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Cover photographs. Front: The genus *Guzmania* is diverse in form, color, hybrid beauty, and probably ancestral species. If you don't know how to recognize the genus as it has been defined for many decades, see the article in this issue by Mulford Foster, printed 50 years ago. See p. 229 for a listing of the cover species and hybrids. Back: Introducing *Tillandsia exserta* by Harry Luther.

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Vriesea oligantha: An Obligate Epiphyte of VelloziaceaeCláudio Coelho de Paula¹ & Elidio Armando Exposto Guarçoni²

Vriesea oligantha (Baker) Mez was first described in 1884, from a specimen collected at Serra do Ouro Branco, Minas Gerais, Brazil. According to Smith & Downs (1977), this species is found in the Serra do Ouro Branco, Serra do Cipó and Serra do Capanema, in the state of Minas Gerais and usually occurs in Campos Rupestres (grasslands on rocky soils). Coffani-Nunes (1997) extended its distribution to the northeastern state of Bahia, along Cadeia do Espinhaço.

Vriesea oligantha grows between 1100 and 1400 m above sea level where it is found exclusively on species of Velloziaceae (FIGURE 1), specifically *Vellozia compacta* and *V. dracenoides*, in Serra Ouro Branco and Serra do Cipó, respectively. These Velloziaceae are known in Brazil as "canela-de-ema." *Vriesea oligantha* is occasionally observed on rocks or in soil, but in such cases, this is due to a plant having fallen off of its host. Thus, *Vriesea oligantha* should not be classified as rupicolous or terrestrial, as cited by some authors.

Vriesea oligantha is easily recognized by its almost silver-grayish leaves with small purple color spots, arranged in the form of an urn. Other prominent characteristics of this species are the erect scape and simple inflorescences with secund flowers after anthesis, almost perpendicular to the rachis (FIGURES 4, 6). The plants can be seen from a considerable distance in the middle of the foliage of *Vellozia* thanks to their erect inflorescences. The flowers have light yellow petals and open at night, characteristic of section *Xiphion* to which it belongs (FIGURE 3). In Serra do Cipó, *Vriesea oligantha* blooms between November and January. The fruits are turned down when ripe, which may facilitate seed dispersion by the wind (FIGURE 5).

On Serra do Ouro Branco, *Vriesea oligantha* grows exclusively on old plants of *Vellozia compacta*, especially in the highest parts of this plant where the greatest amount of sunlight is available. A large number of young individuals that are ellipsoid in shape (FIGURE 2) are commonly observed around adult plants.

Adult individuals develop a lateral sprout soon after flowering, which originates from the bud in the axial of the most outer leaves of the rosette. In some isolated plants, a large number of small offshoots can be observed, even before flowering.

The major conservation problem facing *Vriesea oligantha* is the exploitation of its host, canela-de-ema, which is used as firewood and also for landscape purposes and orchid and bromeliad cultivation. The harvesting of canela-de-ema has led to the loss of many populations of *V. oligantha*.

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Figure 1. Young individuals of *Vriesea oligantha* on a flowering individual of *Vellozia*.



Figure 2. Closeup of *Vriesea oligantha* in habitat.



Figure 3. *Vriesea oligantha* in flower.



Figure 4. The fruiting spike of *Vriesea oligantha*.



Figure 5. *Vriesea oligantha* seed.

Vriesea oligantha is included in the "List of presumably endangered species in Minas Gerais flora" (Mendonça & Lins, 2000). The preservation of this species depends mainly on the conservation of its natural habitats, especially by protecting the "canelas-de-ema".

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- Mendonça, M.P. & L.V. Lins. (Orgs.) 2000. Lista Vermelha das espécies ameaçadas de extinção da flora de Minas Gerais. Belo Horizonte: Fundação Biodiversitas, 157 pp.
- Smith, L.B. & R.J. Downs. 1977. Bromeliaceae, subfamily Tillandsioideae. Flora Neotropica. New York Botanical Garden. (Flora Neotropica Monograph, 14 part 2).

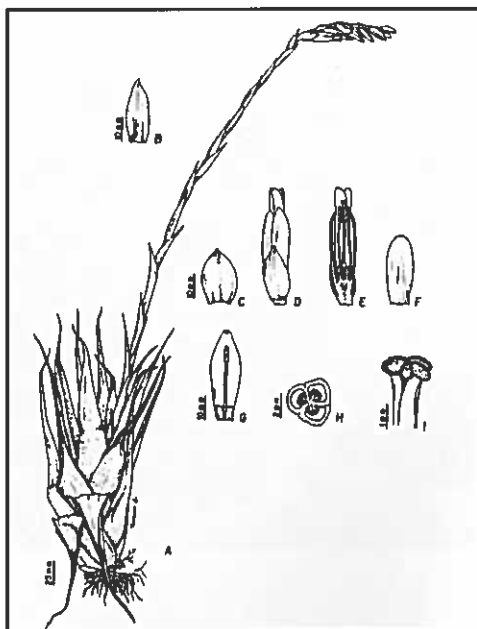


Figure 6. *Vriesea oligantha* (Baker) Mez. A. Habit, scape and inflorescence. B. Scape-bract. C. Floral bract. D. Flower. E. Longitudinal section of the flower. F. Sepal. G. Petals, petal appendages and stamen. H. Transverse section of the ovary. I. Stigma.

Lamarck's Dictionnaire de Botanique Marcel Lecoufle³

French naturalist Jean Baptiste Pierre Antoine de Monet, Chevalier de Lamarck contributed the botanical section (Dictionnaire de Botanique) to the famous "Encyclopédia Méthodique." The entire Encyclopédia was published from 1783 until 1823 and occupied 52 dictionaries with 209 volumes and included 6367 plates. The botanical part, published from 1783 to 1808, filled four of those volumes and 1000 of the plates. The bromeliad plates are numbers 223 (FIGURE 7) and 224 (FIGURE 8). The originals were drawn by Pierre Joseph Redouté and engraved in copper by Bénard.

The different volumes include many articles on "ananassa" and other genera. This work demonstrates that many species of bromeliads were known even as early as the 18th century.



Figure 7. *Ananas comosus* (published as *Bromelia communis*; left), and *Bromelia pinguin* (right).

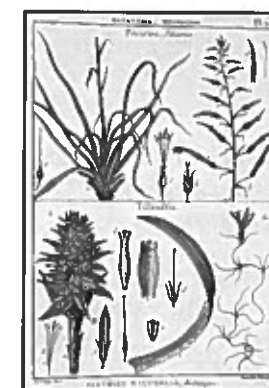


Figure 8. *Pitcairnia bromeliifolia* (top), *Aechmea serrata* (published as *Tillandsia serrata*; bottom left), and *Tillandsia usneoides* (bottom right).

Call for Nominations for BSI Directors, 2007-2009 Term Theresa M. Bert, BSI Nominations Chair

The region for which a vacancy occurs is as follows: **California: 2 directors**

Who may nominate? Any voting member of the society who resides in a region for which there is an opening may nominate a candidate for an opening in that region.

Who may be nominated? A nominee must: (1) be a voting member of the society and have been a voting member for the three consecutive years prior to nomination; (2) reside in the region for which he/she has been nominated; (3) not have served two consecutive terms as a director immediately preceding nomination; (4) agree to being nominated; (5) agree to serve as a director if elected and to remain a member of the BSI for the duration of his/her term. Incumbent directors who have served one term on the BSI Board of Directors may be nominated for a second term.

Procedure for nominating: (1) obtain the consent of the prospective nominee and verify compliance with the qualification criteria; (2) mail nominations to the chairman of the Nominations Committee between January 1, 2006 and March 15, 2006, inclusive. (Nominations must reach the chairman of the Nominations Committee by March 18, 2006.) Nominations by telephone will be accepted through March 15, 2006 but must be confirmed in writing within two weeks; (3) supply with each nomination the full name, address and telephone number of the nominee, the position for which the nomination is being made, the local society affiliation, and a brief biography of the nominee.

Please mail nominations to: Theresa M. Bert, BSI Nominations Chair
9251 13th Ave. Cir. NW, Bradenton, FL 34209, (941) 795-6012. E-mail: nominations@bsi.org

³. Paris, France.

The Case of the Fading Variegation

Bob Reilly⁴

Photographs by the Author

Approximately 20 years ago, I bought an apparently non-variegated clone of *Vriesea saundersii*. This is an attractive plant grown primarily for its foliage (FIGURE 9).

However, my clone produces variegated plants (FIGURE 10) under certain conditions. The variegated plants are produced when the parent plant is nutrient-stressed (which means I put the plant under the bench and forgot about it).

As with most variegated bromeliads, the pups showing this trait are given the best of attention including liquid fertiliser and plenty of light. The interesting outcome though, is that this attention "causes" the variegation to "fade", so that it eventually looks like a non-variegated plant again. I have heard of a similar phenomenon in certain palms.

I would like to hear from anyone who has had similar experiences, or has an alternative explanation for "the case of the fading variegation".



Figure 9. *Vriesea saundersii*, without variegation (left), and Figure 10, with.



⁴ Auchenflower, Queensland, Australia. E-mail: bob.reilly@nrm.qld.gov.au; Telephone (07)3870-8029.

