# Journal of The Bromeliad Society

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# Journal of the Bromeliad Society




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**Cover photographs.** Front: A mass display of one of the cultivars of *Neoregelia carolinae tricolor* (probably 'Meyendorfii') on display at the Floralies of Ghent exhibition in 1980. Photograph by Marcel LeCoufle Back: Vriesea Splendide Variegata at the San Diego World Bromeliad Conference in 1994. Photograph by Peter Wan.

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# Notice of Annual Meetings, Call for Budget and Other Business Items

You are hereby notified that the **annual general meeting of the Bromeliad Society International will be held in Orlando, Florida,** at the Clarion Plaza Hotel at 9:00 a.m. on Wednesday, July 3, 1996, to consider such business as may be brought to the attention of the BSI Board of Directors. All business matters must be sent in writing to the president at least 60 days before the meeting (Bylaws, Art. VII, part 2).

The **annual meeting of the Board of Directors** will be held immediately after the general meeting. The following schedule applies:

1) 90 days before the meeting: Officers, other directors, and committee chairmen shall send budget requirements and financial accounting to the treasurer. (Standing Rules 3 and 6).

2) 30 days before the meetings: Officers, other directors, and committee chairmen shall submit annual reports to the president and send copies to each officer and director. (Standing Rules 3 and 6).

3) 30 days before the meetings: the president will mail the agenda to each officer and director. (Standing Rule 3, par 2g).

Chairmen of the standing committees are elected by the Board of Directors. Nominations may be made by any member of the society in writing at least 30 days before the annual meeting. Nominations may also be made from the floor. You are invited to take part in this very important function by nominating for any committee chairmanship anyone you have found to be qualified, capable, and willing to serve.

*Jerry Raack, President*
*472 Greenhollow Drive*
*Pataskala, Ohio 43062*

# Herbivory in a Bromeliad of the Peruvian Rainforest Canopy

**Margaret Lowman,[1] Philip Wittman,[2] and Donald Murray[3]**

Very few accounts of herbivory in bromeliads of tropical rain forest canopies have been reported in the literature. Whether this accurately reflects a truly low frequency of herbivory or is simply a consequence of the difficulty of making observations in the upper canopies of tall trees, is not known. Benzing (1992) states that "extensive defoliation is rare in neotropical epiphytes", and our observations (that collectively span over 20 years of tree-climbing and canopy access) agree with this statement. Bromeliads are renowned for their tough and sclerophyllous leaves, below average nutritive qualities of foliage, and in some cases, their mutualistic relationships with ants that protect the plants from predators. All of these features serve to minimize their susceptibility to herbivory.

Over the last ten years, many new and innovative techniques for canopy access have been developed or adapted from other disciplines, such as spelunking and rock climbing. These techniques now enable scientists to spend extended periods of time, both safely and comfortably, studying epiphytes and other canopy organisms (Lowman and Nadkarni 1995). Due to these logistic advancements, more comprehensive *in situ* observations of epiphytes and their ecology are now possible. We have recently initiated canopy studies to document herbivory among bromeliads and other epiphytes as part of the research program at the Marie Selby Botanical Gardens. In this article, we report the first occurrence of a significant amount of herbivory in a bromeliad population. This population was found growing in the tropical rain forest canopy of the Amazon basin, in northeastern Peru (latitude 3° 15' S, longitude 72° 54' W) near the Sucasari tributary of the Napo River.

Access to the treetops was facilitated by a canopy walkway built as part of a joint venture to promote tourism as well as tropical research in the area. A consortium called ACEER (Amazon Center for Environmental Education and Research) has provided unparalleled canopy access to scientists and eco-tourists along a series of bridges and platforms built using the trees themselves as major supports. This canopy walkway extends over 400 meters in length ranging from ground level up to the top of the forest canopy at a height of 30 meters.

The bromeliad, *Aechmea nallyi* L.B. Smith, is a relatively rare epiphyte found only in patches of rain forest within the northeast corner of Peru (Luther, personal communication). It grows as a rosette of sclerophyllous leaves, and produces a

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[2] Research Associate, Marie Selby Botanical Gardens
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Bruce Holst

*Figure 1.*
*Aechmea nallyi* in flower, during April 1995 at approximately 28 m along the ACEER walkway, Peru.

*Figure 2.*
*Aechmea nallyi* with its characteristic herbivory, as observed in the canopy of northeastern Peru during July–August 1995.

brilliant pink and yellow inflorescence from March–May (Figure 1). Due to its proximity to the ACEER walkway, a population of approximately 15 individuals of this species was discovered and easily observed for extended periods of time. This was possible despite the fact that they were approximately 20–25 meters above the ground and virtually invisible to ground-based observers.

By using visual estimates to approximate leaf area lost, herbivory was measured for 10 leaves on each of 5 different plants. This sampling technique is described in detail elsewhere (Lowman 1992, 1995). In a manner similar to leaf miners, a herbivore consumed parts of the foliage, creating the characteristic linear "trails" of damage that either removed the uppermost cells of leaf tissue or in some cases chewed through the entire leaf. Although staff from Selby Gardens made periodic observations of *A. nallyi* during the months of April, July, August, September, and October, the responsible herbivore was never seen. We hypothesize that they are most likely to be active during the time prior to flower formation when more of the plant's resources are allocated to the foliage and not being diverted to reproduction.

Herbivory of this bromeliad averaged 10.4% foliage loss. The damage was very distinctive, composed of intermittent long patches parallel to the leaf venation and of uniform width, as shown in Figure 2. The proportions of foliage lost are shown in Table 1. This is the highest amount of herbivory estimated among replicated individuals of one epiphyte species that we have found in the literature, although isolated individuals have been observed with damage levels

*Table 1.*
The percentage of foliage lost on *Aechmea nallyi.*

| | Plant # | | | | |
|---|---|---|---|---|---|
| **Leaf #** | **1** | **2** | **3** | **4** | **5** |
| **1** | 15 | 12 | 15 | 10 | 10 |
| **2** | 5 | 15 | 10 | 20 | 25 |
| **3** | 5 | 15 | 5 | 10 | 18 |
| **4** | 10 | 10 | 5 | 5 | 15 |
| **5** | 2 | 25 | 4 | 4 | 20 |
| **6** | 3 | 20 | 15 | 4 | 5 |
| **7** | 2 | 5 | 20 | 6 | 20 |
| **8** | 0 | 5 | 8 | 10 | 25 |
| **9** | 5 | 8 | 2 | 5 | — |
| **10** | 5 | 5 | 5 | 10 | — |
| **Average** | 5.3 | 12 | 8.9 | 8.4 | 17.3 |
| **Total Average = 10.4%** | | | | | |



ranging from 0–21% in the canopies of subtropical rain forests in Belize (Lowman and Bouricius 1995).

We welcome the report of additional observations of herbivory in bromeliads growing in natural conditions, and plan to conduct future studies on the possible defense mechanisms of bromeliads against herbivores.

ACKNOWLEDGMENTS

We are grateful to the ACEER for providing canopy access in Peru, and to Earthwatch (Watertown, MA) for funding two of us (MDL, PKW) to conduct research there. We also thank Harry Luther for examining this manuscript, and Bruce Holst for the use of his photograph.

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*Marie Selby Botanical Gardens*
*Sarasota, Florida*

# Recent Gifts to the Society

We are happy to acknowledge gifts from the following members and friends of the BSI who have contributed to the Color Fund, to the BSI general fund, or to the Bromeliad Identification Center, some to all three.

Rita & Greg Beeler
Casper Bimmer
David Burdick
Roman Cantero
Anne & Gil Collings
Joy Cornell
Mary Ann Curtis
Howard De Cova
Dana Field
Willard Hartman
Ruth Harvey
Robert Ing
Leonard Maudens
Laura & Jim Mayfield
Sylvia Meluzin
Laura Mesco
Hiroyuki Takizawa
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Adeline Wance

Checks or international money orders should be made payable to The Bromeliad Society, Inc. They may be mailed to Membership Secretary Linda Harbert, 2488 E. 49th St., Tulsa, OK 74105, or to Editor Chet Blackburn, 720 Millertown Road, Auburn, CA 95603.

# The Name Game: or, "What in the World is a Cultivar?"

**Ellen Baskerville, Cultivar Registrar**

Eight or nine years ago when I first heard the term "cultivar registration", my thirst for knowledge of bromeliads brought me into contact with people who tossed around terms like "Cultivated Code," "grex," "hybrid," and "cultivar." Frankly, at the time, it all sounded Greek (or maybe Latin?) to me, but I struggled to understand, and now I find myself in the business of answering many of the same questions that troubled me back then.

"Hybrid" is easy. We all know what a hybrid is. It is any bromeliad that is not a species. What is a species? A species is any bromeliad we did not create. See how easy it is? "Oh, yes!" you say, but the game gets more complicated after that.

**"What is this registration process all about, anyway?"**

Cultivated plants are regulated by the *International Code of Nomenclature for Cultivated Plants,* more commonly known as the "Cultivated Code." The Bromeliad Society International is the designated registration authority for the family Bromeliaceae, and as Cultivar Registrar, I am charged with carrying out various duties.

When previous Registrar Don Beadle compiled the *Preliminary Listing of All Known Cultivar and Grex Names for the Bromeliaceae* in 1991, he was complying with the rules to publish a checklist of all known bromeliad cultivar and grex names as of that date. The rules state that after a reasonable interval to allow for revisions and additions to the list, a comprehensive Bromeliad Registry is to be published. Don Beadle has agreed to share this job with me, and we are well underway. Hopefully, we will have the Registry printed in time for the 1996 World Bromeliad Conference.

