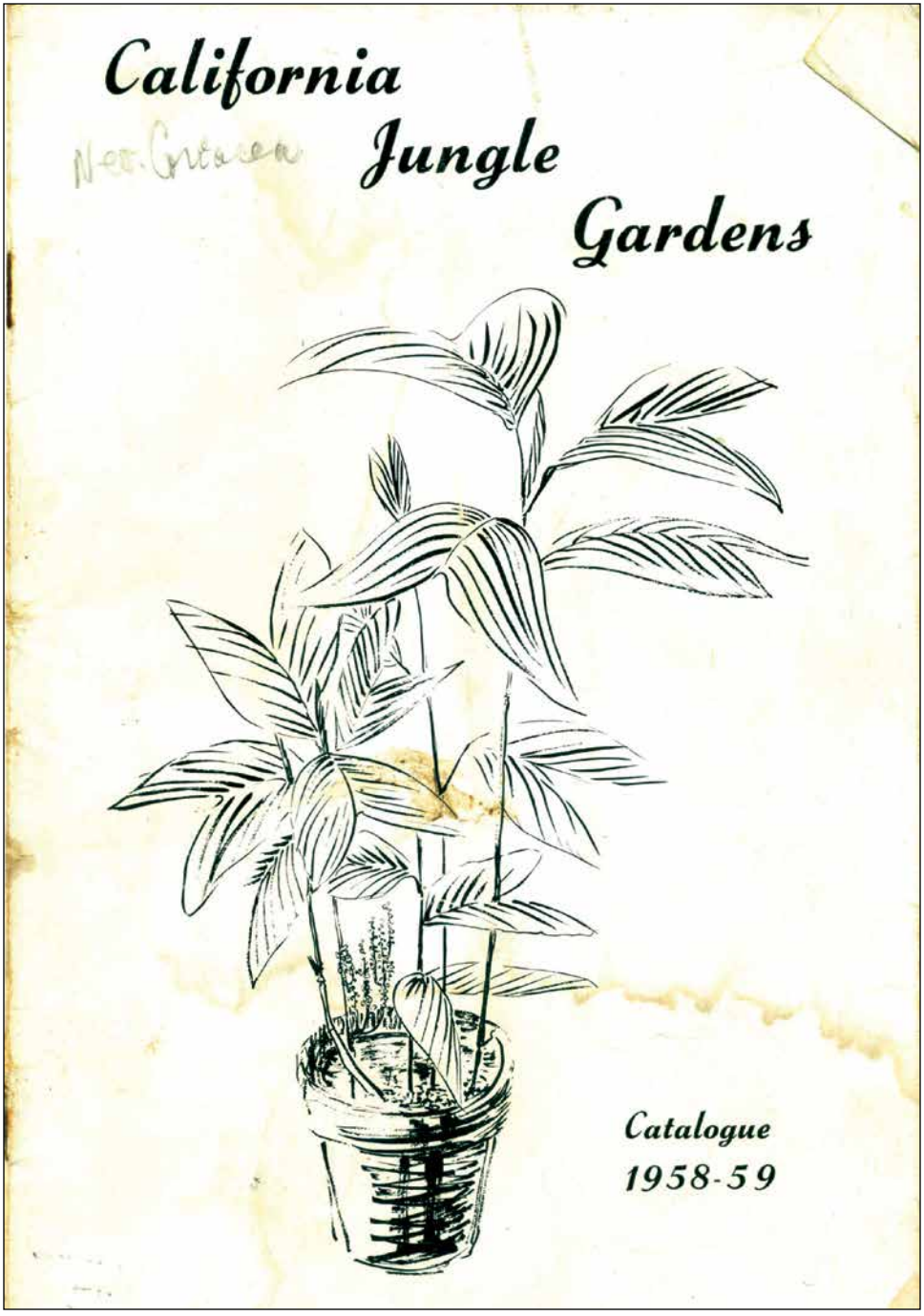


Figure 8. Cover of California Jungle Gardens catalog. This catalog listed 123 different bromeliads for sale over 6 pages.

VRIESIA CARINATA HYBRID MARIE. The "Painted Feather." The feather is the flat, red and chartreuse spike that extends on its slender "quill" from the heart of a shiny, green rosette. This plant remains in color for many months, and is perfect for the modern house, whether at a bright window or on a large coffee table. $5.00

VRIESIA CONFERTA. A fine European hybrid. A large-growing, green leaved plant producing a tall, wide, and flat red spike. $7.50

VRIESIA ENSIFORMIS. We think this an especially nice species because we like red. The plant maintains a nice balance between size of the rosette and size of the flattened spike. The green leaves take on a very light suffusion of red—the spike bracts a bright red—the flowers a showy yellow. There is a parrot-like gayety to the plant. $5.00

VRIESIA FAVORITA. A large green rosette producing on a slender stem a large wine-red flat spike that makes a nice contrast with the yellow flowers. $6.00

VRIESIA GEMMA. Gem-like. An attractive small edition of Vriesia x Mariae. $3.50

VRIESIA GLUTINOSA. The strap-shaped leaves are numerous, crowding together to form a dense, compact, dark green rosette. From Paraguay, and probably resistant to frost. $7.50

VRIESIA GUTTATA. A vigorous novelty, suckering so freely that a single plant soon becomes a mass of rosettes, each about seven inches in diameter. The olive green leaves are peppered with round, brown spots. $2.50

Vriesia carinata hybrid Marie

VRIESIA HIEROGLYPHICA. A must in every bromeliad collection. This plant is a magnificent example of symmetrical form and design. The species name refers to the attractive hieroglyph markings in purplish-black on the broad green leaves. $5.00