New Orleans in the Cross-Hairs

Ken Marks, BSI Webmaster

Summer in South Florida means many things to many people: 3 PM daily thundershowers, so regular sometimes that you could set your watch by them, or maybe sultry days browning at the beach, or even bi-weekly trips around the yard on a riding mower trying to keep the lawn in check. For those who weathered the storms of 2004 (and who may still be awaiting roof repairs or living in a FEMA trailer), the start of hurricane season is an unwelcome accompaniment to the long, hot days of summer.

The biggest storm of 2005, Hurricane Katrina, was unusual in several ways. Instead of forming off the coast of Africa and rolling across the Tropics like a huge bowling ball watched by so many Caribbean nation "bowling pins," this one took shape in the Bahamas. What looked like just another big summer thunderstorm quickly transformed into a category 1 hurricane as it came ashore. The original landfall estimate was the border of Palm Beach and Broward counties (right in my backyard). But before I could say, "Oh no, not again," the fickle storm veered south—good news for me but not so good for my friends south of me in Ft. Lauderdale, Miami, and the Florida Keys.

Katrina dumped a lot of rain and knocked down a lot of trees and power lines, so that once again the sounds of generators were heard throughout the region. But this was just the adolescent tantrums of a storm not yet in its full grown fury. While south Florida was cleaning up from the aftermath (another word getting too much use lately), Hurricane Katrina was growing stronger and stronger from the warm-water energy of the Gulf of Mexico.

Had this stayed a small Category 1 storm, my recounting of the story would probably come as news to our international readers. Instead, the storm increased in size and intensity so that I hardly have to relate the result when it came ashore, as I'm sure it made news in many countries and monopolized much airtime on CNN before, during, and after landfall. While Katrina was still gaining steam in the Gulf, I told one of my friends (whose yard was pretty well decimated by falling trees in Ft. Lauderdale) that if there was any "silver lining" in this cloud, it was that he would never get hit with another Katrina, as this name was sure to be retired—small consolation that.

How coincidental that I happened to be working on scanning and converting more of the old *Journals* to put them up on the members-only *Journals Online* section of the BSI website when I came across a couple of articles about New Orleans in the July-August, 1975 issue of the *Journal* (almost 30 years ago to the date). Reading these articles took on an eerie and surreal quality in light of recent circumstances. It was almost like receiving a letter in the mail from a recently deceased friend. I offer the following two excerpts from the 1975 *Journal*, Volume 25, issue 4, pages 133, 134. The first points out the racial inequalities of the time, some of which, we were reminded during the hurricane, still persist today.

PATIO PLANTERS

ERIC KNOBLOCH

The old quarter of New Orleans, surrounded by the spreading modern city, has surprisingly retained quite a number of its original brick and cypress buildings and its colonial Franco-Spanish atmosphere. As the city outgrew this old area, the section gradually became a deplorable slum, but in recent years the State of Louisiana and the City of New Orleans have taken steps to give the old quarter a special status, and new people, charmed with the unique character of the surroundings, have come in and set about preserving and restoring some of the old houses.

One of the delightful features of these old dwellings is the private courtyard most of them have. The buildings themselves come right up to the sidewalk. In the rear, and surrounded by brick walls, is the patio, shared alike in the old days by the white family and their African domestic servants. The latter lived in a building in the rear, the lower floor of which served as a kitchen for the household. Nowadays, these houses are usually divided into several apartments with a common use of the courtyard, and many lovers of plants have created interesting gardens subject to the very special conditions that a patio with high walls imposes on the gardener.

New Orleans and most of its suburbs are built on drained marshland. Much of the area is even below sea level. Consequently all rainfall is channeled to pumping plants which force the water into Lake Pontchartrain, the large sea-level body of water on the city's north side. This artificially drained land protected from sea tides and Mississippi River floods by substantial dikes, is costly to maintain and relatively expensive, tending to make individual homesites small. Gardens and patios are correspondingly small.

In these limited enclosures, the vertical garden, such as suits the epiphytic nature of most bromeliads and air plants in general is not uncommon. Plants in pots, on slabs of cork bark, tree fern, or on driftwood are fastened to the walls and fences.

The climate, being warm and humid for the most part, provides conditions usually suitable for most bromeliads in the spring, summer, and fall. The normally mild winters are more of a problem, however, for almost without warning the temperature may fall to a point that seriously damages, and sometimes even kills outright, all but the very hardiest of bromeliads. This may not happen for several winters; then again it may happen several times in a single winter.

Another serious problem is the matter of sun and shade in the courtyard. The high walls exclude the bland early morning and late evening sun, but they furnish no protection to the plants when the noon day sun beats down on them. Damage is most apt to occur in summer when the sun suddenly emerges from a thunder cloud after a steamy shower. Its rays easily scald the leaves of susceptible bromeliads such as *Aechmea fulgens*. Shading is accomplished by placing the plants under overhanging galleries, which are common in these patios or under trees where they can receive filtered light.

The hardier and more stoloniferous bromeliads—and there are quite a few that can be used—are often planted so as to ascend into the branches of the garden tree by way of its trunk. Often pots of bromeliads are nested in pebbles, redwood, or pine bark fragments, etc., in raised beds at the base of walls. In winter, when the sun traverses the southern sky, the high walls are apt to exclude too much sunlight at a season when it is most needed, so these pots of bromeliads are shifted to the side of the courtyard receiving the maximum light.

—Braithewaite, Louisiana

CHALK UP NUMBER SEVEN FOR LOUISIANA

Bromeliad enthusiasts continue to increase in number in the New Orleans area. With the formation of the MORRIS HENRY HOBBS BROMELIAD ASSOCIATION, the New Orleans area can now boast of five separate groups. There are seven in the state.

This new group is named for the late Morris Henry Hobbs, nationally known artist, who, with Eric Knobloch, was instrumental in introducing bromeliads to south Louisiana. It was he, aided and abetted by Mr. Knobloch, who formed the original Louisiana Bromeliad Society in February 1954. Mr. Hobbs had won national recognition for his etchings and the contributions he made to the art and technique of etching. His works adorn many homes in New Orleans. For five years, starting with Issue No. 1 for 1959, he drew the covers for the then Bulletin of the Bromeliad Society. His original drawings of bulletin covers and paintings of bromeliads are prized possessions of quite a few Orleanians.

It will take time (and a Herculean effort) but New Orleans will be rebuilt—hopefully better but without losing any of the historic charm for which the city is known and loved. Louisiana has been a hotbed of bromeliad growing since the 1950s. The Louisiana Bromeliad Society was one of the first to become affiliated with the BSI. Though bromeliads will necessarily be way down the list when circumstances focus one's attention on the more immediate needs of food, water, and shelter, I'm sure bromeliads will make their

reappearance once things get back to normal.

Despite the overwhelming concerns of loss of life, property, and possessions in the wake of Katrina, I cannot but help wonder about the little things. Where are Morris Henry Hobbs' original bromeliad drawings and etchings today? Did they pull through this catastrophe so that they may be enjoyed by current (and future) generations of bromeliad enthusiasts?



Did You Know? Florida BSI Membership

Joyce Brehm, BSI President

Of the 1400 or so members of the BSI, Florida provides 1/4 of this membership. Many of these members provide some of the greatest support for us. The current Editors of The Journal of the Bromeliad Society, Bruce Holst & Susan Murphy; the BSI Webmaster, Ken Marks; the Nominations Chair, Terri Bert; Affiliate Shows Chair, Carolyn Schoenau; Judges Committee Chair, Betty Ann Prevatt; the Director of the Bromeliad Identification Center, Harry Luther; and 5 Directors, Michael Andreas, Theresa Bert, Larry Giroux, Ken Marks, and Jay Thurrott.

The BSI is a totally non profit organization which exists on donations and volunteers. No other Region of the BSI is as generous in its donations as the Floridians. Without your financial support and your volunteer support, the BSI could not exist. Whenever you have any question or suggestions regarding the BSI, please feel free to ask one of your directors or me. We truly want to please our members.

Moving?

If your address is changing, even if your move is a temporary or seasonal one, you should notify the BSI Membership Secretary four to six weeks in advance. Even when you are temporarily away, your bulk mail is either discarded by the Post Office or, as in the case of your JOURNAL issue, is returned to us at a postage due cost of .99 cents within the USA.

Please send your name, the old and new addresses, and the effective date to: John Atlee, BSI Membership Secretary, 1608 Cardenas Dr. NE, Albuquerque, NM 87110 or by e-mail to membership@bsi.org.

Report on the Bromeliaceae Symposium at the 17th International Botanical Congress

Jason R. Grant⁵ & Walter Till⁶

The International Botanical Congress occurs every 6 years, and was held this year 18-23 July 2005 in Vienna, Austria. The IBC was also held in Vienna 100 years ago, in 1905. A symposium on Bromeliaceae was organized and moderated by Jason R. Grant and Walter Till entitled "Progress in Systematics and Evolution of Bromeliaceae". Over 100 people attended the 2.5 hour long session.

The abstract of the symposium read: "The Bromeliaceae session is dedicated to the progress made in the understanding of the systematics and evolution of the Bromeliaceae. The Bromeliaceae session at the Monocots III meetings in 2003 clearly highlighted the rapid changes in our understanding of the Bromeliaceae. In addition to the published proceedings of that conference, several other important studies will be published in the near future bringing about sweeping changes at the subfamilial and generic-level classification within the family. The Bromeliaceae session at the IBC will highlight these changes made through presentations by leading scientists conducting research on the family."



Photograph courtesy Jason Grant.