Since the Cultivated Code has recently eliminated the naming and registration of a hybrid grex, we are now solely concerned with the registration of cultivars.[1]

**"There's that word again! So what exactly is a cultivar?"**

In order to define the term cultivar, we need to know that the word "grex" is the term applied to all plants in a batch resulting from making a hybrid. More often than not, a grex, especially one resulting from the use of a hybrid as one of the parents, contains plants which vary considerably in both appearance and genetic makeup. In the past when a grex was named, the plants bearing that name differed widely causing confusion and frustration for the grower. A cultivar would

[1] Tirehane, Piers, ed., International Code of Nomenclature for Cultivated Plants. 1995. (Winborne, United Kingdom; Quarterjack Publishing.)



be an individual plant selected from the grex because of a particular set of attributes. It must be clearly distinct, uniform and stable in it characteristics. The selected cultivar is propagated by **pupping** assuring that all plants with the same cultivar name are genetically identical.

**"How do I choose the cultivars to be named?"**

The most important decision you must make before attempting to register a cultivar is to satisfy yourself that it is truly unique and recognizable. Cultivars should be grown through several cycles of pupping and blooming to insure that they are stable and reproduce consistently. "Recognizable" should mean that the cultivar has unique characteristics which allow it to be identified or recognized without a tag, especially by someone other than yourself. This decision is yours to make and your best judgement is required to prevent the registration of large numbers of essentially identical plants. For instance, if you make a hybrid grex consisting of a variety of clones or cultivars, selecting and registering only the truly unique clone or clones is the most appropriate way to proceed. The next appropriate thing to do is to destroy the balance of the grex or at least make an effort not to release it.

**"What should I include in this description?"**

The description is one of the most important parts of the registration. Even though our preliminary list contains names which never went through the formal process of registration, they are registered because they have been listed in a checklist in accordance with the Cultivated Code.[1] With the inception of the Bromeliad Registry, registration of new cultivars requires formal application with a brief description of the cultivar. This description is what makes the name and information about the new cultivar meaningful. There are many cultivars of *Aechmea chantinii,* but only the description tells what makes each cultivar unique.

The general description should be easy to state, and the use of *A Bromeliad Glossary,* available through BSI Publications, is very helpful. However, the description does not have to be Latinized or be as formal as a description for a species. It should describe the overall size of the plant. The general shape should include information as to whether a plant is tubular or a rosette. Information about growth habit should include whether a plant is stoloniferous or caulescent. Full leaf descriptions should include information about the number of leaves, their color, the length, width, and shape of the tip, along with the size, color and spacing of any spines. The description of the inflorescence is very important. What is its size? Is it branched? What is the bract color and size? What color are the berries, if present, and petals? The description should also include annual blooming times if available.

[1] Tirehane, Piers, ed., International Code of Nomenclature for Cultivated Plants. 1995. (Winborne, United Kingdom; Quarterjack Publishing.)

Another important part of the description is to include a comparison of your cultivar with the plant you think it most closely resembles. This makes the description easier to understand and visualize. A written description of the features or characters that makes the cultivar unique is also required, and the applicant may use the plant the cultivar resembles as a reference. For instance, *Aechmea* 'Ensign' may be described as resembling *Aechmea orlandiana* but having green leaves with white margins suffused with red.

**"What can I register?"**

Any bromeliad cultivar may be registered: a unique cultivar of a species plant, a new, unknown, or undescribed species (e.g. Neoregelia 'Fireball'), a hybrid with unknown parentage, or a natural hybrid. It must simply fit the definition for cultivar as described above.

**"What is all the to-do about photos?"**

New cultivar registrations must be accompanied by two or more slides, prints, or negatives (slides preferred). These photographs accompanying an application corroborate the description and provide an opportunity for pictorial publication in the *Journal of the Bromeliad Society.* One photograph should show a full-frame overall view of the plant with another showing the bloom as close up as possible. Either of these, or perhaps another photograph, should show the features or characters that makes the cultivar unique. At some future date, these photos can be scanned into a computer, and it is conceivable that the Bromeliad Registry would contain photographs of the cultivars.

**"What happens to the information I send in with the registration?"**

The computer database into which the information from the registration sheet is entered is an open one which will allow updating, adding additional material, or changing data at any time. If the attributes for which your cultivar was chosen should change and the cultivar settles on a different form than originally registered, then the registrar should be notified so that corrections can be made to the data. Finally, the information is published in the Bromeliad Registry and made available on the Internet World Wide Web to be accessed by interested people from all over the world.

**"What are some guidelines for choosing names?"**

The cultivar name you choose should follow the guidelines below.[1]

1. On or after 1 January, 1996, new cultivar names must consist of no more than 10 syllables and no more than 30 letters or characters overall, excluding spaces and the single quotes which indicated a cultivar name.

[1] Tirehane, Piers, ed., International Code of Nomenclature for Cultivated Plants. 1995. (Winborne, United Kingdom; Quarterjack Publishing.)



2. The name may not be in Latin, or include botanical names and terms or similarities to existing names which might lead to confusion.
3. It is preferable not to use abbreviations, articles, numerals, arbitrary sequences of letters, or terms such as "cross," "hybrid," or "grex" or words exaggerating the merits of the cultivar which may become inaccurate through introduction of new cultivars.

**"Where should I send my registration?"**

Applications should be mailed to:

Ellen Baskerville, Cultivar Registrar
Marie Selby Botanical Gardens
811 South Palm Avenue
Sarasota, FL. 34236
Office phone: (941) 955-7553 Ext 10
Home phone: (941) 355-1277
FAX: (941) 951-1474

If any of the requested data is unknown, please indicate this in the appropriate space.

So, now that you know how to proceed, I look forward to receiving any additions or corrections to the preliminary list or new cultivar registrations, all to be included in the Bromeliad Registry. If you have any questions, need registration forms, or require assistance, please contact me.

*Marie Selby Botanical Gardens*
*Sarasota, Florida*

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# International Code of Nomenclature for Cultivated Plants (1995 Edition), Now Available

The ICNCP, also known as the Cultivated Plant Code, is the international set of rules for naming cultivated plants of all kinds, from vegetables to ornamentals. It is prepared and released under the authority of the International Commission for the Nomenclature of Cultivated Plants, and as such, is a valuable asset to anyone concerned with accurately naming plants.

The fully revised 6th edition differs dramatically in design from its 1980 predecessor, which has long been out of print. There have been many changes in agriculture, forestry and horticulture since the 1980 edition, particularly in the area of national and international legislation and in considerations of intellectual

*[Continued on page 80]*

# A Checklist of the Bromeliaceae of Costa Rica

**Harry E. Luther**

The following checklist of Costa Rican bromeliad taxa is based on a review of the literature, and field and herbarium study (mostly MO,SEL,INB). This list differs from the inventory presented in Flora Mesoamericana (Davidsae et al. 1944). Many of the additions are the result of recent collections that represent new country records. Some are newly described taxa that were published after the work on the Flora was completed. A few included taxa represent differences of opinion regarding their taxonomic status (*Aechmea pittieri*, *Guzmania compacta*, *Tillandsia cauliflora* and *Vriesea castaneobulbosa*); or are not included for the same reason (*Guzmania costaricensis* = *G. condensata*). Two taxa listed in the Flora are the result of misidentification and do not occur in Costa Rica (*Guzmania dissitiflora*, Colombia and Ecuador only; *Tillandsia compressa*, the Greater Antilles only). A number of undescribed taxa in *Guzmania* and *Pitcairnia* are not included in this checklist. Endemic taxa are noted.

Additions and comments are solicited.

*Aechmea angustifolia* Poepp. & Endl.
*Aechmea aquilega* (Salisb.) Griseb.
*Aechmea bracteata* (Sw.) Griseb.
*Aechmea castelnavii* Baker
*Aechmea dactylina* Baker
*Aechmea lingulata* (L.) Baker
*Aechmea lueddemanniana* (K. Koch) Brongn. ex Mez
*Aechmea magdalenae* (André) André ex Baker
*Aechmea mariae-reginae* H. Wendl.
*Aechmea mexicana* Baker
*Aechmea nudicaulis* (L.) Griseb.
*Aechmea penduliflora* André
*Aechmea pittieri* Mez
*Aechmea pubescens* Baker
*Aechmea tonduzii* Mez & Pittier ex Mez
*Aechmea veitchii* Baker

*Ananas ananassoides* (Baker) L.B. Smith
*Ananas comosus* (L.) Merrill Cultivated & Naturalized

*Androlepis skinneri* Brongn. ex Houllet

*Araeococcus pectinatus* L.B. Sm.

*Billbergia macrolepis* L.B. Sm.

*Bromelia hemisphaerica* Lam.
*Bromelia pinguin* L.
*Bromelia plumieri* (E. Morren) L.B. Sm.

*Catopsis juncifolia* Mez & Wercklé ex Mez
*Catopsis morreniana* Mez
*Catopsis nitida* (Hook.) Griseb.
*Catopsis nutans* (Sw.) Griseb.
*Catopsis paniculata* E. Morren
*Catopsis sessiliflora* (Ruiz & Pav.) Mez
*Catopsis wangerinii* Mez & Wercklé ex Mez
*Catopsis wawranea* Mez
*Catopsis werckleana* Mez **Endemic**

*Greigia columbiana* L.B. Sm.
*Greigia sylvicola* Standl.