VRIESIA INFLATA. The leaves are tinted a soft gray purple and the plant gives a most delicate effect. The spike is bright and curved-inflated, as name suggests. $4.00

VRIESIA KITTELIANA. This interesting Vriesia is spotted with wine-red on olive-green leaves. This species does not resemble any other Vriesia that we have seen and, according to Mez., is a cross of V. BARILLETTII X SAUNDERSII. $4.00

VRIESIA MAGNIFICA. The Goldfish Vriesia. From the nice green rosette emerges an inflated spike that grows more or less horizontally and has the shape and color of a fat Japanese goldfish. $5.00

VRIESIA POELMANNII VAR. RAMIFIEE. An extremely interesting European importation. The tall forked spike is a very deep, burgundy red, in vivid contrast to the clear yellow, tubular flowers. This plant is reputedly hardy in the open on the French Riviera. To cross this novelty with other non-branching Vriesias should be a challenge to bromeliad lovers. $7.50

VRIESIA POLONIA. A notable European hybrid. A rather small, light green rosette of leaves which produces a many branched, bright crimson floral structure. $7.50

VRIESIA REGINAE. This is a giant among the genus. Until the plant is very large, many small plantlets almost detach themselves from the base of the trunk. $10.00

VRIESIA RECURVATA. A medium size rosette of green leaves. The spike holds a curve as it drops, and, with the floral bracts, is crimson. A very beautiful and novel form. $5.00

Figure 9. Page 8 of the California Jungles Gardens catalog, listing some of the Vriesea species and hybrids available for purchase. The descriptions, although short, provided invaluable information to the early bromeliad growers in this country.

don't forget photographs of bromeliad growers and collectors. Figure 6, from the trip Marcel Lecoufle made through the United States in 1966 shows two early giants of bromeliad cultivation together.

Many of these early growers also corresponded with the few scientists studying bromeliads because there were so few options for learning more about bromeliads. Figure 7 is a letter from Lyman B. Smith to Nat DeLeon that is part of a correspondence concentrated during the first half of the 1960's when Nat was not only able to learn much from Dr. Smith, but also help improve Dr. Smith's understanding of bromeliads by supplying information from living specimens.

More mundane materials, such as catalogs from bromeliad nurseries, or any nursery offering a variety of bromeliads (Fig 8), can also be helpful in tracing the introduction of new species and clones into cultivation. The article on the newly revived nothogenus xBiltanthus in a recent issue of the Journal is a direct result of making an old plant catalog available to someone _ Derek Butcher _ who could understand the implications of an obscure listing. In addition, the older catalogs were often illustrated and provided an important source of information for growers just beginning to experiment with bromeliads during the 1950's and 1960's (Fig 9).

Some materials are worthy of preservation just because of their human interest. An example is Figure 10, a Christmas Card designed by Mulford Foster and sent to the extended Foster family and friends.

If you have any materials of the type listed above that we can us scan and make available to others, please let us know. Also, please let us know about other materials you think would be of historical interest, even if they aren't listed above.

Even more important, historical material of this sort is usually lost when it ends up in the hands of someone with no interest in the subject and no clear directions on how it is to be handled. Far too often the default decision is to throw such material away. If you have a collection of any size related to bromeliads (especially if no one in your immediate circle has shown an interest in the subject), please take steps to ensure that anyone deciding on the fate of this material knows that BSI offers to preserve it and make it available for future generations.