Figure 11. Left to right: Elton M.C. Leme, Jason Grant, Claudia Hornung-Leoni, Tom Givnish, Tim Evans, Katharina Schulte, Walter Till, and Michael Barfuss.

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⁶ Institut für Botanik und Botanischer Garten, Universität Wien, Rennweg 14, 1030 Wien, Austria.

The keynote speaker of the session was Walter Till. Presentations were given by Michael Barfuss, Tim Evans, Tom Givnish, Claudia Hornung-Leoni, Elton Leme, and Katharina Schulte (see FIGURE 11). Additionally, 16 posters on Bromeliaceae were exhibited during the Poster Session. The titles of oral presentations were:

1. Progress in Systematics and Evolution of Bromeliaceae; **W.G. Till**; Institute of Botany, Wien, Austria.

2. Phylogeny of Bromeliaceae - implications for origin, adaptive radiation, and geographic diversification; **T.J. Givnish**; University of Wisconsin, Madison, WI, USA.

3. Phylogenetics of subfamily Tillandsioideae (Bromeliaceae): a comparison of plastid and nuclear DNA sequence with morphological data; **M.H.J. Barfuss** & W. Till, R. Samuel; Department of Systematic and Evolutionary Botany, University of Vienna, Vienna, Austria.

4. Improving taxa and character sampling to support generic and sub-generic units in Bromeliaceae: the example of *Alcantarea* and *Vriesea goniorachis* complex (Tillandsioideae); **E. M. C. Leme**; Herbarium Bradeanum, Rio de Janeiro, Brazil.

5. Evolution of the inflorescence in *Puya* (Bromeliaceae): a phylogenetic point of view; **C. T. Hornung-Leoni** & V. Sosa; Instituto de Ecologia, A.C., Xalapa, Veracruz, Mexico.

6. Evolution of Bromelioideae (Bromeliaceae); **K. Schulte**, R. Horres & G. Zizka; Research Institute Senckenberg and J.W. Goethe-University, Frankfurt am Main, Germany.

7. A Phylogenetic Analysis of Bromelioideae (Bromeliaceae) Based on Molecular and Morphological Data; **T.M. Evans**, G.K. Brown, T. Wendt, S.L. Korterling, J.E. Drake. University of Wyoming, Laramie, WY, USA.

Further information can be found at: http://www.ibc2005.ac.at/program/abstracts/IBC2005_Abstracts.pdf

The 18th International Botanical Congress will take place in Melbourne, Australia from July 24-30, 2011. See: <http://www.ibc2011.com/ibc2011/>



***Aechmea serrata* and a Problem with Misidentifications**

Derek Butcher, BSI Cultivar Registrar

In the Journal of the Bromeliad Society 54(4): 176. 2004, Jeffrey Kent pointed out that we should be growing the rarer species to help in their conservation, and this is a very worthy cause. However, care must be taken that the correctly identified species are being nurtured. *Aechmea serrata* (FIGURE 12) is just one where many have problems with identification. U. & U. Baensch (1994, p. 65) had this to say:

"Aechmea serrata. This is a large bromeliad resembling A. smithbiorum as far as the habit is concerned. However, the inflorescence is far more compact. The possibility remains that this plant is in fact a variety or form of A. smithbiorum and is incorrectly referred to as A. serrata in the collections. According to the monograph by Smith & Downs, A. serrata has, as its name indicates, serrated instead of entire primary bracts"

To me this is an odd statement. I would have put the name as *Aechmea smithbiorum* with the comment it was in collections wrongly as *A. serrata*! In order to qualify for the name *A. serrata*, you would assume that some part of the plant must have teeth.

Aechmea serrata was described officially by Linnaeus as *Tillandsia serrata* and then transferred to *Aechmea* by Mez in 1896. The following is the taxonomic history as presented in the Flora Neotropica (Smith & Downs 1979):

Aechmea serrata (Linnaeus) Mez, DC. Monogr. Phan. 9: 243. 1896.

Synonyms: *Caraguata clavata et spicata, foliis serratis* Plumier, Gen. 10. 1703. *Tillandsia serrata* Linnaeus, Sp. Pl. 286. 1753. *Caraguata serrata* (Linnaeus) Schultes filius in Roemer & Schultes, Syst. 7(2): 1231. 1830. *Platystachys plumieri* Beer, Bromel. 9. 1856; nomen illegitimum. *Aechmea martinicensis* Baker, Jour. Bot. London 17: 132. 1879. Type. Martinique, Habn 522 (K), Dec 1871. *Aechmea plumieri* E. Morren ex Baker, Handb. Bromel. 45. 1889; nomen, non *Aechmea plumieri* Baker, Handb. Bromel. 50. 1889.

The type is based on Plumier's unpublished plate which is the one reproduced in Smith & Downs p. 1902, and, on the second line I read '*Caraguata clavata et spicata, foliis serratis*'. So, in this taxon the leaves are serrate too!

The serrate primary bracts also come into the equation with *Aechmea martinicensis* where Baker 1889 stresses the serrate primary bracts to distinguish between it and *A. dichlamydea*! *Aechmea smithbiorum* did not come on the scene until 1896.

Let us now look at *Aechmea plumieri* Morren which was treated by Baker (1889) as a synonym of *A. lingulata* but treated in Smith & Downs as a synonym of *A. serrata*. If you really want to muddy the water, Baker (1889) also had a *Caraguata serrata* Hort which must have been different to the synonym in Smith & Downs because it became *Nidularium scheremetiewii*!

The point I am trying to make is that we should at least follow Smith &

Downs unless we can prove Lyman Smith wrong. To obtain further proof that there was a plant growing on Martinique which was greatly different from the woolly non-toothed primary bracted *Aechmea smithbiorum*, we only have to read what was said in Paris in 1907 (translated from the French by the author):

Aechmea serrata - by D Bois in Revue Horticole (Paris) 79(7): 129-31. 1907.

This species is classified by Mez under *Platyaechmea*. It was found in Antilles, and P. Plumier was the first to make it known as *Bromelia ramosa et racemosa, foliis arundinaceis serratis*. (*Plantarum americanarum*, p. 53, pl. 64) (1755-1760).

A more complete description and a more exact illustration was given by Lamarck; but it is only in these last years that it was the subject of a deeper survey by Mez.

The herbarium of the Museum of Paris owned collected material from Martinique by Messrs Belanger and Hahn; and P. Duss indicates it grows on the trees in the lower woods, and also in the forests, close to the sea, in Guadeloupe and Martinique, between 25 and 600 metres altitude.

The plant was cultivated for a long time in the greenhouses of the Museum and also exists in the garden of Luxemburg; but we don't believe that one can find it in the living plant collections other than those two establishments, nor has its flowering ever been seen.

This species is so rare, having just bloomed in the greenhouses of the Museum, that we are happy to contribute a description from life, with accompanying photographs and drawings executed according to nature.

Plant short stemmed, with offsets. **Leaves** in a rosette utriculium, to 16, from 50 to 60 cm long, very wide and enveloping in their bottom part, at a height of about 10cm forming a gutter with parallel sides, acuminate with a spiny tip. The leaves, more or less recurved, 4 cm wide at the middle; their edges with small reddish green teeth, very close together; hooked with a wide base; finely lined on both sides, pale green and lightly covered with whitish lepidote, especially underneath; the sheath is brownish on the inside. **Scape** thick, cylindrical, 30cm high, erect, green, enveloped by the sheaths of the scape bracts, erect, imbricate and the higher ones especially are shorter; scape bracts tooth edged like the leaves, and those next to the inflorescence are a very pale green.

Inflorescence compact, ovoid panicle, one could nearly say a spike, on account of the reduction of the secondary branches. 10cm long and thick, and hardly exceeds the height of the leaves. It is composed of distichous complanate spikes with very short peduncles, 4 - 5 cm long, generally 3 flowered. **Primary bract** large leaflike, pale green, strongly spined on the edges and terminated with a pointy brownish spine, especially larger when situated closer to the bottom part of inflorescence. Those at the base longer than the spike, 5 cm long or 2½ times longer. **Floral bracts** 15 - 20mm long; long-oval, concave-keeled, strictly imbricate, greenish, rigid, membranous on the edges, streaky veined, with a prominent line on the back in the shape of wing and terminating in a brownish spiny tip. Each envelope the flower to the tip of

the sepals. **Sepals** asymmetric, thick, greenish white, 12 mm long, strongly imbricate, convolute, top blunt with a brown long acicular point. **Petals** purple, 15 mm long, narrow claw and a widened top in an oval blade. **Stamens** a little shorter than the petals, anthers pure white, 6 mm long. **Ovary** glabrous, ellipsoid. **Style and stigma** as with other species of *Aechmea*.

If *Aechmea serrata* cannot be classed as the most ornamental Bromeliad, it is an interesting species, remarkable for the beauty of its foliage and specially for the greatly spiny toothed leafy bracts that come with inflorescence.

We must thank Mr. Labroy, Head Gardener of the greenhouses of the Museum, for having induced it to flower. It took place last January 20 after the application of special attention, such as reduction of the waterings during the period of vegetation rest, then repotting in very fertile compost, composed of a third of good earth of beather to two thirds of leaf compost, and placing in a hot and humid environment.

Plants in Australia with this name seem to be linked to Florida and the same link seems to apply to plants being grown in Costa Rica and Brazil. I feel sure that the plant in Baensch's book can also be linked to 'collections' on mainland USA as the photograph of Wally Berg's plant shows. Note that this plant was being sold in Florida by at least Boggy Creek Nursery.