*Guzmania angustifolia* (Baker) Wittm.
*Guzmania blassii* Rauh **Endemic**
*Guzmania circinnata* Rauh
*Guzmania compacta* Mez
*Guzmania condensata* Mez & Wercklé
*Guzmania coriostachya* (Griseb.) Mez



*Guzmania desautelsii* R.W. Read & L.B. Sm.
*Guzmania donnell-smithii* Mez ex Donn.Sm.
*Guzmania glomerata* Mez & Wercklé
*Guzmania lingulata* var. *lingulata* (L.) Mez
*Guzmania lingulata* var. *splendens* (Planch.) Mez
*Guzmania minor* Mez
*Guzmania mitis* L.B. Sm.
*Guzmania monostachia* (L.) Rusby ex Mez
*Guzmania musaica* (Linden & André) Mez
*Guzmania nicaraguensis* Mez & C.F. Baker ex Mez
*Guzmania obtusiloba* L.B. Sm.
*Guzmania patula* Mez & Wercklé
*Guzmania plicatifolia* L.B. Sm.
*Guzmania polycephala* Mez & Wercklé ex Mez
*Guzmania sanguinea* (André) André ex Mez
*Guzmania scherzeriana* Mez
*Guzmania skotakii* H. Luther **Endemic**
*Guzmania spectabilis* (Mez & Wercklé) Utley
*Guzmania sprucei* (André) L.B. Sm.
*Guzmania stenostachya* L.B. Sm.
*Guzmania subcorymbosa* L.B. Sm.
*Guzmania zahnii* (Hook.f) Mez

*Mezobromelia pleiosticha* (Griseb.) Utley & H. Luther

*Pepinia beachiae* (Utley & Burt-Utley) H. Luther **Endemic**

*Pitcairnia arcuata* (André) André
*Pitcairnia atrorubens* (Beer) Baker
*Pitcairnia brittoniana* Mez
*Pitcairnia funkiae* M.A. Spencer & L.B. Sm. **Endemic**
*Pitcairnia guzmanioides* L.B. Sm.
*Pitcairnia halophila* L.B. Sm. **Endemic**
*Pitcairnia heterophylla* (Lindl.) Beer
*Pitcairnia kalbreyeri* Baker
*Pitcairnia lyman-smithiana* H. Luther
*Pitcairnia maidifolia* (C. Morren) Decne
*Pitcairnia megasepala* Baker
*Pitcairnia membranifolia* Baker **Endemic**
*Pitcairnia saxicola* L.B. Sm.
*Pitcairnia valerioi* Standl.
*Pitcairnia wendlandii* Baker

*Puya dasylirioides* Standl.
*Puya floccosa* (Linden) E. Morren ex Mez

*Racinaea adpressa* ssp. *orthiantha* (Standl.) J.R. Grant
*Racinaea contorta* (Mez) M.A. Spencer & L.B. Sm.
*Racinaea rothschuhiana* (Mez) M.A. Spencer & L.B. Sm.
*Racinaea schumanniana* (Wittm.) J.R. Grant
*Racinaea spiculosa* (Griseb.) M.A. Spencer & L.B. Sm.
*Racinaea tetrantha* var. *caribaea* (L.B. Sm.) M.A. Spencer & L.B. Sm.

*Ronnbergia hathewayi* L.B. Sm.

*Tillandsia abdita* L.B. Sm.
*Tillandsia acostae* Mez & Tonduz. ex Mez
*Tillandsia anceps* Lodd.
*Tillandsia balbisiana* Schultes f.
*Tillandsia biflora* Ruiz & Pav.
*Tillandsia brachycaulos* Schltdl.
*Tillandsia bulbosa* Hook.f
*Tillandisa butzii* Mez
*Tillandsia caput-medusae* E. Morren
*Tillandsia cauliflora* Mez & Wercklé ex Mez **Endemic**
*Tillandsia complanata* Benth.
*Tillandsia dexteri* H. Luther **Endemic**
*Tillandsia excelsa* Griseb.
*Tillandsia fasciculata* var. *fasciculata* Sw.

*Tillandsia fasciculata* var. *densispica* Mez
*Tillandsia festucoides* Brongn. ex Mez
*Tillandsia filifolia* Schltdl. & Cham.
*Tillandsia flexuosa* Sw.
*Tillandsia insignis* (Mez) L.B. Sm. & Pittendr.
*Tillandsia ionantha* Planch.
*Tillandsia juncea* (Ruiz & Pav.) Poiret
*Tillandsia lampropoda* L.B. Sm.
*Tillandsia leiboldiana* Schltdl.
*Tillandsia longifolia* Baker
*Tillandsia makoyana* Baker
*Tillandsia monadelpha* (E. Morren) Baker
*Tillandsia multicaulis* Steud.
*Tillandsia oerstediana* L.B. Sm.
*Tillandsia paucifolia* Baker
*Tillandsia pruinosa* Sw.
*Tillandsia punctulata* Schltdl. & Cham.
*Tillandsia* × *rectifolia* (Wiley) H. Luther
*Tillandsia recurvata* (L.) L.
*Tillandsia schiediana* Steud.
*Tillandsia singularis* Mez & Wercklé
*Tillandsia streptophylla* Scheidw. ex Morren
*Tillandsia subulifera* Mez
*Tillandsia tricolor* var. *tricolor* Schltdl & Cham.
*Tillandsia tricolor* var. *melanocrater* (L.B. Sm.) L.B. Sm.
*Tillandsia usneoides* (L.) L.
*Tillandsia utriculata* L.
*Tillandsia variabilis* Schltdl.
*Tillandsia venusta* Mez & Wercklé

*Vriesea acuminata* Mez & Wercklé[1]
*Vriesea ampla* L.B. Sm.[1] **Endemic**
*Vriesea apiculata* L.B. Sm.[1] **Endemic**
*Vriesea attenuata* L.B. Sm. & Pittendr.[1]
*Vriesea balanophora* (Mez) L.B. Sm. & Pittendr.[1] **Endemic**
*Vriesea bicolor* L.B. Sm.[1] **Endemic**
*Vriesea bracteosa* (Mez & Wercklé) L.B. Sm. & Pittendr.[1] **Endemic**
*Vriesea brunei* Mez & Wercklé[1] **Endemic**
*Vriesea burgeri* L.B. Sm.[1]
*Vriesea camptoclada* Mez & Wercklé **Endemic**
*Vriesea capitata* (Mez & Wercklé) L.B. Sm. & Pittendr.[1]
*Vriesea castaneobulbosa* (Mez & Wercklé) J.R. Grant
*Vriesea chontalensis* (Baker) L.B. Sm.
*Vriesea comata* (Mez & Wercklé) L.B. Sm. & Pittendr.[1]
*Vriesea diffusa* L.B. Sm. & Pittendr.[1]
*Vriesea dodsonii* L.B. Sm.[1] **Endemic**
*Vriesea gladioliflora* (Wendl.) Antoine[1]
*Vriesea graminifolia* Mez & Wercklé[1]
*Vriesea greenbergii* Utley[1]
*Vriesea hainesiorum* L.B. Sm.[1] **Endemic**
*Vriesea heliconioides* (Humb., Bonpl. & Kunth) Hook.f ex Walpers
*Vriesea hygrometrica* (André) L.B. Sm. & Pittendr.[1]
*Vriesea incurva* (Griseb.) R.W. Read
*Vriesea kathyae* Utley[1] **Endemic**
*Vriesea kupperiana* Suess.[1]
*Vriesea latissima* (Mez & Wercklé) L.B. Sm. & Pittendr.[1]
*Vriesea leptopoda* L.B. Sm. & Pittendr.[1]
*Vriesea leucophylla* L.B. Sm.[1]
*Vriesea luis-gomeziii* Utley[1] **Endemic**
*Vriesea lutheriana* J.R. Grant **Endemic**
*Vriesea lyman-smithii* Utley[1] **Endemic**
*Vriesea macrantha* Mez & Wercklé[1] **Endemic**
*Vriesea macrochlamys* Mez & Wercklé in Mez[1] **Endemic**
*Vriesea marnier-lapostollei* L.B. Sm.[1]
*Vriesea monstrum* (Mez) L.B. Sm.
*Vriesea nephrolepis* L.B. Sm. & Pittendr.[1]
*Vriesea notata* L.B. Sm. & Pittendr.[1] **Endemic**
*Vriesea nutans* L.B. Sm.[1] **Endemic**
*Vriesea ororiensis* (Mez) L.B. Sm. & Pittendr.[1]

[1] Transferred to genus *Werauhia* by Grant (1995).



*Vriesea pedicellata* (Mez & Wercklé) L.B. Sm. & Pittendr.[1]
*Vriesea picta* (Mez & Wercklé) L.B. Sm. & Pittendr.[1]
*Vriesea pittieri* Mez[1]
*Vriesea ringens* (Griseb.) Harms[1]
*Vriesea rugosa* Mez & Wercklé[1] **Endemic**
*Vriesea sanguinolenta* Cogn. & Marchal[1]
*Vriesea singuliflora* (Mez & Wercklé) L.B. Sm. & Pittendr.[1] **Endemic**
*Vriesea stenophylla* (Mez & Wercklé) L.B. Sm. & Pittendr.[1]
*Vriesea subsecunda* Wittm.[1]
*Vriesea tonduziana* L.B. Sm.[1] **Endemic**
*Vriesea triflora* L.B. Sm. & Pittendr.[1] **Endemic**
*Vriesea umbrosa* L.B. Sm.[1]
*Vriesea uxoris* Utley[1] **Endemic**
*Vriesea vietoris* Utley[1] **Endemic**
*Vriesea viridiflora* (Regel) Wittm. ex Mez[1]
*Vriesea viridis* (Mez & Wercklé) L.B. Sm. & Pittendr.[1] **Endemic**
*Vriesea vittata* (Mez & Wercklé) L.B. Sm. & Pittendr.[1]
*Vriesea werckleana* Mez[1]
*Vriesea williamsii* L.B. Sm.[1]

## Natural hybrids

*Tillandsia acostae* × *T. tricolor* var. *melanocrater*
*Tillandsia brachycaulos* × *T. caput-medusae* (syn: *T. brachycaulos* var. *multiflora*
*Tillandsia schiediana* × *T. ionantha* = *T.* × *rectifolia*
*Tillandsia schiediana* × *T. juncea*
*Tillandsia tricolor* var. *melanocrater* × *T. fasciculata*
*Tillandsia tricolor* var. *melanocrater* × *T. juncea*

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*Sarasota, Florida*

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*We thank Harry Luther for permission to delete the literature citations for each taxon before reprinting in these pages. The fully annotated checklist occurs in* SELBYANA, *The Journal of the Marie Selby Botanical Gardens cited above. Subscriptions to* SELBYANA *are available through* SELBYANA, *P.O. Box 1897, Lawrence, Kansas, 66044-8897, USA, 1-800-627-0629. Subscription price is $55 per volume for all* libraries and institutions *(includes normal shipping).* Personal *subscriptions are available at $35 per volume.*

[1] Transferred to genus *Werauhia* by Grant (1995).