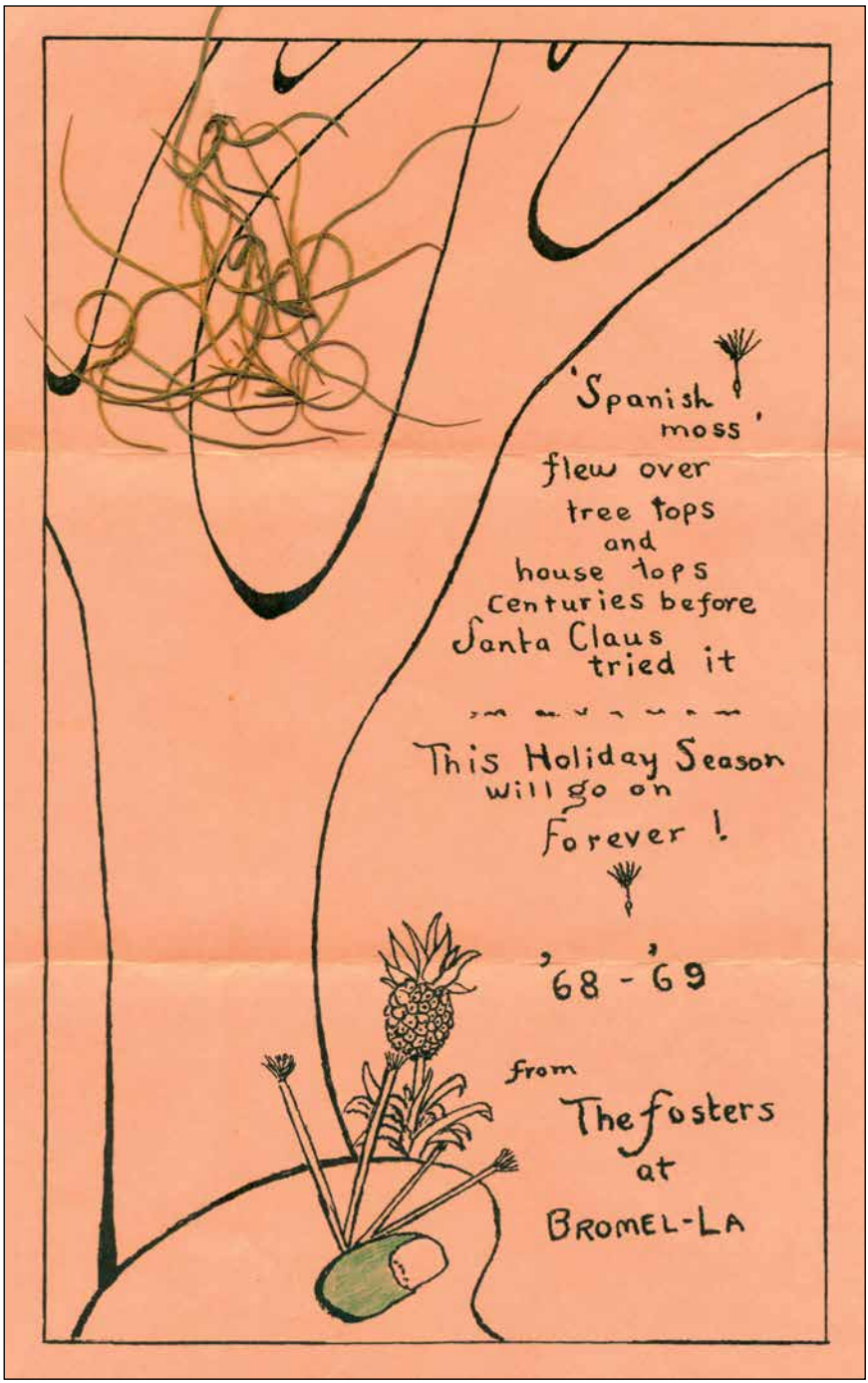


Figure 10. Christmas greeting card designed by Mulford Foster and sent to the Foster's many friends. Courtesy of Wesley Schilling.

To Be Or Not To Be A Species

David Benzing

Growing bromeliads rather than African violets, day lilies, or tea roses amounts to choosing what nature has perfected versus what humans have engineered. Understanding how a species—an entity produced by Darwinian evolution—differs from a cultigen (= cultivar) is useful because it explains lots of observations familiar to experienced hobbyists. Let's begin our comparison with the simplest of definitions: the species is both a biological reality and a taxonomic rank we use to identify collections of naturally occurring individuals that can freely inter-breed among themselves, but usually not with the members of other species. So far so good, but what about how species come into being and how they relate to one another, and most interestingly, why they exist in the first place? Bromeliads such as *Tillandsia stricta* and *Aechmea fasciata* have been long and widely cultivated, but they remain species according to criteria that don't fit domesticated stocks. It's the fact that a species constitutes a genetically coherent population shaped by natural selection that makes the difference. We'll return to the cultigen below.

Perceptions about what amounts to a "kind" of organism, which is a colloquial term roughly equivalent to species, and how different kinds of organisms relate to one other have changed dramatically through recorded history. For instance, the unrealistically composite creatures that populate Greek mythology reflect the transmutability of the species as it was viewed some 2500 years ago and for that matter for most of the time since back then. Belief in spontaneous generation, a conviction based on the same notion of biological fluidity persisted until finally put to rest by Francesco Redi's seventeenth century demonstration that fly maggots don't spring anew from rotting meat, nor despite their crude resemblance can ripening heads of wheat become caterpillars.

The pendulum swung in the opposite direction when what scientists call the typological (invariant) species concept replaced the absurdly flexible Greek version. Carl Linnaeus, the father of modern taxonomy, was among the majority of educated Europeans who during the eighteenth century considered all living things God's work, or more precisely, believed all living creatures to be his divine special creations. As such, species were by definition static, effectively immutable. The occasional anomalous individual, owing to its failure to match its archetype, was dismissed forthwith as a mistake, something akin to a copy error. And then came Charles Darwin's publications in the second half of the nineteenth century soon to be followed by rediscovery of Gregory Mendel's similarly seminal breeding experiments with garden peas.

It wasn't possible to understand the true nature of the biological species until investigators had discovered how they proliferate and subsequently change over time. Answers to both questions emerged during the first half of the twentieth century as a group of biologists brought together findings from what at the time were separate scientific disciplines that communicated far less than they do today. The result is the "evolutionary" or "Mendelian" species concept. Simply put, the species