These plants could well have supplied the seed for the BSI seed bank in 1989 and Peter Franklin in Australia has an offset of what is grown in Florida as *Aechmea serrata* and seedlings from self-set seed for this same misidentified taxon. We also know that seed offered as *A. serrata* from the BSI seed in Oct 1990 was even more suspect because this was the origin of the cultivar A. 'Que Sera'. So unless you have some form of provenance the name of *A. serrata* on the label may well be suspect!

Aechmea serrata is probably on the endangered list because of the work of the French botanist, Claude Sastre, who has given me detail on this elusive plant. It does appear to be under cultivation in Europe both in France and Belgium. There is also a large clump growing in the Jardin de Balata in Martinique but does not set seed.

If anybody thinks they are growing the 'true' *Aechmea serrata* would they please advise the Bromeliad Identification Center at Selby Gardens so it can be properly identified and a program started for its conservation.

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Photograph by Frieda Billiet.

Figure 12. *Aechmea serrata*.

The Urubamba River Valley, Revisited

Leo Dijkgraaf⁷

Photographs by the Author

Earlier I reported on the bromeliads in the department of Cusco in Peru (Dijkgraaf 2005). Recently, I visited the region of Urubamba and Machu Picchu again, this time at the end of the rainy season in the month of May. My first visit was in November and then I noticed that all the *Puya*'s were past flowering. There is a species in great abundance here, and this time most of the plants were in full bloom (FIGURES 13, 14), making them about 70 cm in height.



Figures 13, 14.
Unidentified
species of
Puya growing
Cusco
Department,
Peru.



Figures 15, 16.
*Tillandsia
caulescens*,
growing along
the road near
Urubamba,
Peru.



Figure 17.
Another
unidentified
species of
Puya.

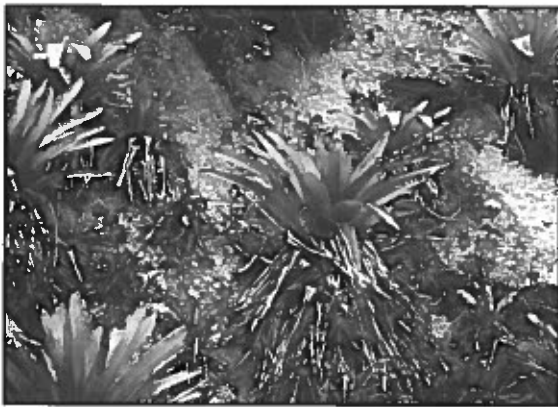


Figure 18. Extraction of salt near Urubamba, Peru.



Figure 19. The Historic Machu Picchu Sanctuary, Peru.

⁷ The Netherlands. E-Mail: ldijkgraaf@tiscali.nl.



Figures 20, 21. *Tillandsia stenoura*.



Figure 22. *Tillandsia latifolia* var. *divaricata* used for decoration at the train station in Machu Picchu Pueblo, Peru.



Figure 23. *Tillandsia fendleri* at the train station in Machu Picchu Pueblo, Peru.



Figure 24. An interesting multiple-inflorescence *Tillandsia*, possibly a damaged *T. fendleri*.

Near Urubamba are the Salineras de Maras, terraces where salt is being extracted on the slopes of the hills (FIGURE 18). The salt comes out of salt-layers in the mountains and is transported via an underground river that surfaces above the terraces. A system of irrigation leads the water down to fill all the salines. On rocks along the road to the salineras and also in other locations around Urubamba, *Tillandsia caulescens* can be found (FIGURES 15, 16). Most of the pictures in literature I saw of this species depict plants with green leaves, and the likeness of the foliage with *Tillandsia tenuifolia* is mentioned (Shimizu & Takizawa 1998). The plants at this location on the rocks, however, are grey in color.

The Urubamba River flows on past the ruins of Machu Picchu. Yearly, thousands of tourists walk the more than 40 kilometers long route known as "The Inca-trail to Machu Picchu". It is only a small part of the vast network of paths in the mountains of the Andes that was constructed some 500 years ago by the Incas and that connected the settlements of their civilization. In the beginning of the 20th century Machu Picchu was rediscovered in ruins and being overtaken by nature (FIGURE 19). Together with other settlements that have been made accessible, it now is part of a protected area of 325 square kilometer under the name "Sanctuario Histórico de Machu Picchu". In this sanctuary there are snowcapped mountains, high-altitude grasslands ("puna") and many types of forest. The Inca-trail runs at altitudes between 2500 and 4200 meters and there are few flat stretches. Because of the thin air it is not an easy route to walk, and for most people it takes 3 to 4 days to accomplish (a marathon runner holds the record with 6 hours). Along this trail I took pictures of a *Puya* sp. (FIGURE 17) and of *Tillandsia stenoura* (FIGURES 20, 21). After taking the train from the city of Cusco (or Cosqo, the original name) to Machu Picchu Pueblo (a new name for a place still better known as Aguas Calientes) I didn't have to search far for bromeliads, for there on the platform of the railway station some plants were placed as decoration. I noticed *Tillandsia latifolia* var. *divaricata* (FIGURE 22) and *Tillandsia fendleri* (FIGURE 23); both species were later also spotted in the trees in the surroundings. There was also a plant that looks to me like a hybrid of *Tillandsia fendleri* (FIGURE 24), or possibly the result of damage to the developing inflorescence.

Literature Cited

- Dijkgraaf, L. 2005. Bromeliads in a Sacred Valley. *J. Bromeliad Soc.* 55(1):3-5.
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Living Large with *Alcantarea*

Theresa Bert*

Species of the genus *Alcantarea* are native to eastern Brazil where they grow as terrestrials in open places. Most species grow in full sun on massive granitic rock outcrops at medium elevations (500-1500 m) in cracks where water percolates through the granite. The genus *Alcantarea* was formerly recognized as a subgenus of *Vriesea*. Most species are very large—3-5 ft. in diameter at full size. They have brightly colored to lightly colored and green flower clusters that are often spectacular, and up to 7-8 ft. tall. The flower cluster can have multiple branches with sometimes colorful bracts, and lovely, three-petaled, yellow or white flowers with long, protruding stamens. Many of the species have flowers with long petals that curve backward and sideways, like lovely curls at the ends. Don't hold your breath waiting for these plants to flower, though—they can be 10 or more years old before they flower—but it's worth the wait!

You will need space to grow these plants. *Alcantarea* species can be grown in a loose mix of potting soil, a little charcoal, and perlite. It is best to increase pot size as they grow. They eventually become so heavy that the bases lean and press against the edge of the pot. At this time, they'll fall over when loaded with water unless some preventative measure is taken. I usually pot them in plastic pots and then put those into heavy clay pots. Sometimes I also need to counterbalance the base of the plant by putting a brick or two

in the plastic pot on the side opposite the plant base. Some species and cultivars (e.g., *A. imperialis* 'Red') tend to rot at the base; to guard against this, grow those plants in pure perlite and a porous rock such as commercially available lava rock. Use lots of time-released fertilizer, but avoid placing the fertilizer so that it touches the plant base. *Alcantareas* respond well to time-released fertilizer, such as 6-month, time-released Nutricote®



Figure 25. *Alcantarea burle-marxii*, in cultivation at the Marie Selby Botanical Gardens.

Photograph by Phil Nelson.

* Bradenton, Florida.

(available under the brand-name "Dynamite"). They also do well in the ground. They survive light frosts without damage if covered with frost-cloth or sheets. I grow them in my yard in full sun or partial shade. Plant or place them in locations where you won't need to move them after they're full-grown. An *alcantarea* holding even a little water can weigh 80-100 lbs.

The pups on *alcantareas* grow from the trunk. Small "grass pups" with thin leaves can appear beneath the leaves when the plant is anywhere from small through full-sized. These can be removed when they're about 4-5 in. long and grown in pots. They are not easily removed because the base is curved into the trunk of the parent plant. To remove them, dig the potting mix away from the plant, grasp the pup by the base, and wiggle it from side to side while simultaneously pulling the pup a bit away from the mother plant.

Very robust pups frequently appear after the plant has bloomed if time-released fertilizer pellets are placed between the leaves. Cut off the inflorescence after flowering for best results. Sometimes it is possible to get a dozen or more pups by using this method. To harvest the pups, I remove all leaves below them and use the same technique described above for the grass pups. The best way to get them to root is to insert them between the parent plant's trunk and a big remaining leaf until they develop roots. This may take a few months, but for me, this works better than potting them.



Photograph by Phil Nelson.

Figure 26. *Alcantarea farneyi*, in cultivation at the Marie Selby Botanical Gardens.

Alcantareas can tolerate some leaf litter accumulation, but not acorns or rotting leaves left in their centers for months. Several large species available for cultivation are cold-tolerant, easy to grow, and quite spectacular, especially *Alcantarea imperialis*, *A. odorata*, *A. extensa*, *A. brasilliana*, *A. vinicolor*, and *A. beloisae*. *Alcantarea imperialis*, the most popular species, can be found with leaves that are green above and green or various shades of red or purple beneath. *Alcantarea odorata* can be purchased with varying degrees of trichome (scale, or scurf) coverage. Those with thick trichome coverings (e.g., cultivar 'Silver') are fuzzy- or snowy-looking and beautiful.