# Something New For Orlandiana 96

**B.C. McKinney**

You Bromeliophiles have long been acquainted with the nomenclature of our favorite plant family. Victoria Padilla's popular book *Bromeliads*[1] has an excellent section on the subject. From it you learned that there is a generic name (genus) and a descriptive name (species). Many are named after people.

That gave us an idea! Why not feature plants which have been named for persons who have been active in the International Society, or in our local societies, at the World Bromeliad Conference in 1996? We would prepare a booklet listing these persons who have been so honored. Some of them will even be attending the conference. For example, Grant Groves of the Bromeliad Society of Central Florida named one of his hybrids for his lovely wife Debbie, *Neoregelia* 'Debbie'. Grant and Debbie will be coming to the conference.

If you are one of those persons, it would be great if you could bring a plant named in your honor for a special display. I'm sure Bert Foster will come and bring an *Aechmea* 'Bert', a plant named for him by his distinguished father, Mulford Foster, "The Father of Bromeliads." Others of you might like to bring a plant named for someone who could not attend, or perhaps a deceased person.

Just for fun, we reviewed a list of plant names of persons so honored who were associated with our local societies. We found *Aechmea fosteriana* and *Aechmea mulfordii,* both named for Mulford Foster (deceased); *Aechmea nallyi* named for Julian Nally (deceased); *Aechmea racinae* named for Racine Foster, Mulford's wife and colleague (deceased); *Billbergia fosteriana* and *Canistrum fosterianum,* both named for Mr. Foster; *Greigia van-hyningii* named for O.C. Van Hyning (deceased); *Neoregelia fosteriana, Othophytum fosterianum, Dyckia fosterella,* and *Vriesea fosteriana,* all named for Mr. Foster.

So get busy and let us know of such plant/persons you are aware of. If you are one of those persons, try to bring your plant to the conference. If not, bring one or more named for others. See you there!

*30 Springview Drive*
*Orlando, Florida*

[1] Padilla, Victoria. 1973. *Bromeliads.* New York: Crown Publishing, 134pp.



# When in Doubt, Don't Throw it Out!

**Wally Berg**

In 1987, I acquired a much-sought-after plant: *Orthophytum burle-marxii.* As the months passed, it stopped growing and started to deteriorate. I had heard that this plant was difficult to grow, but I figured if others could grow it, so could I. Undaunted, I decided the best thing I could do was to repot it.

When I acquired this plant, I made a common mistake. I did not repot in the same mix that I use in my growing area. This plant had been growing on capillary mats with an entirely different mix, and I could not keep it from drying out. Repotting raised my spirits, but as the months passed, the leaves began falling off and the entire plant was looking worse and worse. Someone suggested that I put it in a saucer of water, which I did, and after about four months, It rotted off at the base. At this point it had only three or four small leaves, and I had to decide whether to trash it or try something new.

Not being one to give up, I cleaned off the rotted base and dipped it in Rootone. I potted it in a 5" standard black plastic pot using only pure perlite. Months later, the plant started producing new leaves. I added Osmocote time-release fertilizer from time to time, supplementing my regular liquid feeding schedule. After a year, I started to have a beautiful plant and continued to water and feed it heavily, leaving it in the perlite. Soon, a large pup appeared. I happily removed it and gave it to an avid bromeliad grower who also potted it in pure perlite.

Finally, in May of 1993, six years after acquiring the plant, it came into bloom. It was beautiful! As always seems to happen, our show was six months away so I took my *Orthophytum burle-marxii* to Show and Tell at our regular monthly meeting. Harry Luther was at the meeting and commented that it was one of the largest specimens he had seen. The leaves were seventeen inches long and the inflorescence was three and one-half inches across.

That night I asked my wife, the photographer of the family, if she would take some photographs of this plant as Harry Luther would like some for his slide library. A few days later I asked if she had taken those photographs. She said she had, but I sensed that something was wrong but didn't press the issue.

That night, after a superb meal, she said she had experienced a little problem. While trying to get better light for the picture, she had moved the small table on which the plant was sitting and it fell off. Well, I thought, a few broken leaves...no big deal. Then she reached over and lifted the entire top off the plant. It had broken

*Figure 3.*
The rejuvenated *Orthophytum Burle-marxii.*[1]

right in half and looked as if it had been scalped! So now I could provide Harry with a herbarium specimen too, along with the slides she had taken.

As I stood looking at the plant and five broken pups, I was cheered by the fact that I had shared a pup of this beautiful plant with a friend and that it was growing happily in its pot of perlite. So, if you're having trouble growing a plant, try some perlite, but remember to feed it regularly.

*2251 Constitution Blvd.*
*Sarasota, Florida*

[1] There are color pictures of O. burle-marxii in habitat on pages 4 and 5, volume 58 (January–February, 1988) of the JOURNAL.



# Nat DeLeon Honored

Former BSI president Nat DeLeon has been honored by the Tropical Plant Industry, Florida Nurserymen and Growers Association, by being inducted into The Foliage Hall of Fame. Nat has long been an eminent figure in the field of ornamental horticulture.

A portion of the letter citing his significant contributions to the tropical foliage industry was printed in both the *Bromeliad Advisory* (the newsletter of the Bromeliad Society of South Florida) and the newsletter of the Florida Council of Bromeliad Societies. In part it reads:

"...for outstanding development of numerous hybrids of both aglaonemas and bromeliads. Many of the early commercial hybrids of both these plants came as a result of Mr. DeLeon's work. Through his collecting trips and extensive research, Mr. DeLeon has developed over 200 hybrids, many of which are mainstays of the commercial foliage industry today."

Among his accomplishments, Nat has been president of both the BSI and the International Palm Society, was formerly the Chief Horticulturist in charge of the grounds of Miami's famous Parrot Jungle, has taught courses on bromeliad culture at Fairchild Tropical Gardens, was one of the founders of the Florida Council of Bromeliad Societies, was a past director of the BSI, and also served as hybrid registrar for the BSI.

He was the first president of the Bromeliad Society of South Florida and is an honorary lifetime member of that affiliate. He is still very active in that organization where, according to their newsletter editor Moyna Prince, he is known as much for his dry sense of humor as his vast store of knowledge.

A meticulous hybridizer, Nat was responsible for introducing numerous bromeliad hybrids into cultivation. Paradoxically, the bromeliad he is best known for introducing is not a hybrid at all, but a species. It is still undescribed botanically but is universally known to all of us as Neoregelia 'Fireball', a name tacked onto it by Nat's long-time friend, Ralph Davis.

Nat and his two sons currently operate a nursery known as DeLeon's Bromeliad World.

Nat can take pride in the fact that it is highly likely that every respectable bromeliad collection anywhere in the world has at least one plant in it that he was responsible for introducing.

Congratulate Nat when you see him, it is an honor well-deserved.

# Puracé: A Colombian Surprise

**Chet Blackburn** **Photographs by the Author**

Colombia has one of the most diverse flora and faunas found anywhere in the world. Some of the reasons for this become immediately evident upon looking at a relief map of the South American continent.

Colombia is the only South American country, for example, with shorelines on both the Pacific and Atlantic Oceans, (with the Atlantic side being the Caribbean Sea). It is also the only country that extends from Central America to the Amazon basin.

The western part of the country is dominated by the lofty Andes. To the north, the eastern part of the country is covered by hundreds of square miles of empty grassland, known as the Llanos, which stretch in solitude all the way into Venezuela. To the south, the eastern part of the country becomes criss-crossed by meandering streams and blanketed with heavy forest. It is, in fact, the northern end of the vast Amazon rainforest.

The heaviest rainfall in South America is found near Buenaventura in western Colombia, while one of the driest areas (but not **the** driest) in South America is to be found on the Guajira Peninsula at the northeast tip of Colombia.

In fact, almost every habitat that exists in South America occurs within Colombia's borders. Colombia not only contains a number of plants and animals typically found in such varied regions as the Amazon Basin, the Andes, Central America, the Pacific shoreline and the Caribbean Coast, but it also has a large number of plant and animal species that are found only within its borders. In fact, between 40 and 50 percent of the bromeliad species listed for Colombia in FLORA NEOTROPICA appear to be restricted to Colombia.

For most of their length, the Andes Mountains extend from Argentina to the southern Colombian border as one long continuous chain. Shortly after entering Colombia, however, they split into three separate ranges; the Western Cordillera, the Central Cordillera, and the Eastern Cordillera. Each of the three ranges are high enough that their slopes form barriers preventing plant and animal life living between them from crossing over, thereby creating classic conditions for evolution to work its wonders on isolated populations.

In this area where the Andes branch apart can be found one of the least known national parks in South America, Puracé National Park. It is named after the imposing Volcan Puracé which stands ominously at the northern end of the park in the Sierra do Coconucus. A trail leads to the summit of the volcano, but the climb is a strenuous one and anyone attempting it should be prepared for



sudden weather changes, which are common. Actually, the same can be said for trails throughout the park because elevations within it range from about 2,590 meters (8,500 feet) to almost 4,875 meters (almost 16,000 feet).

Puracé is probably the best place in the Andes to see the rare Andean Condor. Other rare wildlife found there include the Spectacled Bear and the Mountain Tapir.

The 830 km square park is also the source of three of Colombia's largest rivers; the Caqueta River, which flows east to join the Amazon in Brazil (under its Brazilian name of the Japurá river); the Magdalena River, which occupies the valley formed between the Central Cordillera of the Andes and the Eastern Cordillera, and is the most important river in Colombia's history; and the Cauca River, which flows through the valley formed between the Central Cordillera and the Western Cordillera. Both the Cauca and Magdalena Rivers run the length of the country from south to north before merging together and emptying into the Caribbean Sea.