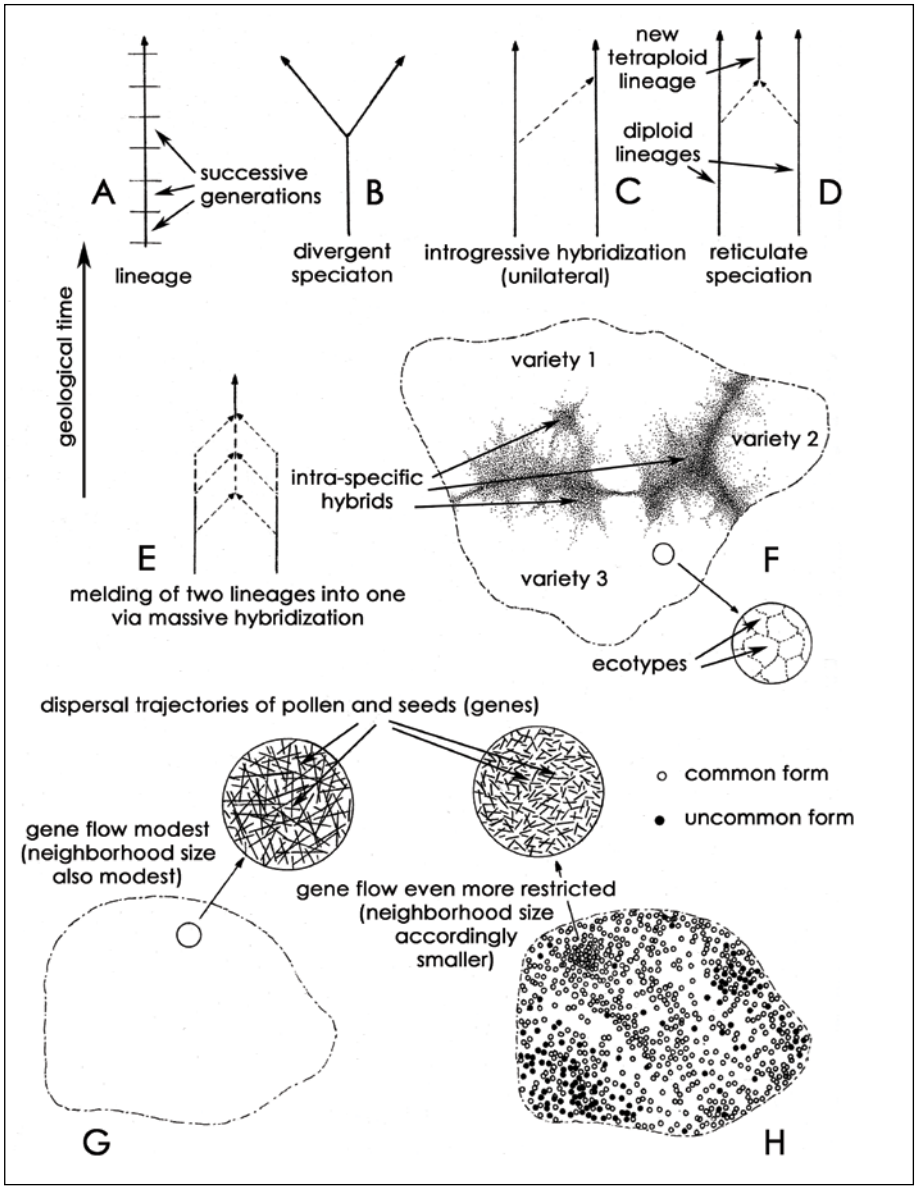


Figure 1. A. a single lineage indicating only its seven most recent generations B. divergent speciation whereby one lineage gives rise to two daughter lineages C. introgressive hybridization that results in selective gene transfer from one lineage to another (unilateral) across an incompletely developed reproductive barrier D. reticulate speciation involving polyploidy where one or more hybrids between two diploid lineages produce a third tetraploid lineage E. the swamping of two previously distinct lineages (gene pools) as a consequence of frequent hybridization F. the geographic distribution of a polymorphic species that consists of three varieties and multiple ecotypes G. the geographic distribution of a species illustrating the influence of gene flow on neighborhood size H. the geographic distribution of a species with more restricted gene flow (less mobile pollen and/or seeds) and smaller neighborhood size than illustrated in G. Also shown in H are the geographic distributions of two versions of a form within a species.

according to this view is a population of individuals that being inter-fertile amounts to a pool of shared genes. More specifically, it's a population that has descended from a succession of older populations that together equal a "lineage" as depicted in figure 1A. No two members of a lineage are identical in form or behavior, but neither are they more similar to, or more inter-fertile with, individuals that belong to any other species (lineage). Bromeliad growers see many examples of this kind of within-species ("intra-specific") variation. Species comprised of individuals that differ more among themselves than usual often are described as "polymorphic". In fact, polymorphism to one degree or another characterizes all species. It's just that some are more visibly varied than others.

Taxonomists continue to pay homage to the typological species concept and Special Creation when, as required by international code, they designate a type specimen (officially known as a "holo-type") as they "describe" and name a species previously unknown to science. The "type" (short form) is indeed special, but only in the sense of having been chosen from among what usually are multiple specimens found growing at the discovery site. This individual, along with a "diagnosis" written in English or Latin which details its gross characteristics, officially speaks for its kind even though not it or any other single representative can fully describe any species given the ubiquity of polymorphism. Types are maintained in botanical museums called herbaria, the largest of which contain millions of dried, pressed plants mounted on stiff paper. Figure 2 illustrates the holo-type for *Werauhia dalstroemii* from Ecuador. Many of the types described by Carl Linnaeus more than 250 years ago remain in good condition in European herbaria. The type featured in figure 2 resides in the collection housed at the Marie Selby Botanical Gardens in Sarasota, Florida.

A lineage most often begins as one of two daughter lineages derived from an ancestral lineage as depicted in figure 2B. Following birth, it persists without proliferating, dies out, or its genes live on embodied in one or more younger daughter lineages. Viewed from another angle a "speciation" event of this so-called divergent-type occurs when what had been a single gene pool (or call it a species or a lineage as you like) becomes divided into two or more gene pools. It's a two-step process. First, something causes the ancestral gene pool (lineage) to fragment, and then the resulting daughter populations, which at this point are only incipient species, diverge (evolve) until distinct enough from one another to no longer be capable of interbreeding. Now we have two quite respectable lineages (species). Speciation via a second route (figure 1DE) involves two ancestral lineages that are closely enough related to at least occasionally hybridize leading to the consequences described below. When an ancestral "stem" lineage(s) gives rise to daughter lineages that go on to do the same thing