If you want unique, interesting landscape bromeliads, try plants of this genus, but beware, they can grow quite large!



Events Calendar

AUSTRALIA

March 4-5, 2006. BROMELIAD SHOW & PLANT SALE. Bromeliad Society of Mt. Coot-tha Botanical Gardens. Mt. Coot-tha Botanic Gardens Auditorium, Brisbane, Queensland, Australia. Mar 4, 8-4; Mar 5, 9-3. Displays, lectures, book and plant sales, raffles, free parking. Entry Fee \$3.00 adults, children under 14 accompanied by an adult are free. For more information, contact Norma Davis. E-mail: norma.davis@griffith.edu.au or phone (Aust 07 3389 1061).

April 29-30, 2006. BROMELIAD SOCIETY OF NEW SOUTH WALES AUTUMN SHOW. Wellbank Street, Concord.

October 28-29, 2006. BROMELIAD SOCIETY OF NEW SOUTH WALES SPRING SHOW. Wellbank Street, Concord.

UNITED STATES

March 25-26, 2006. HARRY P. LEU GARDENS ANNUAL SPRING SALE. Harry P. Leu Gardens, 1920 N. Forest Ave., Orlando, FL 32803.

April 1-2, 2006. BROMELIAD SOCIETY OF HOUSTON SPRING BROMELIAD SALE. Houston Arboretum & Nature Center, 4501 Woodway, Houston, TX USA. Apr 1, 9-5, Apr 2, 11-4. For more information, contact bromeliadsocietyhouston.com or 713-858-3047.

April 22-23, 2006. BROMELIAD SOCIETY OF SOUTH FLORIDA ANNUAL SHOW. Fairchild Tropical Botanic Gardens, 10901 Old Cutler Road, Coral Gables, FL 33156. For more information, contact Robert Meyer, at 305-668-3344.

May 26-28, 2006. BROMELIAD SOCIETY OF HOUSTON STANDARD BROMELIAD SHOW & SALE. Houston Arboretum & Nature Center, 4501 Woodway, Houston, TX USA. Sale: May 26, 12-5, May 27, 9-5, May 28, 11-4; Show: May 27, 2-5, May 28, 11-4. For more information, contact bromeliadsocietyhouston.com or 713-858-3047.

June 7, 2006. WORLD BROMELIAD CONFERENCE JUDGE'S SCHOOL 3. Bromeliad Society International. Town and Country Resort Hotel, Mission Valley, San Diego, California, USA. The all-day school will be held in San Diego. Pre-registration, including a small fee is required. For more information, contact Betty Ann Prevatt, JCC Chairman, at 239-334-0242 or email bprevattpcc@aol.com.

June 6-11, 2006. WORLD BROMELIAD CONFERENCE, Large show and sale, judged competition, lectures, social events, and more. Sponsored by the Bromeliad Society International and the San Diego Bromeliad Society. Town and Country Resort Hotel, Mission Valley, San Diego, California, USA. Hotel rates are \$124 per night. The rate is good for any three days during the Conference. For more information, contact BSI Membership Secretary, 1608 Cardenas Dr. NE, Albuquerque, NM 87110, USA. E-mail: membership@bsi.org; www.bsi.org.

September 8-10, 2006. SOUTHWEST BROMELIAD GUILD SHOW. Corpus Christi, Texas, USA.

September 16-17, 2006. BROMELIAD SOCIETY OF HOUSTON FALL BROMELIAD SALE. Houston Arboretum & Nature Center, 4501 Woodway, Houston, TX USA. Sep 16, 9-5, Sep 17, 11-4. For more information, contact bromeliadsocietyhouston.com or 713-858-3047.

September 30, 2006. FLORIDA COUNCIL OF BROMELIAD SOCIETIES' EXTRAVAGANZA, Sale, banquet, and rare plant auction. Miccosukee Resort and Gaming Convention Center, Miami, FL USA. For more information, contact www.fcbs.org.



Errata: Forgotten Photographers

Several photographic credits were inadvertently dropped in the May-June issue. In the Article on Darkest Delights by Geoff Lawn (pp. 120-124): Figure 22, *Canistropsis* 'Plum', is by Jarka Rehak, Figure 25, *Vriesea* 'Negro', by Derek Butcher, Figure 23, *Cryptanthus* 'Snakeskin' and 24, *Neoregelia wilsoniana*, by Geoff Lawn. In the article by Lucia Hechavarria Schwesinger on *Tillandsia canescens* (pp. 136-138), the photos were by J. Richard Abbot. Thank you for your photos!

Decorative *Tillandsia cyanea*

Ron Parkhurst⁹

One of the most versatile bromeliads for decoration and arranging is *Tillandsia cyanea*. Over the years, there have been many hybrids of *T. cyanea* introduced, which have improved the shape, size, and color of this plant. I personally like to use them in lava-rock pockets, which can be placed into a small wooden bowl with lava cinders or pebbles as a top dressing. They also do well mounted on driftwood with moss wrapped around the mount to conceal the roots. Of course, they simply look great grown in a decorative pot as well. Your imagination is the only limit to this great decorative plant, and one of the few bromeliads to give off a fragrance from the small delicate blue/purple flower, somewhat like "all-spice."

Recently, I used a piece of slate, drilled some holes into it to create a wire mesh basket to mount the cyaneas in, and then covered it with moss. The theme was for the piece to look like the island of Maui. May you have fun in creating different themes with this spectacular plant!



Figure 27. *Tillandsia cyanea*.

Photograph by Ron Parkhurst.

Reproductive Aspects of Sympatric Bromeliads in Southeastern Brazil

Rodolfo Antônio de Figueiredo¹⁰

Photographs by the Author

Summary

Bromeliads constitute an important element of the Atlantic Rain Forest of Brazil. In some places of Serra do Japi, a southeastern Brazilian reserve of rainforest, there are rocky outcrops covered with relicts of semi-arid vegetation. Four bromeliad species were studied in this special environment in respect to their reproductive ecology. The species were self-incompatible, with sequential flowering, and visited by hummingbirds and several butterfly species. The bromeliads revealed their importance as a year-round source of nectar in rocky outcrops. Although hummingbirds could be considered the most important pollinators of the bromeliads studied, butterflies were the most frequent visitors and should be considered also important in pollen flow at the study site.

Key words: *Aechmea distichantha*, *Billbergia distachia*, *Tillandsia tenuifolia*, *Vriesea carinata*, southeastern Brazil.

Introduction

Bromeliads constitute one of the largest neotropical families found in Brazilian forests (Reitz, 1983; Leme, 1993; Luther and Sieff, 1996; Proença and Sajo, 2004), with an important participation on the turnover of nutrients and on the increment of biodiversity in Atlantic Forest sites (Rocha et al., 1997; Oliveira, 2004).

The Atlantic Forest is found in Brazilian coastal lowlands, but enters São Paulo State following the rivers, and can be found hundreds of kilometers from the Atlantic Ocean. One of these areas, a Brazilian biodiversity hotspot, is the Serra do Japi, which is included into the Atlantic Forest Domain (sensu Ab'Saber 1977). During a previous geological time, Serra do Japi was covered by arid savanna. However, in spite of Atlantic Forest invasion, some areas in the forest were still covered by semi-arid vegetation, a relict of the vegetation occurring during the arid periods of Quaternary (Ab'Saber 1992). These places are characterized by large rocky outcrops, which show a typical vegetation of semi-arid zones, dominated by Cyperaceae, Cactaceae, and Bromeliaceae (Leitão Filho 1992).

Bromeliaceae is the most numerous of all neotropical epiphytes and its pollination is carried out mainly by hummingbirds (Sick 1984, Bawa 1990, Proctor et al. 1996; Buzato et al. 2000), although several other bird species also obtain resources from it (Nadkarni and Matelson 1989, Pizo 1994). As these

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plants show floral variability and there are few detailed studies on flower visitors (Benzing 2000), the same bromeliad species could change its flower visitor groups when inhabiting different areas. Figueiredo (1997) demonstrated that *Buddleja brasiliensis* (Buddleiaceae), which is pollinated by hummingbirds in the Atlantic Forest (Sazima et al. 1996), is visited and pollinated mainly by hymenopterans on a plateau covered with semideciduous forest.

The rocky outcrops of Serra do Japi shelter four sympatric bromeliad species, *Aechmea distichantha* Lem., *Billbergia distachia* Mez ex Dur. & Jacks, *Tillandsia tenuifolia* Jacq., and *Vriesea carinata* Wawra. The present study aimed to record the reproductive aspects of these bromeliads in order to verify if their pollinator groups differed from what was recorded in studies carried out in another areas, as well as their importance in providing a nectar resource throughout the year in the rocky outcrops.

Materials and Methods

Fieldwork was carried out in Serra do Japi, located in the western part of Atlantic upland (latitudes 23°12'-23°22'S and longitudes 46°57'-47°05'W, 800-1300 m elevation). Maps of the area are available at Smithsonian Homepage (2005) and Morelato's book (1992). Average annual precipitation of the area could reach 1900 mm, but in the dry season, which extends from April to September, the mean monthly rainfall is 80 mm (Pinto 1992). The temperature ranges from 15.7°C to 19.2°C (Pinto 1992).

Observations (Lehner 1979) were made on five individuals of each bromeliad species, from 6 am to 6 pm (total of 36 hours in each species). All flower visits were recorded and the animals identified using field guides (Grantsau 1989, Brown-Jr. 1992). These individuals were observed fortnightly along a year in order to verify their flowering periods.