It is not necessary to climb the volcano to discover evidence of volcanic activity at Puracé. There are fumaroles and boiling mudpots not far off the road in an area known as the Termales de San Juan.

In this area of hot, bubbling mud and sulphur springs my wife Jean and I found the endemic *Puya cuatracasasii* L.B. Smith (Figure 4). It grows thickly there on slopes of volcanic soil between rivulets of warm mineralized water formed by the many springs in the area. According to the altimeter that I usually lug around with me on such trips, the elevation was about 12,500 feet. The smell of sulphur permeates the air and the water takes on various hues depending upon the algae present in that particular location. Multicolored mosses and lichens also add to the color display.

This is one of the smallest of the puyas, and is an attractive one. It has an interesting, club-like inflorescence encircled by large cream-colored flowers. It is only about a foot tall when not in flower but the inflorescence reaches up to 3 times that height in flower.

Another plant growing along with it was even more interesting. I originally mistook it for a cycad and was therefore quite surprised to find a cycad growing at that high altitude. However under closer inspection, the "cycad" turned out to be a fern with a thick trunk and very stiff leaflets. I later learned it was a *Blechnum* sp? (Figure 5).

Since we were in a national park, I refrained from collecting either of them. I never found either plant outside the park boundaries, so I have no idea how they would do in cultivation. To the best of my knowledge, neither is in cultivation.

*Figure 4.*
*Puya cuatracasasii* L.B. Smith. A small attractive Puya blanketing the ground between sulphur springs at Puracé National Park.

*Figure 5.*
*Blechnum sp?* A fern at Puracé Park that looks surprisingly like a cycad.



*Figure 6.*
*Racinaea fraseri* (Baker) M.S. Spencer & L.B. Smith. Common in the Popayan area of Colombia.

*Figure 7.*
*Pitcairnia pungens* Humboldt, Bonpland & Kunth. One of the more conspicuous bromeliads seen along the road.

Puracé National Park is about 37 miles (60 kilometers) east of Popayan, on the road to Neiva. The road goes right past the park but the park is still rather isolated and not heavily utilized. We were there for a couple of hours in the Termales de San Juan area without encountering another human being. There are few buildings and we did not spend the night there, though I understand that there are now a couple of rooms available for rent in the thermal baths area along with a small visitor center. It is an easy round trip in one day from Popayan.

A few bromeliads can be seen along the road between Popayan and Puracé. Around Popayan *Racinaea fraseri* (Figure 6) is common. Another tank-type bromeliad with beautiful bright red foliage is frequently encountered on trees overhanging streams in sheltered ravines that the road traversed. We were unable to collect any of these but I suspect it was *Tillandsia pastensis,* with which I have had some experience in the past. With this species, the bright red color developed by the foliage in its high elevation habitats inevitably turns to plain green when brought into cultivation. There were also a few other tank-type bromeliads along the road that I was unable to identify.

*Pitcairnia pungens* (Figure 7) is relatively common with its scarlet inflorescences being very conspicuous in the rocky places it grew. These were usually well up on the steep roadbanks on the uphill side of the road, and tantalizingly just out of reach on the downhill side. The one I did bring back bloomed reliably for me for about five years before succumbing during a hard winter.

A nice compact form of *Tillandsia incarnata* grew at the base of talus slopes, among rocks, and even on fence posts along the road just below the town of Puracé.

The winding road is frequently steep and precipitous and has numerous panoramic views, but is in good condition. It provides easy access to a part of Colombia's high country which is difficult to reach in most areas.

The park deserves to be better known than it is. It is worth the trip for anyone finding themselves in the Popoyan area.

*Auburn, California*

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**CORRECTION:** Vol 46(1), p. 43. In the first sentence in the Orlandiana ad, the word "continental" should have been "convention". The ad should have read:

"....registrants to the convention breakfast on July 4...."

The convention breakfast will be a full-breakfast buffet.



# Some Observations on the Adaptability of Selected High-Altitude Tillandsioideae to Cultivation in South Africa

**George Stamatis**

Tillandsioideae from high altitude forests and cloud forests, whether at low or high altitudes, have always presented problems to growers near sea level. Because many have evolved in mist-smothered habitats where temperatures are cool (but not cold), surfaces are damp, and the air is humid, their acclimatization and cultivation has been something that only experienced growers could achieve, often with limited success. If one can recreate and maintain these conditions artificially, there may be few problems, but because this is a costly and delicate affair, it is not for everyone.

Some of the most beautiful and bizarre species hail from cloud forests. They are usually rare and are therefore available only from specialty nurseries. Prices generally run high, and in some cases, the purchase of a single specimen of a plant such as *Guzmania lingulata* 'Fortuna' can break a grower's bromeliad budget.

Sadly, there has not been enough experimentation with these species. They are certainly worth a try for their beauty alone, and in some cases will become the status symbols of one's collection. Just the thought of the spectacular beauty of a blooming *Tillandsia eizii* or *Tillandsia prodigiosa* would be enough to get most people interested in trying them.

Climatic conditions in my area can be described as follows: Under normal conditions, it is a warm, mild, frost-free, subtropical climate without extremes. The summers are hot and humid and the winters warm and dry. Rainfall is high, with heavier rains falling during the summer months. Maximum temperatures can reach 36 degrees Celsius and occasionally even to 40 degrees. The minimum temperature falls to about 12 degrees Celsius.

The plants are grown outdoors in a shadecloth house and in the garden as epiphytes on trees and logs. Although we are located 30 degrees south of the Equator, the warm tropical Mozambique Ocean current makes our climate warm and humid. There are no major hurricane threats. Older hurricanes that are in the process of dying out can cause occasional floods on very rare occasions, but no threatening hurricanes come our way.

The following are my observations regarding cultivation of selected high elevation species in this part of South Africa without the aid of an artificial environment:

*Catopsis*

This genus is not widely known here, and has limited appeal; mainly to the collector, oddball lover and grower with a genuine botanical interest. Like cycads, *Catopsis* species are single-sexed, or dioecius. Generally, they do well either mounted with a swath of moss or potted up in a coarse medium. All are mesic.

*Catopsis paniculata:* This is a nice, lush species from Costa Rica. I have found that it tends to waste away rapidly here at sea level. The outermost leaves soon become disfigured with patches resembling bruises, but I have found that plants will survive if these leaves are completely removed, the plants hung upside-down in an airy position, and watered sparingly until all signs of this condition have vanished. Plants treated in this manner seem to pull through. A very light dusting of dithane also helps.

*Catopsis subulata:* This is one of my personal favorites. It is a stout, bulbous species with a nice powdered appearance. It holds a lot of water, and turns a pleasant rusty bronze when grown in bright light. I've had no problems at all with acclimating it. It seems to grow equally well mounted or potted. I have tried two different potting mediums: a fine chipped bark; and coal/sphagnum/stone. Both worked well but the former produced better growth.

*Tillandsia*

*Tillandsia butzii:* I've had success growing this one vertically or upside-down amidst foliage of terrestrial plants which provide humid shelter. Once it has clumped, problems are diminished. It is a mesic species. I have grown it

Chet Blackburn

*Figure 8.*
*Tillandsia Imperialis* E. Morren ex Mez.



successfully in full sun at sea level. It did well growing along with ferns and provided with the same treatment that they received in my garden.

*Tillandsia imperialis:* (Figure 8) This is the unchallenged beauty of Mexico, but I found that it was totally unsuccessful at sea level, regardless of how much I fussed with it and pampered it.

*Tillandsia kirchoffiana:* It has proven to be problem free, provided it is well watered and kept well aerated. It is not a reliable bloomer until it forms a clump. I have had success with both potted and mounted plants. It has tolerated temperatures up to 34 degrees Celsius in my shade house outdoors with no signs of stress.

Marcel Lecoufle

*Figure 9.*
*Tillandsia multicaulis* Steudel.

*Tillandsia kolbii:* Regardless of all my efforts it has been a failure at sea level. From a purchase of 40 plants, only 6 survived.

*Tillandsia lucida:* This is a real survivor! It adapts easily and quickly. I grow mine potted and treat it like a *Guzmania.*

*Tillandsia multicaulis:* (Figure 9) This stunning plant from Mexico was really problematic. Mature plants stood no chance, but youngsters made it to flowering (but no further!). It showed similar symptoms to *Catopsis paniculata* and the same treatment of removing damaged leaves did produce limited success on young plants only. I grew mine sitting in net pots with frequent watering. Its beauty inspired me to keep on trying, but all my attempts eventually failed.

*Tillandsia myriantha:* Forget it! This one didn't even last a month. I don't know which caused it more stress, the hot humid climate, or the importation process. It really seemed like a frail species...and more's the pity since it is such a rarity.

*Tillandsia secunda:* I experimented with 2 different cultivars, 'Vivipara' and 'Jardin'. The former reacted like *Catopsis paniculata,* with the same

treatment resulting in full recovery. The latter just developed purple "freckles" and grew vigorously. Both were grown loose in net pots in bright shade with frequent watering to cool them off. Watering was reduced once they acclimated to the high temperatures of our climate.

*Tillandsia viridiflora:* This has been another failure thus far. A specimen is only now starting to show vigour after 2 years of being in a weakened state. The variegated variety was not as problematic, but it still had it share of problems.

*Vriesea*

*Vriesea corcovadensis:* This elegant species unfortunately did not make it. Nigel Thompson, The person I purchased mine from, lives above sea level, and has advised me that it is similar to *Tillandsia butzii* in that it gets tougher as it forms a clump. He owns a huge ball of this species and says it blooms more reliably in this state. I will definitely give this one another try.

*Vriesea heteranda:* This rare and weird plant did present some early difficulties, but shows a lot of vigour once established. I treated it similar to *Catopsis paniculata,* although it seems to be hardier than that species.