Closely related plant species (lineages) are often inter-fertile, meaning "internally" compatible, and when this is so they may inter-breed and exchange genes in one or both directions as illustrated in figure 1C. However, naturally occurring "inter-specific"" hybrids aren't common owing to the pervasiveness of "external" barriers that absent the internal type just as effectively prevent sexual unions between species. External barriers to hybridization among co-occurring inter-fertile

lineages include non overlapping flowering seasons, reliance on different kinds of pollinators, and habitats that aren't suitable for hybrid success. Fortunately, gene exchange via hybridization is (and must be) infrequent because to remain adapted to local conditions a lineage's gene pool must remain generally free of alien genes (those originating from another gene pool). There are exceptions, however: hybridization actually promotes fitness when it occurs as part of a mechanism that allows one lineage to selectively "borrow" genes from another lineage (figure 1C). 'Archaic' *Homo sapiens* engaged in enough of what's called "introgressive hybridization" to explain why two to three percent of our present day gene pool (nonAfricans only) harks back to (was received from) our now extinct 'sister' species *Homo neanderthalensis*. How this "gift" is benefiting us isn't entirely clear.

Higher plants also can generate entirely new lineages via hybridization when this event is coupled with "polyploidization'. Polyploidization is achieved, for example, when hybrids between diploid lineages generate "unreduced", i.e., 2N, sperm and eggs that following sexual fusion result in tetraploid (4N) progeny as shown in figure 1D. Possessing what now are two complete sets of chromosomes such offspring cannot backcross (breed back) with the members of either parent lineage, but being inter-fertile they can establish a population capable of becoming new species. Speciation via this less traveled second route is considered "reticulate" (net-like) as opposed to divergent (tree-like; figure 1DE versus 1B). Polyploidy has played a significant role in bromeliad evolution and before that during the early history of the entire flowering plant complex. Pineapple, being a tetraploid (4N) species exemplifies this fact, while its seed-free clones qualify as cultgens.

Appropriately structured intra-specific variation is vital because every species occupies a geographic range that varies to some extent. Polymorphism is also essential to allow intergenerational adjustment (adaptation) to changes that occur over time at single locations. Ultimately it's the "genetic architecture" of a species, specifically how its "gene pool" is organized in space and operates over time that determines its capacity to adapt (evolve). Potential for countering new challenges to survival corresponds in large measure to a population's ability to endow its progeny with combinations (genotypes) comprised of any of the genes in any of their forms (alleles) present in its gene pool. The more diverse a gene pool and the more readily its contents can be recombined when circumstances require improved genotypes the more likely a threat can be mitigated, i.e. adaptive fine-tuning can be accomplished. In reality, no gene pool is fully flexible (all of its genes being free for reordering as needed) owing to limitations on within-pool gene flow. Mate choice is always at least somewhat constrained by agencies such as the flight patterns of pollinators, mode of seed dispersal, and whether or not a breeding system obliges self-fertilization, out-crossing, or some mix of the two. All of these factors influence a metric called "neighborhood" size, a subject considered in more detail below.

Figure 1FH illustrates two kinds of polymorphism, one being the result of natural (Darwinian) selection and the second the consequence of "genetic drift", which is a more random process that more strongly influences the genetic architectures of small compared to larger populations. Should multiple traits (characters) be conspicuously

polymorphic in the first instance and should the individuals that share specific states and combinations of these characters be separated geographically then intra-specific differentiation has reached the point of variety formation. Incidentally, a character is a heritable trait that occurs in at least two "states", as in the case of petal pigmentation (the character) where the states correspond to different colors. The species illustrated in figure 1F consists of three varieties, each confined to one of the three regions that make up the range occupied by the species overall. Presumably, growing conditions in these three regions differ enough to have promoted divergent adaptation, or more precisely, the gene combinations (genotypes) that underlie such adaptations. Note also that zones of genetically more mixed individuals (intra-specific hybrids) occur where the varieties meet, which should come as no surprise considering that members of different varieties, although individually fine-tuned for different conditions at separate locations, remain inter-fertile.

Also note that figure 1F illustrates the category "ecotype", many of which often exist within a species. An ecotype is a manifestation of genetic architecture that is too fine-grained in outward expression to warrant assignment of a Latin name. Character states that differentiate same-species ecotypes as the name implies reflect subtle genetic adjustments to growing conditions that often shift across short distances. Examples include tolerances and requirements for soils characterized by certain chemical (e.g., pH) or physical (e. g., moisture holding capacity) characteristics, or for exposure to sun versus shade. Being less differentiated than same-species varieties suggests that ecotypes can turnover more rapidly thereby increasing a population's capacity to respond to similarly fast moving environmental change. Little is known about ecotypes among the bromeliads, but they surely exist.

Like the sub-specific rank variety, which is equivalent to the zoologist's subspecies, the "form" warrants a Latin name, but unlike the taxonomic variety its existence is often grounded solely on the presence of just one conspicuous character such as leaf shape, hairiness, or robustness at maturity. A particular form exhibits either the more common or the less common state of its defining character. Members endowed with a given character state range from rare to abundant and follow no consistent pattern of occurrence across the geographic range of the species in question (figure 1H). Individuals that express the less common of the two character states often do so because the governing gene has a "recessive" allele that must occur in two copies (be homozygous) to make the bearer a representative of that form. For example, the white version (meaning no pigment present) of a more typically lavender-flowered bromeliad is likely nothing more than a specimen that possesses a pair of defective alleles of a gene that controls a crucial step in the biosynthesis of a particular "anthocyanin". The relative occurrences of the two versions of this form correspond to the relative frequencies of the functional versus defective (recessive) alleles of the gene that determines whether or not a possessor's petals are colored.

As noted above, a species "known to science" bears a Latin binomial, the first word of which identifies its membership in a particular genus just as a surname reveals a person's family affiliation. The second word, its "specific epithet", equals our given name: it distinguishes a species from its relatives within the same genus.