Self-pollination was tested in bagged inflorescences with flower buds. After anthesis, bagged flowers were hand pollinated with self-pollen. Fruit set was observed 30 days later. The same amount of bagged inflorescences was set as control, left under natural conditions of pollination.

Results and Discussion

Several individuals of *Aechmea distichantha*, *Billbergia distachia*, *Tillandsia tenuifolia*, and *Vriesea carinata* were found in rocky outcrops inside the rainforest. As can be seen in FIGURE 28, all studied bromeliads in rocky outcrops of Serra do Japi have tubular flowers and conspicuously colored inflorescences, which are floral features related to ornithophily (Faegri and van der Pijl 1979, Proctor et al. 1996).

The flowering phenology of the studied bromeliads is described in FIGURE 29. *Aechmea distichantha* and *Tillandsia tenuifolia* flowered in the wet season, while *Bromelia distachia* and *Vriesea carinata* flowered only in the dry season. All species flowered during several months, characterizing Gentry's steady state pattern of flowering (Gentry 1974). Following Newstrom et al.

(1994), the phenological pattern of the bromeliads can be classified as annual and regular. These phenological patterns seem to be typical for hummingbird-pollinated bromeliads (see Araujo et al. 1994, Sazima et al. 1996).

The sequential blooming of the sympatric bromeliads studied here provides a year-round nectar supply to the flower visitors. Sequentially flowering was also found in three sympatric *Vriesea* species (Araujo et al. 1994), as well as in an assemblage of hummingbird flowers (Sazima et al. 1996), both studies carried out in a coastal location of Atlantic Forest in São Paulo State.

All bromeliads were self-incompatible (TABLE 1). Previous studies also showed self-incompatibility in some of the genera studied here (Vervaeke et al. 2001, Canela and Sazima 2003). Like the present study, Araujo et al. (1994) also found self-incompatibility in *Vriesea carinata*.

TABLE 1. Fruit set of bromeliad flowers (self-pollination and natural conditions - control) in rocky outcrops of Serra do Japi, southeastern Brazil.

	<i>Aechmea distichantha</i>	<i>Billbergia distachia</i>	<i>Tillandsia tenuifolia</i>	<i>Vriesea carinata</i>
Self-pollination (% of fruit set)	0 (0/35)	0 (0/20)	0 (0/6)	0 (0/15)
Control (% of fruit set)	77.1 (27/35)	65 (13/20)	50 (3/6)	60 (9/15)

Numbers in parenthesis are the number of infructescences/inflorescences, respectively.

TABLE 2 shows the flower visitors recorded. All bromeliads were visited by two hummingbird species, *Phaethornis pretrei* and *Aphantochroa cirrochloris*. A third hummingbird species, *Phaethornis eurynome*, was recorded only in *Billbergia distachia* flowers. The Planalto Hermit (*P. pretrei*) is found from south to northeastern Brazil, inhabiting scrubby areas and dry forests. The Sombre Hummingbird (*A. cirrochloris*) is endemic of southeast Brazil rainforests. The Scale-throated Hermit (*P. eurynome*) is found in south and southeastern Brazil, inhabiting coastal rainforests (Grantsau 1989). In spite of that, the Scale-throated Hermit was also recorded in Serra do Japi (Silva 1992). Sequential flowering of the bromeliads seems to be important in allowing these birds to inhabit the area along the year, as occurred with *Ramphodon naevius* depending on three *Vriesea* species in the coastal rainforest (Araujo et al. 1994).

The hummingbird species, however, were not the unique pollinators of the bromeliads (TABLE 2). Indeed, butterflies were important flower visitors, carrying out most of the visits. As in some captured butterfly species, pollen was observed on their tongues and head; these species could also play a role in bromeliad pollination.

Aechmea distichantha flowers were visited by several species of butterflies, hummingbirds, and bees (TABLE 2), but the most frequent pollinator was *Heliconius ethilla* (Lepidoptera, Nymphalidae). *Aechmea distichantha* was previously studied in the coastal Atlantic Forest, and it was visited by four hummingbird species (Sazima et al. 1996). The Bananaquit (*Coereba flaveola*, Coerebidae) also visits the flowers of this bromeliad species (Sazima and Sazima 1999), which was not verified in the present study. Other studies with *Aechmea* recorded hummingbirds, bees, and flies on its flowers, but without mention of butterflies, such as the studies with *A. pectinata* in



Figure 28. Inflorescences of the four bromeliads found in rocky outcrops of a Brazilian rainforest. Left to right, top to bottom: *Aechmea distichantha*, *Billbergia distachia*, *Tillandsia tenuifolia*, *Vriesea carinata*.

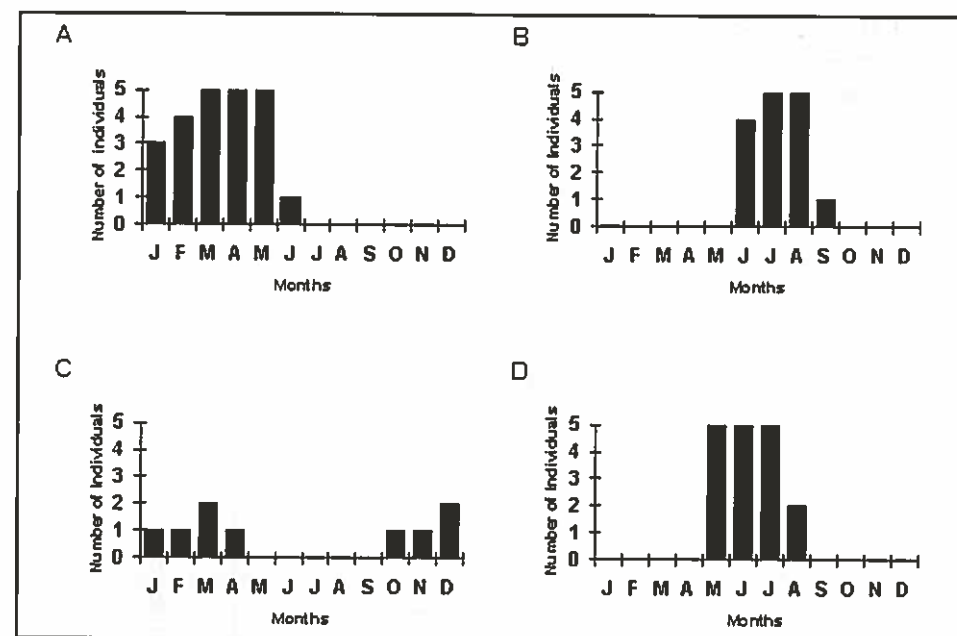


Figure 29. Flowering phenology of the bromeliads found on rocky outcrops of Serra do Japi, southeastern Brazil: (A) *Aechmea distichantha*, (B) *Billbergia distachia*, (C) *Tillandsia tenuifolia*, and (D) *Vriesea carinata*.



Figure 30. The butterfly *Heliconius ethilla* (Nymphalidae) visiting an inflorescence of *Aechmea distichantha* growing on a rocky outcrop of Serra do Japi, southeastern Brazil.

TABLE 2. Flower visitors of bromeliads in rocky outcrops of a Brazilian rainforest. Each bromeliad was observed for 36 hours, from 6 am to 6 pm.

Bromeliad Species	Flower Visitors	No. Visits
<i>Aechmea distichantha</i>	Aves	
	Trochilidae	
	<i>Phaethornis pretrei</i>	04
	<i>Aphantochroa cirrochloris</i>	06
	Hymenoptera	
	Apidae	
	<i>Boimbus brasiliensis</i>	07
	<i>Trigona spinipes</i>	17
	Lepidoptera	
	Hesperiidae	
	<i>Polygonus manuli</i>	18
	<i>Vettius lafresnayei</i>	12
	<i>Sodalia coler</i>	10
	<i>Lychnychoides ozias</i>	10
	<i>Gorgythion beggina</i>	06
	Nymphalidae	
	<i>Heliconius ethilla</i>	51
	<i>Heliconius erato</i>	16
	<i>Diaethria clymena</i>	05
	<i>Aeria olena</i>	04
	<i>Tithorea harmonia</i>	03
<i>Billbergia distachia</i>	Aves	
	Trochilidae	
	<i>Phaethornis pretrei</i>	27
	<i>Phaetornis eurynome</i>	10
	<i>Aphantochroa cirrochloris</i>	06
	Hymenoptera	
	Apidae	
	<i>Trigona spinipes</i>	08
	Euglossini	
	<i>Euglossa sp.</i>	03
	Lepidoptera	
	Hesperiidae	
	<i>Gorgythion beggina</i>	06
	<i>Lychnychoides ozias</i>	04
	Nymphalidae	
	<i>Heliconius ethilla</i>	06
	<i>Actinote carycina</i>	04
	<i>Junonia evarete</i>	01
	Papilionidae	
	<i>Heraclites thoas</i>	02

TABLE 2, continued

Bromeliad Species	Flower Visitors	No. Visits
<i>Tillandsia tenuifolia</i>	Aves	
	Trochilidae	
	<i>Aphantochroa cirrochloris</i>	14
	<i>Phaethornis pretrei</i>	09
	Hymenoptera	
	Apidae	
	<i>Trigona spinipes</i>	09
	Lepidoptera	
	Hesperiidae	
	<i>Lychnychoides ozias</i>	02
	Nymphalidae	
	<i>Placidula euryanassa</i>	06
	<i>Philaethria wernicket</i>	02
	<i>Episcada carcinia</i>	01
	<i>Hypothyris ninonia</i>	01
<i>Vriesea carinata</i>	Aves	
	Trochilidae	
	<i>Phaethornis pretrei</i>	36
	Hymenoptera	
	Apidae	
	<i>Trigona spinipes</i>	10
	Halictidae	
	<i>Halictus sp.</i>	06
	Lepidoptera	
	Hesperiidae	
	<i>Gorgythion beggina</i>	04
	<i>Heliconius ethilla</i>	05

Atlantic lowlands (Canela and Sazima 2003), *A. beeriana* in Amazonia (Nara and Webber 2002), and *A. lingulata* in the arid northeastern Brazil (Siqueira Filho and Machado 2001).