The table below summarizes my experiences with these species. Others in different parts of the world, growing under similar conditions may obtain different results.

| Species | Total No. of plants | No. of survivors |
|---|---|---|
| *Catopsis paniculata* | 3 | 1 |
| *Catopsis subulata* | 3 | 3 |
| *Tillandsia butzii* | 8 | 8 |
| *Tillandsia imperialis* | 2 | 0 |
| *Tillandsia kirchoffiana* | 6 | 6 |
| *Tillandsia kolbii* | 40 | 6 |
| *Tillandsia lucida* | 2 | 2 |
| *Tillandsia multicaulos* | 5 | 2 |
| *Tillandsia myriantha* | 2 | 0 |
| *Tillandsia secunda* 'Jardin' | 1 | 1 |
| *Tillandsia secunda* 'Vivipara' | 1 | 1 |
| *Tillandsia viridiflora* | 3 | 1 |
| *Tillandsia viridiflora* 'Variegata' | 3 | 2 |
| *Vriesea corcovadensis* | 1 | 0 |
| *Vriesea heterandra* | 2 | 1 |

In conclusion, I would say that *Catopsis paniculata* would be a representative example of how cloud forest species react and should be treated. All these plants deserve more attention and I am sure that if more people give these worthwhile plants a try, we will learn more about their cultural needs. Just

*[Continued on page 87]*



# Termites and Bromeliads: An Unlikely Combination

**David H. Benzing**

Bromeliads, like all other plants, interact with animals in various ways, some favorable—even mandatory to reproduce—and others negative; for instance when herbivorous types visit to eat plant tissue. Most of the beneficial plant/animal relationships involve birds and insects, in the second group, mostly members of Hymenoptera, the Order to which the bees, wasps, and ants belong. Order Lepidoptera, the butterflies and moths, and Diptera, the flies and their relatives, also help set fruits as do a variety of vertebrate animals including birds. Although frequently bird and occasionally bat-dependent, bromeliads belonging to all three subfamilies, including most of the larger genera (e.g., *Aechmea, Pitcairnia, Tillandsia*) rely on insects ranging from moths to bees to set fruits. Certain Bromeliaceae (e.g. *Aechmea mertensii, A. tillandsioides* and several *Neoregelia* species) also produce seeds that tropical tree-dwelling ants collect and cultivate to secure their carton (primarily a mixture of soil and plant debris) nests with roots. Still another, larger group of species (e.g., various Bromelioideae, *Tillandsia,* and *Brocchinia acuminata*) regularly house entire colonies of ants within cavities formed by inflated leaf bases. Repayment consists of plant nutrients delivered in excrement and prey brought to the nest by foragers—perhaps with a modicum of protection for the bromeliad against herbivores thrown in.

Bromeliaceae, because of its so-called tank species, exceeds all other plant families for still another kind of mutualism with fauna. Specifically, leaf chambers filled with rainwater and fallen leaves and other shed plant parts harbor diverse and abundant invertebrate animals plus an occasional vertebrate, which along with some microbes, comprise a complex biological community of litter processors vital to bromeliad nutrition. Nutrients these tank residents release into the water impounded in the overlapping leaf bases enter the plant through absorptive foliage. Without these mutualists, more precisely without the nutritional enhancement they provide, Bromeliaceae would be far less successful in the canopies of tropical American forests. Conversely, those same forests would harbor many fewer animals were tank bromeliads absent. Scientific inquiry into the dynamics of the aquatic microcosms tank bromeliads maintain to obtain moisture and nutrients, often in lieu of access to soil, remains preliminary and offers worthwhile challenges to researchers. However, another, even more poorly understood association with insects provides the subject for this article.

The termites (Order Isoptera) also interact with plants with important consequences for both parties. As social insects like most kinds of ants, termites also live in colonies, some comprised of millions of individuals. However, they supposedly favor vegetation solely by aiding the release of nutrients from dead

plant biomass for reutilization following reabsorption through living roots. In short, these insects recycle nutrients like nitrogen and phosphorus by eating all sorts of dead plant material. Some species of termites feed exclusively on wood, but others specialize on shed foliage; none seems well-suited to directly benefit a plant as ants, bees, and birds can, and indeed they probably never pollinate or disperse seeds. Moreover, termite mounds I've encountered never supported gardens like those rooted in arboreal ant nests in tropical America. So you can imagine my skepticism when told by Talita Fortuna, a Brazilian biologist, during the bromeliad symposium held in January, 1995, at Ribeirao Preto as part of the XLVI Botanical Congress of Brazil, that local terrestrial bromeliads frequently occur in close association with termite nests. My impression would soon change as our party (also Harry Luther, Elton Leme, Padro Nahuom, Walter Till, and Peter Krugel, all participants in the symposium), spent the following week traveling through Minas Gerais state to visit its many bromeliads in their usually rocky habitats.

*Figure 10.*
*Aechmea phanerophlebia* growing on a rock near Diamontina, Brazil. Note the covered termite trail leading up to the base of the bromeliad.

During our first morning in the field, just a few kilometers outside the beautiful old city of Diamontina, I encountered a lithophytic specimen of *Aechmea phanerophlebia* unmistakably associated with termites. As Figure 10 illustrates, a covered trail led from the soil below up the rock face to the base of the bromeliad and its intercepted supply of rain water within inflated leaf bases. Termites require moisture to build protected trails and nests out of the mix of materials, including soil, plant debris, and fecal pellets, comprising their special brand of carton. Presumably, tank bromeliads provide more continuous supplies of water in these seasonally arid habitats than the relatively porous local soils. Plants in turn seem unlikely to benefit from visits by strictly vegetarian insects.



Alerted now for additional examples, I noticed that most of the abundant terrestrial *Dyckia* and *Encholirium* specimens in the same habitat also associated with termite cartons (Figure 11).

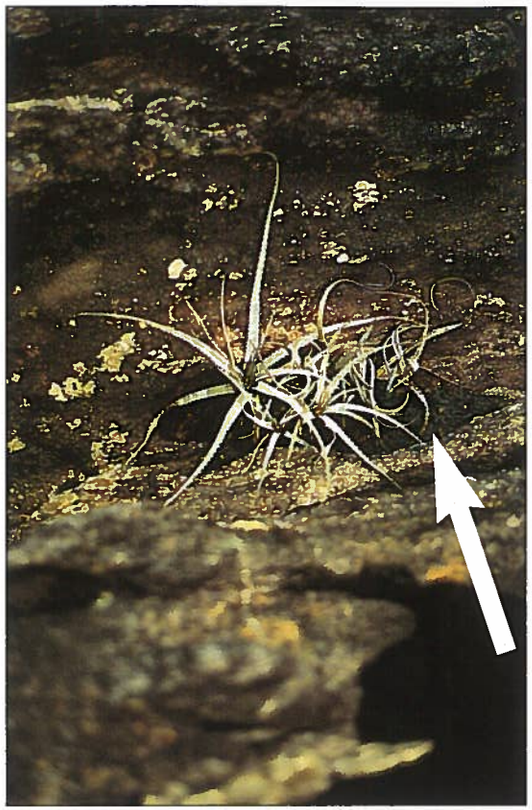

*Figure 11.*
An immature *Encholirium sp.* specimen rooted in a rocky substratum and surrounded by carton housing many termites.

In fact, the entire area featured a veritable network of covered termite trails linked to small mounds of the same material that surrounded many individual herbaceous plants, often bromeliads. Dissection of these constructions exposed abundant, active termites, but no evidence of damage to the adjacent bromeliads. Nests surrounded plants above the root system contrary to the arrangement expected if the termites had planted seeds on existing cartons. Apparently, nest inhabitants choose a plant, often a bromeliad, simply to provide superstructure or improve conditions in the nest galleries, perhaps especially those housing the exceptionally desiccation-prone termite eggs and larvae. Plants release moisture from foliage as carbon dioxide enters leaves and stems for use in photosynthesis. Each night, some types of plants also move moisture from deeper to more superficial layers of soil by a root-mediated process called hydraulic lift. Either process would help humidify living space allowing the termites, especially their young, to benefit from association with a living plant.

But what about the bromeliad? Is the presence of nesting termites beneficial or neutral? Either of two possibilities would make the partners mutually advantaged by association with the other. If the termite nest contains appreciable quantities of plant nutrients they should be available to the bromeliad—if not directly to roots penetrating the carton—then later as nests decomposed. Cartons could also provide beneficial insulation in habitats like those represented by the campos represtres that experience periodic fire during annual dry seasons. Much of the local flora, many trees and some herbs including certain Vellosia, exhibit

thick bark or mantles of persistent leaf bases that prevent heat injury to underlying, living plant tissues. In effect, these plants possess fire-selected adaptations for survival. A few bromeliads (e.g., some *Brocchinia,* and *Cryptanthus* species), probably survive in fire-prone habitats in similar fashion. However, a layer of nonflammable termite carton might provide the same protection at less cost to the plant. Clearly, deeper inquiry into the relationships between Bromeliaceae and termites is warranted. We already know that termites play key roles as nutrient cyclers in many kinds of tropical habits. Bromeliads may provide important support for these insects thereby increasing their own contribution to community maintenance through so far unappreciated mechanisms. Termites in turn may contribute more directly to bromeliad welfare by fertilizing them or reducing their vulnerability to natural ground fires.

*Oberlin College, Oberlin, Ohio*

## International Code

*[continued from page 59]*

property rights, the use of information technology, and the steady expansion of the range of International Registration Authorities.

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# Another New *Guzmania* From Northwestern Ecuador

**Harry E. Luther**

The extremely wet forests on the lower slopes of the Andes west of the small town of Lita, Ecuador harbor an incredible diversity of species of Guzmania. Indeed, collecting along a 40 km transect of the forest by the road being built towards San Lorenzo on the coast has revealed more species of this genus than occur in all of tropical America north of Panama, or all of Brazil. At least twenty species are absolutely sympatric along the short stretch of roadside forest between Lita and Alto Tambo at 600–700 m elevation. More grow above and below this area. Unfortunately, much of this epiphyte paradise is rapidly being converted into charcoal, lumber and bean fields, despite much of the region being protected on paper as preserves. The future of the species described below is especially problematic as it lacks nearly all the prerequisites of a cherished ornamental.