Figure 2. The holo-type of *Werauhia dalstromemii*

Varieties bear trinomials, the third word being preceded by the abbreviation "var." (e.g., *Tillandsia fasciculata* var. *densispica*). A form goes the variety one name better (e.g., *Tillandsia fasciculata* var. *densispica* forma *alba*), although just three words suffice when no variety is recognized. *Tillandsia fasciculata* is represented by three varieties in Florida, only one of which includes the uncommon white flowered form. By the way, no discrete boundaries currently isolate these three varieties from one another suggesting a violation of the geographic separation rule cited above. But this is not the case. The previously mentioned agencies that in nature limit or prevent gene exchange among intra-specific varieties and co-occurring sexually compatible species often disappear in regions heavily impacted by humans or following some equally catastrophic act of nature. Physical disturbance, if severe enough, essentially "homogenizes" adjacent habitats thereby enhancing opportunity for intermingling among what had been geographically separated gene pools as illustrated in figure 1C-D.

Now we know that what meets the eye doesn't fully reveal the genetic architecture of a population. Deeper assessment requires determining the status of a dozen or so multi- allelic genes. Armed with this information a geneticist can estimate "neighborhood" size, which is a number that describes the rate at which the individuals that constitute an inter- fertile population have been exchanging genes (how stirred is its gene pool). Species that employ strong fliers to move their pollen and seeds and are self-incompatible usually exhibit neighborhoods that encompass more territory than those populations that tend to self-pollinate and/or disperse less mobile offspring (figure 1GH). *Tillandsia recurvata* and *T. usneoides* illustrate the two sides of this coin, a difference that in their case is attributable to distinct reproductive mechanisms. The former species, being "autogamous" (i.e., actually a spontaneous self-pollinator), possesses a genetic architecture characterized by small neighborhoods (restricted gene flow) and much allelic diversity (many genes with multiple alleles), whereas Spanish moss, being both insect pollinated and self-incompatible, is less genetically diverse, and its neighborhoods on average are much larger as a consequence of more frequent long range gene exchange.

Pronounced polymorphism is common among some of the most widely cultivated of the bromeliads. *Guzmania monostachia* demonstrates this phenomenon in a particularly conspicuous way by displaying weakly and much more liberally pigmented floral bracts depending on where it occurs in nature. Its palest representatives come from south Florida where fruit set that requires no pollinators has diminished the need to invest valuable resources in alluring pigments. Efficient resource use being a strong promoter of Darwinian fitness, this relaxed requirement has provided an opportunity to beneficially down-regulate anthocyanin synthesis by members of this northern most population of *G. monostachia*. Intra-specific variation in other many characters such as the scheduling of flowering and seed dispersal probably track region-specific conditions such as the durations and dates of wet and dry seasons and when specific pollinators fly. Undoubtedly some polymorphisms, particularly those resulting from genetic drift, have no adaptive value now nor likely did they in the past. Why, for example, does the robustness of Spanish moss vary many fold across its unmatched north-south range?

Summarizing briefly, biologists have determined that species are by nature polymorphic, and that they possess gene pools structured by Darwinian selection sometimes augmented by genetic drift, and that inter-fertile populations are usually shielded from disruptive gene flow by external barriers to inter-breeding. Intra-specific variation constitutes an adaptive response to growing conditions that vary simultaneously across geographic ranges. Widely dispersed species are the most likely candidates to include subpopulations that differ enough to warrant sub-specific Latin names, and they also probably encompass the most ecotypes (figure 1FGH). Traits among the bromeliads that directly affect their survival by determining requirements for and tolerance of full sun versus shade, degree of drought-hardiness, and so on, often exceed in biological importance the more readily measurable and conspicuous intra-specific differences that taxonomists tend to choose to recognize forms and varieties. These two ranks, along with the ecotype, represent points along a continuum in the sense that they are recognized on the basis of characteristics, both adaptive and otherwise, that when more pronounced in expression also serve to differentiate species and sometimes even higher ranks in the Linnean system of plant classification.

So what about the plant that qualifies as a cultigen? Some of the most prized of the cultivated bromeliads cannot be considered species in the strictest sense of this label, although they deviate far less than numerous examples in dozens of other other families. Plant domestication is a step-wise process and its products vary accordingly, retaining in extreme cases little resemblance to their wild ancestors (e.g., maize). Deviations from "wild type" stocks are rather modest when it comes to the bromeliads, too little time having passed and too little effort having been expended to achieve greater change. Much of what makes up today's commercial stocks are clones or inbred lines derived from one or a few particularly desirable individuals selected for propagation from aesthetically polymorphic populations, or they are hybrids between species. Few, if any, of the bromeliads encountered in collections today show signs of the rigorous breeding and artificial selection required to obtain the qualities that make our grain staples and garden vegetables so desirable for human consumption. It's still reasonable to label an exceptionally showy specimen of *Tillandsia cyanea* a member of a species: not so the fancy tea rose that has experienced enough genetic manipulation of the non-Darwinian kind to assure that it would fail if returned to its ancestral habitat.