Billbergia distachia flowers were also visited by several species of hummingbirds, butterflies, and bees. *Phaethornis pretrei* was the most frequent pollinator (TABLE 2). Only this bromeliad species received visits of *Phaetornis eurynome* (TABLE 2). A study carried out with *B. distachia* in the coastal Atlantic Forest showed that its flowers were visited mainly by *P. eurynome* (Sazima et al. 1996).

Tillandsia tenuifolia flowers received visits of butterfly and bee species, but *Aphantochroa cirrochloris* was most the frequent pollinator (TABLE 2). *Tillandsia tenuifolia*, *T. stricta*, and *T. bulbosa* were visited solely by hummingbird species in northeastern Brazil (Siqueira Filho and Machado 2001). The Mexican species *T. deppeana* and *T. multicaulis* had their flowers visited by hummingbirds and bees (Ordano and Ornelas 2004).

Vriesea carinata flowers were visited by some species of butterflies and bees, although the main pollinator was the Planalto Hermit (TABLE 2). Three *Vriesea* species studied in the coastal lowlands of São Paulo state were visited by *Ramphodon naevius* (Trochilidae) and bees (Halictidae) (Araujo et al. 1994). *Vriesea procera* was exclusively visited by hummingbirds in northeastern Brazil (Siqueira Filho and Machado 2001), but visited by hummingbirds and bees in Rio de Janeiro State (Van Sluys et al. 2001). *Vriesea neoglutinosa* flowers were visited only by hummingbirds in Espírito Santo State (Van Sluys and Stotz 1995). Two hummingbird species visited the flowers of *V. sceptrum* in a coastal Atlantic Forest (Sazima et al. 1996).

Conclusions

All bromeliads studied showed floral features related to ornithophily, such as tubular flowers, absence of odor, and conspicuously colored inflorescences. Indeed, hummingbirds could be considered the main pollinators of all bromeliads species. But butterflies also seem to constitute an important visitor group at the rocky outcrops of Serra do Japi (FIGURE 30).

Acknowledgements

I thank the municipal government of Jundiá for permission to work in the Serra do Japi Reserve and Faculdade de Ciências e Letras Padre Anchieta for providing logistical support.

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Fifty Years Ago in the Journal (Bulletin) - *Guzmania*

Fifty years ago, Mulford Foster published a simple, but useful article on how to recognize the genus *Guzmania*. Older articles such as this, and especially descriptions of new species, are still important references for a new generation of bromeliad specialists and hobbyists. A good example of which is current Selby Gardens bromeliad intern, Yuribia Vivas (FIGURE 31). Ms. Vivas, who was recently appointed as Curator of Bromeliaceae at the Venezuelan National Herbarium in Caracas, is at Selby Gardens for three months working in the BIC to learn more about the genus *Guzmania*. Yuribia hopes to become an authority on that genus, as well as of all the rich bromeliad flora in Venezuela and adjacent areas. Of course, not everything you read in the Journal is still valid, particularly when it comes to generic concepts. In Foster's series of articles on "How Well Do You Know Your Bromeliads," his description of *Lindmania* [Brom. Soc. Bull. 2(1): 10. 1952] is what we now recognize as *Fosterella*. Ed.

Figure 31. Yuribia Vivas, Curator of Bromeliaceae at the National Herbarium in Caracas, Venezuela, examines a *Guzmania sanguinea* at Selby Botanical Gardens.



Cover Photo Legend. Row 1: *Guzmania* 'Fortuna', *G. mucronata*, *G. globosa*; Row 2, *G. patula*, *G. musalca*, *G. sanguinea*; Row 3, *G. breviscapa*, *G. renyi*, *G. vittata*; Row 4, *G. farcinifoliformis*, *G. 'Puna Gold'*, *G. berteroniana*. Most photographs by Phil Nelson with a few by Bruce Holst (Row 1-2, 1-3, 2-3).

HOW TO RECOGNIZE A GUZMANIA A GUIDE FOR THE LAYMAN

Mulford B. Foster

We are always being asked for a simple rule or guide to be able to tell whether a certain plant belongs to this or that family or section of a family. We are so often asked, "How can you tell a *Guzmania* when you see one? What are the outstanding features that separate it from some of the other bromeliads?"

When you take into consideration that the botanists have been trying to settle this question for two hundred years and that few of them have completely agreed with each other, it is not so readily explained as some of the layman, who have little more than their casual eyesight and wishful thinking to rely upon, want it to be. There are few short cuts for the botanist so the layman shouldn't ask for, perhaps, one rule that has taken the scientist years of observation and study to learn.

There are certain outstanding characteristics that a *Guzmania* must have. However, several of these very same characteristics are common with other genera as well.

First of all, every *Guzmania* must have smooth edged (entire) leaves. There are no spiny edged leaves in the *Guzmania* group. The leaves are generally glossy and the plants are generally in the form of a many-leafed rosette. In most species there are fine penciled longitudinal lines, brown or maroon, showing faintly or strikingly in the leaves, usually most evident near the base of the leaves. Certain exceptions such as *Guzmania musaica* will not show these longitudinal lines but may show very striking bands of penciled markings of maroon or dark green color instead.

The flower head of a *Guzmania* may be on a tall scape or it may be sunken in the leaf rosette. It will be in a close, head-like form if low, but may also have a close, head-like formation on a long stem. Some flower heads are in a tight, cone-like form while others are on long spikes with short compact branches or long open branches. One character in *Guzmania* that a layman can see easily is that the flowers are always in more than two rows, while in most species of *Tillandsia* and *Vriesea* they are in exactly two rows.

All *Guzmanias* have plumose seeds, generally brownish-the little feathery parachutes that float on a current of air. (All members of the subfamily, Tillandsioideae, (to which *Guzmanias* belong), will have this kind of seed, but not all are brownish.)

No matter what the form of the scape or the seed, it will be necessary, for final identification of a *Guzmania*, (and for that matter any bromeliad) to

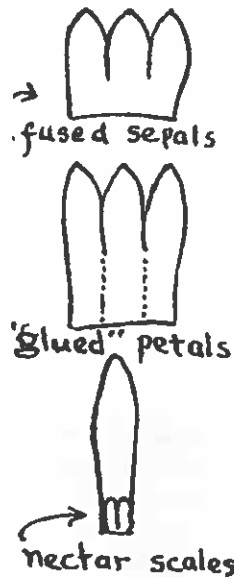
examine the parts of the flower which can be seen when you dissect a flower. First, you must remove the floral bract, then the sepals which are generally attached to each other at the base; then, with the aid of a magnifier, you examine closely the petals.

Most of the *Guzmania* flowers do not open very wide, if at all, and then usually but very little. However, some spread completely open with recurved petals. *Guzmania* flowers will be, generally, white or yellow.

All flowers will have colorful floral bracts which may appear to be petals, especially in the closely framed heads such as *G. lingulata*. These bracts may be yellow, green, white or red-orange and many of them also have penciled longitudinal lines, like the leaves.

Of sepals, there are three; they are the flower parts that surround or contain the three petals. In *Guzmanias* the sepals will be fused near their base. The edges of the sepals will be smooth – not serrated.

The petals, however, will give the final decision, and it is on the basis of whether or not they will be joined together but not fused. In *Guzmania* it will be a good “glue job” as Lyman Smith says. The petals can be separated without actually tearing the tissues in the process. Some may be joined higher than others. Thus:



Also, the petals must be naked, without nectar scales at the base of the petals. [Ed. note: if the petals are fused and bear nectar scales, then you have a *Mezobromelia*.]

These are nectar scales.

(If the petals are definitely fused or grown together at the base and have nectar scales at the bottom of each petal, then, most likely you have a *Vriesia*. But if the petals are separate and have no nectar scales then you probably have a *Tillandsia*.) (See your Cultural Handbook, p. 15, showing the drawing of the flower parts of a *Vriesia*.)

If the layman becomes bewildered at this seemingly “technical” approach, may I say that I have endeavored to simplify and synthesize to a minimum, those characteristics essential to the determination of a *Guzmania* without which your observations can have no valid frame of reference.

A little keener observation, a little more analysis, a little more curiosity, a little more insight into the flower will enrich your *Flower I.Q.*



Attention Bromeliad Newsletter Editors!

The BSI is pleased to announce the selection of a new editor for the Journal of the Bromeliad Society, Andrew Flower. He will assume the position with the first issue of Volume 56 (2006). We will include more information on Mr. Flower in the next issue of the Journal, but please, begin sending your societies' newsletters to him immediately. Your newsletters are a wonderful source of information on events and include many articles that deserve reprinting for a wider audience. Thank you for your support during our tenure as editors.