*Guzmania corniculata* **H. Luther, sp. nov.** (Figure 12).

**Type.** Ecuador: Prov. Esmeraldas, roadside between Lita and Alto Tambo, 600 m. elev., Sept, 1992. C. *Skotak s.n.* (SEL, holotype).

*A G. glomerata* Mez & Werckle, cui affinis, sepalis excedens bracteis florigeris; a *G. confusa* L.B. Smith, cui similis, bracteis florigeris et sepalis majoribus differt.

**Plant** epiphytic, flowering 70–85 cm tall. **Leaves** densely rosulate, spreading, 70–90 cm long, thin-coriaceous, appressed punctate lepidote throughout, especially abaxially. **Leaf Sheaths** broadly elliptic to ovate, 7–11 × 6–9 cm, dark castaneous. **Leaf Blades** ligulate, acute to attenuate, 22–35 mm wide, green or tinged reddish. **Scape** erect, 55–75 cm × 4–6 mm. **Scape bracts** erect, densely imbricate, the lowest subfoliaceous, the upper elliptic, attenuate, all with dark castaneous sheaths. **Inflorescence** digitate, 2-pinnately compound with 8 to 12 branches, 6–8 × 6–8 cm. **Primary bracts** elliptic to broadly ovate, acute to attenuate, subcoriaceous, more or less even, appressed-punctate lepidote, somewhat lustrous, dark reddish-brown. **Branches** short stipitate to subsessile, spreading at 45–90 degrees from the main axis, 2–4 × 1–2 cm, polystichously 8 to 20-flowered. **Floral bracts** elliptic, acute, 15–24 mm long, carinate, punctate-lepidote, reddish-brown to green. **Flowers** with a 2–3 mm long stout pedicel, opening at night. **Sepals** exceeding the floral bracts, narrowly elliptic, acute, 20–28 mm long, connate for 2–4 mm, the adaxial pair carinate with the keel bearing a 0.5–1 mm long horn, the abaxial sepal ecarinate and unadorned, all appressed-lepidote and reddish brown. **Corolla** with spreading lobes. **Petals** oblanceolate to spatulate, obtuse to somewhat retuse, 25–30 mm long conglutinated into a tube for 2/3 of their length, white. **Stamens** and **style** included in the corolla tube.

PARATYPE. Clone of the holotype, flowered in cultivation, 24 Sept. 1995, *H. Luther s.n.* (SEL, QCA).

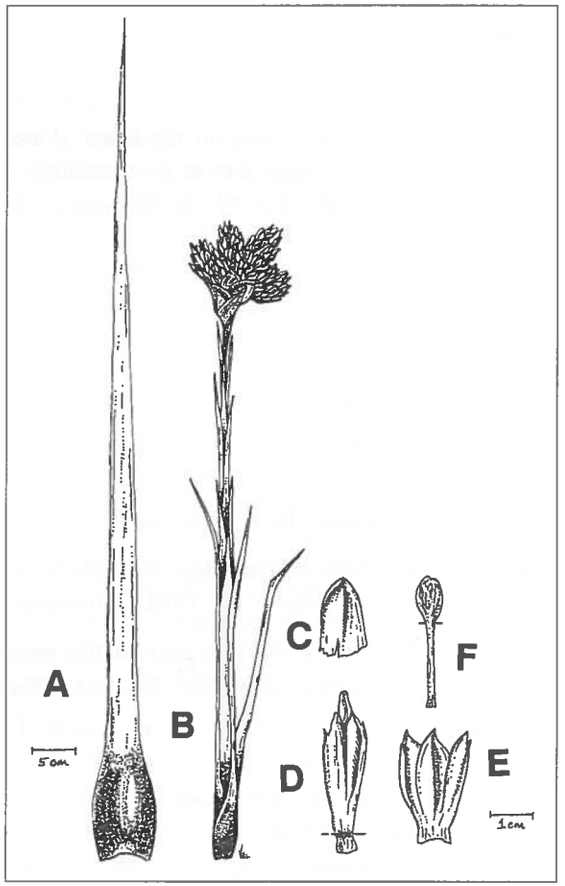


*Figure 12.* *Guzmania corniculata* H. Luther. A, leaf, adaxial surface; B, scape and inflorescence; C, floral bract; D, flower, preanthesis, adaxial view; E, calyx, abaxial view; F, petal.

This new species seems most closely related to *G. glomerata* but can immediately be distinguished due to its sepals that exceed the floral bracts. From the somewhat similar *G. confusa* and *G. subcorymbosa* L.B. Smith, *G. corniculata* differs by having much longer sepals (20–28 vs 10–12 mm) and floral bracts (15–24 vs 7–10 mm). The small horns on the adaxial sepals appear to be unique to the genus *Guzmania*.

ACKNOWLEDGMENTS

I thank the collector, Chester Skotak, for sending me material of this *Guzmania*, and the artist, Valerie Renard for the illustration.

*M.B. Foster Bromeliad Identification Center*
*Marie Selby Botanical Gardens*
*Sarasota, Florida*



# Brazil

## (Selections from the book BRAZIL) by Mulford B. and Racine Foster

### V

### ESPIRITO SANTO, STATE OF THE HOLY GHOST

We have never been able to figure it out but it seems that whenever we wish to take a train out of any city in Brazil, it invariably starts either before or just at daybreak. There are always taxi drivers who sleep in their cars near the hotels so no matter what the hour, you can find a way to the station. But if you do not arrive at said station well before the starting time, that is, if you have several pieces of baggage, you are going to run into complications. Each railroad, in fact we believe each railroad station, has its own strict rules and if you think that because you can carry your suitcase into the car with you at one station you can do the same at another, you are mistaken. "Nao senhor." You must first have your bags weighed, then you may be allowed to carry one of them into the car if it is not too large to fit into a little box by the gate entrance. You place the bag in this trial size-estimator and if it doesn't get stuck or doesn't overlap the sides then you may carry it in, but if it is half an inch over size then you must take it back to have it checked and carried in the baggage car.

If your bags are heavy then you will have to open them to show that you have *somente roupas,* only clothing. Then it will be carried free, but if there is anything else in the bag excepting *roupas* you will have to pay for everything! When you finally have all matters settled you board the train just as it is pulling out and you have barely time to settle (from the train window) the tip with your *corregador* who may have helped you into or out of these difficulties as the case may be.

Settling down in a stiff hard seat with a sigh of great relief you find that you have occupied the seat of a portly linen-dustered traveling man who suddenly appears and asks why you did not look at the seat numbers on the little checks that were given you by the ticket seller (although you did not know you had a reservation). You at last find your seat which has already been occupied by a family of six children who should have gone into the *segunda clase* car up front.

With a series of sudden jerks, both backwards and forward, the little train which was to take us to Espirito Santo, had actually started on its way. It's so nice to feel at last that every detail has been finally settled. But do not be too sure because as soon as the train has really become serious as to which way it intends traveling, the conductor's assistant passes through and gives you and your ticket and baggage the twice over. The suitcases did not hold everything so the leftovers, including drawing materials, a sweater, a book and some lunch, etc., went into a neat little package and while the conductor said nothing about small packages as

you passed through the gate, the assistant now informs you that he will have to take it to the baggage car and you must pay a fee for it at once. Objections are to no avail except that when you finally convince him you have your lunch in the package he will possibly reluctantly agree to allow you to have the package in the seat with you–that is after he has placed a sticker on it and made a charge for it!

After two or three hours of traveling the train will have made a complete circle around the Bay and now we are just across the harbor from Rio. At long last we start our journey north, up through the little state of Rio de Janeiro. The low swamp lands soon disappear and very lovely mountains appear, only to fade away in the distance as the train travels east to the coast.

God has his fingers everywhere in Brazil! A number of great shafts of granite throughout Brazil have the appellation "Dedo de Deus" but the best known are the ones at Therezopolis, Itabira and Cachoeiro. The last-named digit at Cachoeiro do Itapemerim in the Aymores mountains seemed to point the way for our first journey into Espirito Santo.

Our puffing, grunting, snorting little wood-burning engine told us time and again that we were in the mountains once more. It is a mountainous state whose terrain is favorable to much coffee growing.

Cachoeiro is the second largest city within the state but there are no local telephones. Imagine a town of 30,000 people without a single telephone! It is an unusually thriving and progressive community where they make cement, do lumber business of all kinds, and make tile, besides growing abundant coffee in the surrounding territory. A thriving silkworm industry is outside of the city where they are making a fine quality of silk. We have seen few small cities with greater civic and municipal pride, and yet no telephone.

Like so many towns in Brazil, when you leave the city limits you are definitely in the rural section (if not before). There are no suburbs. The jungle may have been cut down on the edge of the city, but as in Rio where the jungles are on the mountain sides, much of it still remains within the city limits.

Most people are amazed to learn that the jungle soil is not a deep rich earth. Millions of acres of this verdant growth depends on a shallow six to twelve inches of rich forest soil and when the great canopy of tall trees are felled, everything that is not burned by the sun is burned by the owner who is searing the land. Coffee or some other crop is planted, but in a few years the best of the earth has washed away and the settler moves on.

Dr. Hoehne told us that in Brazil already more than 300 species of orchids are believed to be extinct as a result of the complete destruction of so much forest area. Also some of these species have been lost because greedy collectors have deliberately destroyed every trace of certain species, after they had procured enough of the plants to send back to Europe, for their own benefit, jealous of any other collector, so that they themselves might have the exclusive scoop.