Call for Nominations for the BSI Wally Berg Award of Excellence

Theresa M. Bert

E-mail: theresa.bert@myfwc.com

Introduction

The BSI Wally Berg Award of Excellence was initiated in 1999 to honor the late Wally Berg (1927-2000) of Sarasota, Florida. Wally and his wife Dorothy were extraordinary bromeliad growers. Their private collection was one of the most diversified and unique in the world. The garden-and-waterfall setting of their bromeliad gardens was magnificent and immaculate. Wally was an enthusiastic supporter of the BSI. He donated many rare plants for sales and auctions that benefited the BSI, the Bromeliad Research Center at Marie Selby Botanical Gardens, research on the "Evil Weevil", and other worthy causes. He volunteered many hours of service at Selby Gardens. He had a broad knowledge of bromeliad horticulture and science and frequently spoke to bromeliad societies on a variety of topics, especially about his adventures exploring and collecting bromeliads in Central and South America. Wally also served the Sarasota Bromeliad Society by holding many offices and donating plants for the society's activities and sales. He introduced numerous bromeliad taxa into culture and created several hybrids. He frequently won top awards at World Bromeliad Conferences and at Florida local and regional bromeliad shows. For his contributions to the "bromeliad world," a number of bromeliad species were named for him.

Some of Wally and Dorothy Berg's achievements and adventures are featured on the Florida Council of Bromeliad Societies' website: http://fcbs.org under Photo Index--Programs--see "Berg Cage" and "Bromeliads in Habitat."

Following are the award criteria and procedures for nominations for the BSI Wally Berg Award of Excellence. Individuals, couples, or members deceased within the past two years, are eligible. Nominees must be past or present members of the BSI, and nominators and voters must be present BSI members in good standing.

Award Criteria

1. Nominees must be past (if deceased) or present members of the BSI.
2. Nominees should be bromeliad growers who are nationally or internationally recognized for diversity of species cultivated and excellence of cultivation.
3. The individuals should actively pursue one of the following activities:
    a. Collecting and identifying bromeliads in natural environments, including collecting new species/varieties/cultivars; the members of the various bromeliad societies and organizations, including the BSI, should benefit from this activity;
    b. Promoting the appreciation and cultivation of bromeliads at the international level, including such activities as organizing and participating in collecting trips with international representation, giving presentations and seminars to national and international audiences, and writing manuscripts for publication in national or international books, journals, or other media (e.g., Internet, CD ROMS).

4. The individuals should actively support efforts to further the scientific, taxonomic, or cultural understanding of bromeliads through donation of time, effort, or money to recognized organizations, institutions, or groups of individuals (e.g., the BSI, Marie Selby Botanical Gardens, bromeliad clubs or councils).
5. The individuals should be active in a local, regional, or national bromeliad society and be recognized by other members of that society for their contributions to the functioning of that society and its activities.
6. If the individuals are bromeliad hybridizers, they should be internationally recognized for excellence in one or more of the following categories:
    a. Innovation in creating bromeliad hybrids,
    b. Success in cultivation of bromeliad hybrids,
    c. Promotion and distribution of bromeliad hybrids.
7. The individuals should be generally recognized as experts in one or more of the following aspects of bromeliads:
    a. Ecology, evolution, or taxonomy,
    b. Cultivation or hybridization,
    c. Display or exhibition.
8. The individuals should be generally recognized for their generous nature in sharing knowledge of bromeliads and for personal giving for the benefit of other people interested in bromeliads and for bromeliad organizations at all levels.

Procedures for Nomination

1. Any BSI member in good standing (i.e., dues paid for 2014) can nominate for this award. Only BSI Board members are allowed to vote for the nominees.
2. The nominator should submit the nomination by email. The nominator should provide a brief resume of the accomplishments of the nominee(s) in bromeliad-related activities (e.g., service, offices held, major awards won) and a letter describing the way in which the nominee(s) meets at least four of Criteria 2-8 listed above.
3. Past nominees may be re-nominated if they currently meet the award criteria. Previous award winners (Dorothy Berg, Dennis Cathcart, John Anderson, Harry Luther, Grace Goode, Elton Leme, Derek Butcher) are ineligible for re-nomination.
4. Please send nominations to both cajat@aol.com and webmaster@bsi.org. Thank you. Nominations will be forwarded to Theresa Bert, who will prepare them for submission to the BSI Board for voting.
5. **Nominations must be received before June 1, 2014.

The winner's name will be published in the BSI Journal and posted on the BSI website. The winner or his/her representative will receive the award at the 2014 BSI World Conference in Honolulu, Hawaii, USA. One award is made every two years, at each BSI World Conference. The award is a rotating plaque with the current and all former winners' names and year of award engraved on it. The BSI considers this award to be its highest honor.

Review: Air Plants, Epiphytes & Aerial Gardens by David H. Benzing

Jay Thurrott

Air Plants Epiphytes and Aerial Gardens by David H. Benzing, published 2012 Comstock Publishing Associates, a division of Cornell University Press. 239 pages. Hardcover.