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***Pitcairnia tabuliformis*: From 3/8" to Bloom in 17 Months!**

Herb Plover¹¹

Photographs by the Author

In an article "You Get Strong, Fast Growth With Fertilizer (and light)" in the April, 2005 issue of BROMELIANA, (reprinted in the BSI JOURNAL, March/April, 2005) I described how the frequent application of a high-strength fertilizer produces robust, fast growth in many different bromeliads including *Pitcairnia tabuliformis*. I bought a clump of three 3/8" plantlets of that rarely seen species at the 2004 World Bromeliad Conference from Deroose Bromeliads, still in its closed tissue culture container. Each plantlet had only three leaves.

Accompanying the article was a photo of the clump taken seven months later, the largest of which already had 10 leaves up to 3" long. They had been transferred to a larger pot in my regular bromel mix with slow release Nutricote® pellets (13-13-13) on top. They had been grown close to a bank of Vita-Lite™ and Verilux® fluorescent tubes and had been foliar sprayed with a high-strength fertilizer 2 or 3 times a week.

A few months later I separated the clump into individual pots with slow release pellets, but now they received the regular weekly fertilizer regimen I use for my collection - 3 weeks on and one week off with a strength of 1/4 tsp. fertilizer (20-17-37) to 2 quarts of water. The largest piece was kept under the fluorescent lights and the other two were moved to moderate, natural light. (Plants grown under my three fluorescent light units receive this regimen of fertilizer the year round. For plants grown at the windowsills this regimen is reduced or briefly suspended during dark winter months when the temperature dips well below freezing. We use little heat during the winter; the windows are double paned and fit tightly into the frames.)

Now stronger and in their own pots the *Pitcairnia tabuliformis* grew rapidly with longer, wider leaves. The largest of them, growing under lights, began flattening out (table-like) and formed the inflorescence seen in the photo on this page. From a 3/8" tissue cultured plantlet it has grown to a diameter of 14.5 inches and bloomed in 17 months! (FIGURES 33, 34).

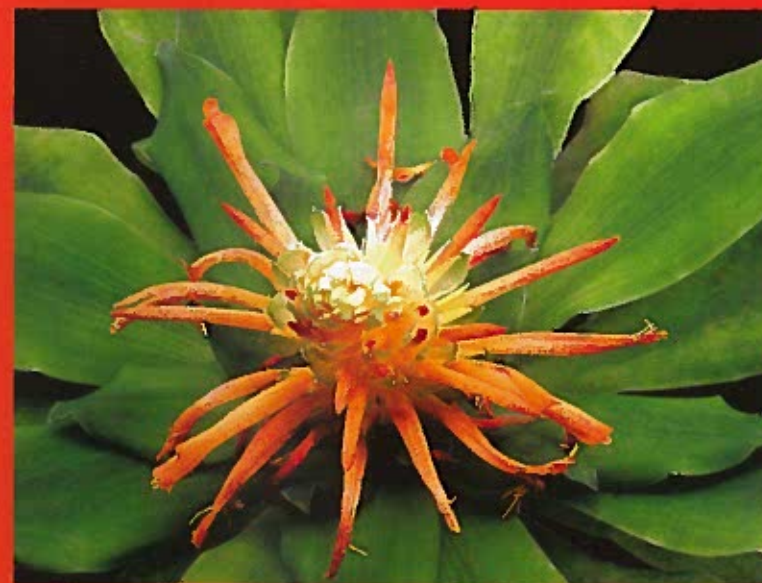
Like most species of its genus, *Pitcairnia tabuliformis* is an incredible water guzzler; it does not like the medium to dry out. I grew the three plants wick-watered, one in its own pot and the other two on larger tray reservoirs with other plants. The individual container is filled with about 7-8 ounces of water to just below the bottom of the container reservoir. In about one week the water has all been taken up by the roots and the reservoir is dry.

At this point it is necessary that I mention a traumatic event which may in part have influenced or triggered bloom in this plant, and that is that it was subjected to an extended period of drought and heat. The reader may recall

¹¹ Jamaica, New York. Reprinted with permission from an article slated for an upcoming issue of Bromeliana.



Figure 33, 34. Two views of *Pitcairnia tabuliformis* cultivated with an intensive fertilizer regimen.



my description in BROMELIANA of the disaster, which struck my plants last June when I went on a three-week vacation. I've left my plants without a plant sitter for three weeks for many years without a problem. I keep them out of the sun or strong light by dropping the Venetian blinds and tilt the slats so as to block out sunlight, and I cut the time the fluorescent lights are on in half. Just before I leave I water the plants almost to excess and then return later and fill all the leaf axils with more water. This has always worked. With the darkened rooms cooled by air conditioning evaporation of the water in the media, reservoirs and leaf axils is substantially slowed.

I had expected the air-conditioning in our coop development to be turned on shortly after we left as it usually is; so all the windows were closed. But this time we had a power plant failure and at the same time we had ten straight days of temperatures higher than 95°F and the rest of the time it was around 90°F. Thus the apartment became an oven and all water in the media, reservoirs and leaf axils was totally evaporated. The aridity and extreme heat for three weeks led to a spider mite infestation, but these critters like vriezeas, not pitcairnia.

Despite or perhaps because of its need for water, *Pitcairnia tabuliformis* appears to hold a decent quantity of water in its leaves, as they suffered minimal damage from the drought. A number of the lower leaves browned off, but there was no damage to the rest of the leaves. Still, the shock may have affected the largest most mature piece, because after being revived with lots of water and a continued fertilizer regimen for five months, the plant went into bloom.

Another bonus is that this plant is putting out multiple pups around its circumference. I reiterate my gratitude to Reginald Deroose for taking the time and financing the tissue culture process to mass-produce clones of *Pitcairnia tabuliformis*.



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In Memoriam: Elvira Groß

Pierre L. Ibisch¹¹, Daud Rafiqpoor & Wilhelm Barthlott¹²

The worldwide community of bromeliad science and cultivation has lost one of its most dedicated researchers: days before the publication date of the Bolivian *Puya elviragrossiae* (Vásquez & Ibisch 2005), a new species dedicated to Elvira Angela Gross to celebrate her 50th birthday, on August 25, she passed away in the town of Eberbach, Germany. Elvira was a very kind and bountiful person who dedicated her life to botanical research and in spreading the word about the fascination of plants.

She was born on November 12, 1954, in Neckarsulm. From 1977 onwards she studied botany at the University of Heidelberg, where she became a disciple of the botanist Werner Rauh (1914-2000). Her doctoral dissertation was devoted to the bromeliad seeds (1988). Using bromeliad seed biology as the starting point, she became involved in taxonomy. She authored or co-authored 56 taxa in 17 bromeliad genera (52 species, 4 varieties) and published 61 papers and books (complete list of taxa and publications in Ibisch et al. 2005). Additionally, she helped with the editing of important bromeliad works such as Rauh's *Bromeliensstudien* series (*Tropische Subtropische Pflanzenwelt*). After concluding her work with Werner Rauh, 1998, she moved to the University of Bonn where she became a collaborator of the Nees Institute for the Biodiversity of Plants. There, she continued her support of biodiversity projects funded by the Mainz Academy of Sciences and Literature.

Elvira catalyzed the bromeliad inventory of Bolivia promoted by Pierre Ibisch and later Roberto Vásquez. Many new species were described from this effort and a systematic review of the genus *Fosterella* was prepared. With her participation in the *Fosterella* research, sadly, her taxonomic work came to an end. Elvira published several plant books on orchids, palms, and other plants groups for the wider German public. Until her death, she worked on a book of the Alps flora. She will be missed by all of us.

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Figure 35. Elvira Groß, 1954-2005.



¹¹ Pierre L. Ibisch, Fachbereich Forstwirtschaft, Fachhochschule Eberswalde, Alfred-Möller-Str. 1, D-16225 Eberswalde, Germany. ¹² Daud Rafiqpoor & Wilhelm Barthlott, Nees-Institut für Biodiversität der Pflanzen, Meckenheimer Allee 170, D-53115 Bonn, Germany.



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Introducing: *Tillandsia exserta*

Harry E. Luther, BIC

Photographs by Phil Nelson



Tillandsia exserta Fernald is rather uncommon in cultivation but is a showy and easily grown species. It is very drought and relatively cold tolerant in Central and South Florida. I've also seen it outdoors in coastal southern California. Oddly, it has never been illustrated in the Bromeliad Journal.

The habitat of *Tillandsia exserta* is usually dry thorn forest, often with arborescent cacti, in northwestern Mexico at low elevations. Plants in the northern part of the species

range in the state of Sonora near Guaymas grow with *T. recurvata*. At the southern limits near Mazatlán in Sinaloa State, *T. exserta* occurs with *T. balbisiana*, *T. schiedeana*, and *T. caput-medusae*, among others. These are mostly twig epiphytes growing under very exposed conditions. The northernmost populations seem to consist of the largest plants. These are 50-65 cm tall in nature but can grow to over 1 meter tall in cultivation with many lateral branches on the inflorescence. In contrast, the southern populations often contain flowering plants less than 35 cm tall with unbranched spikes.

The specific name refers to the sepals that are exserted beyond the pink lepidote floral bracts, a character easily seen in both living and dried specimens.



Figures 36-38 (left to right). *Tillandsia exserta* habit, inflorescence, and flower.