A bromeliad that has been grown and sold horticulturally in Europe for the past forty years, *Aechmea weilbachii,* may be an example of this kind, or it may be a case of where the collector did not wish anyone to know the origin or locality where the type (first one) was found–hence it is still unknown where this *Aechmea* grows natively in Brazil. There is no record as to where it was found and no one has discovered it growing in the wild in all these years. Although we found one which was close to it taxonomically, it may prove to be just another phase of that species.

Early in the morning, from our little hotel window, we had our first glimpse of that great monolithic shaft of granite, the "Finger of God" (Dedo de Deus), truly like a finger pointing high into the clouds. It beckoned, and we decided that would be our locality for the day's hunting, so we started out bright and early without guide or assistant. The great mountain was such a short distance away that we certainly would have no difficulty reaching it.

How many miles we walked that first day we shall never know. While it was but a few moments to the outskirts of the town, the further we walked, the further away our goal seemed to be. By noon we had not yet reached even the base of the sentinel mountain!

*Their search for bromeliads in that area seemed futile until they found a huge, brilliant-flowered bromeliad growing on a giant tree-like cactus. Just as they were getting ready to photograph the bromeliad they observed two hummingbirds come to feed. Then follows a description of hummingbird behavior.*

The Brazilians call the hummingbird "Beija-flor," the flower kisser, or as we like to say, kiss of the flower.

There seems to be some affinity between bromeliads and little *beija-flores.* They both are endemic only to the Americas. They grew up together, possibly each formed for the benefit of the other. The hummers seem to prefer brilliant reds and yellows in their selection of flowers and the bromeliads having much red in many of their inflorescences are indebted particularly to them for pollenization. It is rather significant that the hummingbirds are not only the largest family of birds in the Americas, but in the entire world, and until a single species of bromeliad *(Pitcairnia)* was reported to have been found in Africa, Bromeliaceae was considered the largest plant family to be found only in the Americas. (Before a species of *Rhipsalis,* an epiphytic cactus, was found in Africa, Cactaceae was known to be the largest plant family endemic to the Americas.)

After this lovely episode we went out into more open campo where a huge purple bougainvillea was growing wild there on the side of the hill. It was our first sight of this plant in its native habitat. To find this immense plant growing without assistance of man was quite different from seeing it securely reposing in some sophisticated Florida garden. Thinking that possibly this great display of color might be the climax of the day we started to return, taking the west side of

the slopes. We passed a deep ravine we had seen earlier in the day and now, investigating this spot, as evening fell, it proved to be our real collecting place for the day as far as bromeliads were concerned. On this, our last effort, we found twelve more species, one a large interesting terrestrial *Pseudoananas,* or false pineapple, whose leaves reached up nine feet. One of these twelve bromeliads proved to be a lovely new variety of *Billbergia, B. iridifolia* var. *concolor.* This was sufficient compensation for all disappointments of the day.

The following morning we struck out again on foot intent upon reaching the base of that elusive mountain, the "Finger of God." From the town it was awesome to see this mysterious monolith rising among the hills. As we stopped to look at its massive height, it seemed to beckon us, but as we walked it seemed to elude us.

Not far beyond the city limits we came upon a man with his family resting under the spreading branches of an immense mango tree. This man agreed to help us get to the mountain to find parasitas. He proved to be a very excellent guide and led us near our goal, though always it seemed just as far away. First finds of the trek were a bronze-maroon phase of *Billbergia horrida* and the odd monotypic *Acanthostachys,* a species of bromeliad which has no brothers nor sisters.

We walked for miles over hot bare fields and came at long last to the "knuckle" of the "Finger" where we found a very wet, swampy area which caused us no little delay in crossing it. Now we were so close to the great "Dedo de Deus" that we could see it only occasionally up through the trees. On the rocks at its base we found several species; one, a *Vriesia,* was growing in the full sun on the hot, otherwise barren sloping rocks. We found it in fruit, the stem being seven feet high! Another herbarium specimen for our press. It was the largest *Vriesia* we have ever found, and proved to be a new species, now named *Vriesia extensa.* All over the sheer smooth walls of that great shaft of the "Finger Mountain" were literally millions of this *Vriesia* but not one in ten thousand could be reached by man. Some of them weighed all of thirty or fifty pounds each! They seemed happy and contented with their lot and continue to throw off feathery parachutes with seeds attached making a landing on a spot which to us would truly be a "no man's land," a landing not of conquest but determined effort to survive where almost no other living thing could live. The man or plant which is adaptable to conditions at hand, however difficult they are, finds happiness there.

The great climax of the day, however, was the discovery of one of the most spectacular *Aechmeas* ever found, whose leaves were mottled and rumpled with an embossed effect of dark splotches on light green. After cutting our way through a very heavily matted undergrowth, Mulford finally reached an outcropping of nearly bare rock, and suddenly he shouted at the top of his voice. Being overcome with joy helps so much to carry one along when the feeling of exhaustion seems to be predominant. Here we beheld a cluster of plants that would warm the cockles of any plant lover's heart. Mulford would not touch them until Racine and the native helper had arrived to this "sacred spot." This man who



had lived all his life in this region and knew the country well, had never seen a plant so *formidavel.* We took just a few of these plants and left a good supply there and then searched the surrounding area for other examples hoping to find fruit or flower but that was not to be found, although this *Aechmea* did come into bloom for us a month later. Orange bracts and white flowers, what a color combination! the colors of our adopted city, Orlando, Florida. Seven months later, after much careful research, Dr. Lyman Smith made certain that it was an entirely new species and he was as thrilled as we were, even though he had never seen the plant alive. By the time he named it, it was evident that Orlando was becoming the home of the largest collection of living bromeliads in the world, on account of our extensive work. So when the Latin description was first published in the "Arquivos" by Dr. Hoehne of the Institute of Botany of the state of Sao Paulo in Brazil, it was officially named and recorded *Aechmea orlandiana.*

Many persons wonder why we will endure so much discomfort and hardships on our collecting trip, and the question is sometimes difficult to answer but we know that the greatest compensation is that the discovery and realization of our searchings later carry a message to thousands and this *Aechmea orlandiana* carried a message from the "Finger of God."

*[To be continued]*



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## Some Observations

*[continued from page 76]*

think, the survival of such fragile species may one day rely totally on humanity's ability to cultivate them and maintain good genetic diversity in cultivation. The bromeliad world would be poorer without them.

ACKNOWLEDGEMENTS:

I would like to thank Tropiflora Nursery in Sarasota, Florida, and Nigel and Rosalie Thompson of Westville, Durban, Natal 4001, Republic of South Africa, for the excellent plant material purchased from them which I've used as the basis for these observations.

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Photograph by Peter Wan

A beautifully variegated form of *Vriesea* 'Splendide' displayed at the San Diego World Conference in 1994. A limited number were available from Kent's Bromeliad Nursery booth at the conference. Jeff Kent had obtained the slow growing plant from De Meyer about twenty years earlier.

## Calendar

| | |
|---|---|
| 8–17 March | The 1996 New York Flower Show, "Broadway in Bloom", salutes the New York Theater at the New York Coliseum on Broadway and 59th Street at Columbus Circle. Many display gardens and educational exhibits will be featured including a large exhibit by the New York Bromeliad Society "Blooming Bromeliads on Broadway." Hours are 10 a.m. to 10 p.m. |
| 22–23 March | The Bromeliad Guild of Tampa Bay will hold a BSI judged show and sale in conjunction with the Tampa Federation of Garden Clubs annual show. The show and sale will be held at 2629 Bayshore in Tampa. Hours are 10 a.m. to 5 p.m. Friday, and 9 a.m. to 5 p.m. on Saturday. Contact: Tom Wolfe 813-961-1475. |
| 30–31 March | The annual show and sale of the Acadiana Bromeliad Society will be held at the Blackham Coliseum in Lafayette, Louisiana. Contact: Eddie Dupuy, 318-332-2535 |
| 6–7 April | The San Diego Bromeliad Society will presents its annual show and sale in Room 101, Casa del Prado, Balboa Park in San Diego. Hours are 1 p.m. to 4 p.m. on Saturday, and 10 a.m. to 4 p.m. on Sunday. No Admission charge. Contact: Les Lanning 619-459-3095 |
| 13–14 April | The Shreveport Bromeliad Society will host its 15th Annual Show and Sale at the Barnwell Garden and Art Center located at 501 Clyde Fant Parkway, Shreveport, Louisiana. Show hours will be from 1:00 p.m. to 5:00 p.m on both days. Contact: Harvey C. Beltz, 6327 S. Inwood Rd., Shreveport, La. 71119-7260 |
| 20–21 April | The Sarasota Bromeliad Society annual show and sale, co-sponsored with the Marie Selby Botanical Gardens, will be held at Selby Gardens, 811 South Palm Avenue, Sarasota, Florida. Hours are 10 a.m. to 5 p.m. on Saturday, and 10 a.m. to 4 p.m. on Sunday. Contact: Wally Berg 941-924-0060 |
| 20–21 April | The Seminole Bromeliad Society will be holding its fourth annual bromeliad show and sale at the Garden Club of Sanford, Highway 17-92 and Fairmont in Sanford, Fl. The public is invited to enter plants for either competition or display. Hours are from 9:00 to 6:00 on Saturday, and 10:00 to 4:00 on Sunday. For details, call in Sanford 407-333-0445; in Orlando 407-898-1229; in DeLand 904-736-1470. |
| 4–5 May | The annual show and sale of the La Ballona Valley Bromeliad Society will be held at the Veteran's Auditorium in Culver City, California at the intersection of Culver and Overland Blvds. The hours are from 11:00 a.m. to 4:30 p.m. on Saturday, and from 10:00 a.m. to 4:00 p.m. on Sunday. An added bonus is that the Sunset Succulent Society show and sale will be held on the same days in the same building. No admission charge and parking is free. Contact: Charlyne Stewart, (310) 391-4118. |

Show chairmen and newsletter editors are requested to send notices of their society events to Chet Blackburn, 720 Millertown Road, Auburn, CA 95603