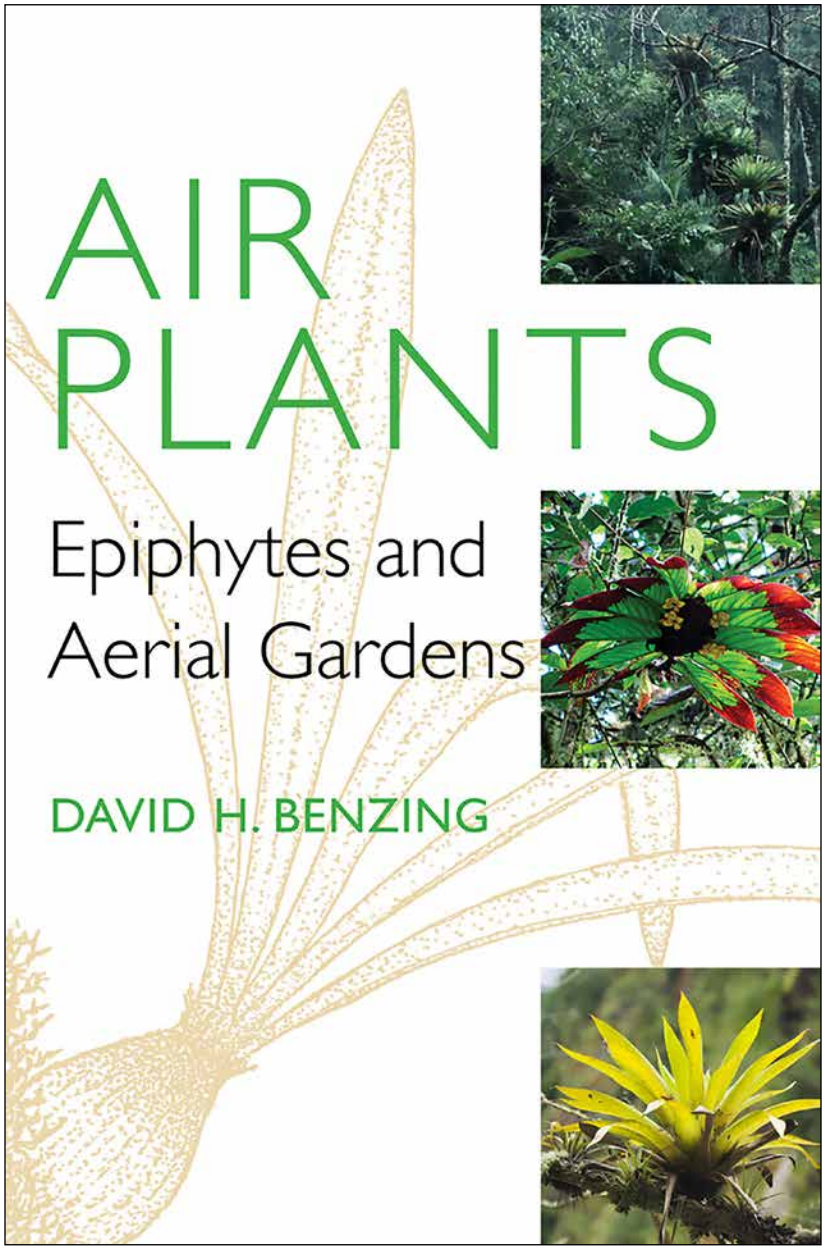
David Benzing's latest book, Air Plants Epiphytes and Aerial Gardens truly has something to offer to everyone who has an interest in learning more about this intriguing group of plants. Although usually associated with the orchid and bromeliad families, the author also identifies and discusses epiphytism in representatives of the Araceae (the aroids – including the widely cultivated genera Anthurium and Philodendron, among others), Amaryllidaceae, Cactaceae (Rhipsalis and Epiphyllum), Ericaceae, Gesneriaceae (most commonly associated with the terrestrial african violets, but also containing a number of epiphytic genera), Rubiaceae (Hydnophytum and Myrmecodia - the ant plants), Moraceae (strangler figs), Apocynaceae (hoyas), Solanaceae , and Piperaceae (Peperomia) as well as ferns and other miscellaneous plant groups.

Very basic information is offered in a down-to-earth manner that will hold the interest of the newcomer and for the more seasoned hobbyist, student, or researcher some of the mysteries and curiosities associated with families of plants that have chosen to leave their roots behind in favor of a more arboreal lifestyle are revealed in a very logical and easy to follow progression of chapters. Particularly useful, is a 14 page glossary that defines scientific terms used throughout the book. Dr. Benzing, professor of Biology at Oberlin College, begins this work in chapter one by addressing the frequently asked and very basic question "What is an epiphyte?" and then continues with discussion on the origins of epiphytism based on genetic research _ looking for clues to the traits which ultimately allowed plants to occupy this ecological niche.

So-called "air plants" face an entirely different set of challenges from the terrestrials and the author clearly identifies these as well as the benefits that can be received when plants live their lives removed from more earthly concerns. It is likely that bromeliad enthusiasts will begin with the Bromeliaceae section, but regardless of your specific area of interest, such a fascinating tale is woven by continually comparing features of each of the families of epiphytic plants that the reader is soon enthralled with the discussions of the unique ways in which each plant family has adapted to not only survive, but to thrive as an epiphyte. Unfortunately, those same unique adaptive features that have allowed epiphytes to survive in sometimes hostile environments also make them sensitive to changes in those environments and the book closes with a chapter devoted to the need to protect and conserve many epiphytic species that are now facing threats ranging from loss of habitat to climate change. In Air Plants Epiphytes and Aerial Gardens Dr. Benzing has presented scientific subject matter in such a manner that it will certainly appeal to a broad range of scientific and non-technical readers. I found the book to be fascinating and highly recommend it for the library of any orchid, bromeliad, gesneriad or other plant enthusiast possessing a curiosity regarding how these plants came to abandon their roots and took to the air.

The reviewer has been actively involved with the Florida Council of Bromeliad Societies and the Bromeliad Society International, having served as chairman and president

respectively for these organizations. An environmental chemist, Mr. Thurrott has been the author and co-author of research papers regarding water treatment processes and has served on technical review panels for the American Water Works Association, where he is a lifetime member.



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The BSI Seed Fund has found a new chairman! Many thanks to Bryan Windham of Kenner, Louisiana for taking on this responsibility.

More information to follow soon!

The Bromeliad Society International

The purpose of this nonprofit corporation is to promote and maintain public and scientific interest in the research, development, preservation, and distribution of bromeliads, both natural and hybrid, throughout the world. You are invited to join.

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