

# ***Journal of The Bromeliad Society***



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**Cover photographs.** Front: *Tillandsia eizii* inflorescence showing the density of spikes and the rich, pink color of the bracts. The text is on pages 178–179. Back: An example of *Tillandsia eizii* inflorescences cut for sale on the streets of San Cristóbal de Las Casas, Chiapas. Text and photographs by Robert Guess.

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## Two New *Vriesea* Species from Bahia, Brazil

Elton M.C. Leme

In the northeastern Brazilian states such as Bahia, the dry climatic conditions that predominate inland determined the retraction of the distribution of mesic species and the isolation of tracts of Atlantic Forest in the higher hills, usually on the watershed facing the ocean. During past geological epochs, however, the surrounding environment was wetter allowing the expansion of rain forest and the migration of its species, including bromeliads. Recent collections in one of those hills, which are today partially covered by Atlantic Forest, demonstrated the existence of two new bromeliads closely related to endemic species known only from the mountains of the states of Rio de Janeiro and Espírito Santo, hundreds of kilometers to the south. The species described here may be considered witnesses of the speciation process caused by isolation after climatic catastrophes of remote periods.

*Vriesea sandrae* Leme sp. nov. (figures 1 and 3, A–E).

A *Vriesea debilis* Leme, cui affinis, inflorescentia saepe composita, laminis foliorum latoribus, bracteis floriferis inflatis, ecarinatis, floribus longioribus, petalis ligulis binis 6–7 mm longis differt.

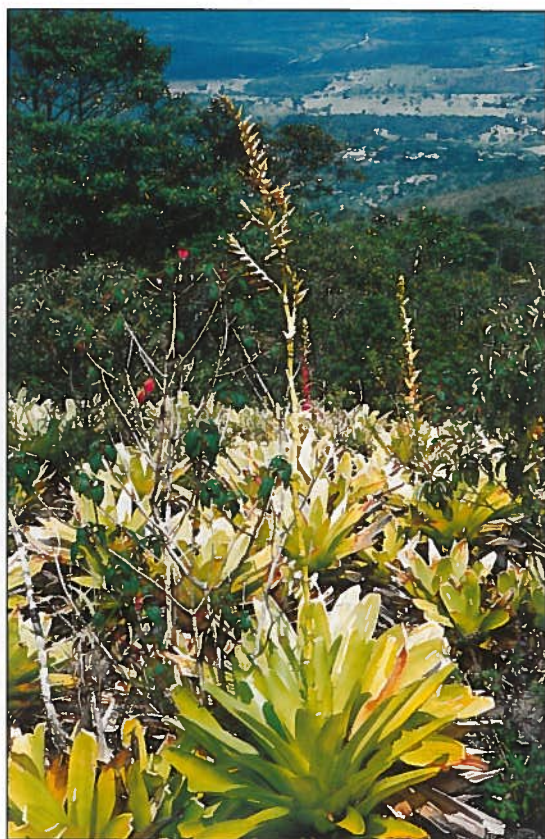
**Type.** Brazil. Bahia, Santa Terezinha, about 1000 m alt. *Roberto Menescal & Sandra Linhares s.n.* October 1994. (holotype HB, paratype HB, Nov. 13, 1994. *Sandra Linhares s.n.* (HB)

**Plant** epiphytic, flowering ca. 60 cm high; **leaves** 18–25 in number, rosulate, suberect-arcuate, forming a narrow funnellform rosette at base; **sheaths** elliptic, 9 × 5.5 cm, very inconspicuously lepidote on both sides, pale in color; **blades** sublinear, 20–30 × 2.5–3 cm, slightly narrowed at base, apex acute and apiculate, green on both sides, glabrescent. **Scape** 20–35 cm long, 3–4 mm in diameter, rigid, erect, green, glabrous; **scape bracts** lanceolate, acute and apiculate, enfolding the scape, 30–33 × 12 mm, green or straw-colored, finely nerved, slightly shorter to slightly exceeding the internodes. **Inflorescence** simple or laxly bipinnate, 25–35 cm long (when compound), suberect to erect; **primary bracts** resembling the scape bracts, red, distinctly shorter than the sterile bases of the branches; **branches** 3–5 in number, very laxly arranged, 18–22 cm long including the peduncle, suberect, spikes 10–15 × 2.5–3 cm. narrowly elliptic, apex acute, inflated, densely flowered at anthesis with 8–15 flowers, peduncle 8–12 cm long, ca. 3–4 mm in diameter, bearing many sterile bracts, the basal ones resembling the scape bracts but shorter, and the upper resembling the floral bracts, rachis completely covered by the bracts; **floral bracts** elliptic, 35 × 25 mm, broadly



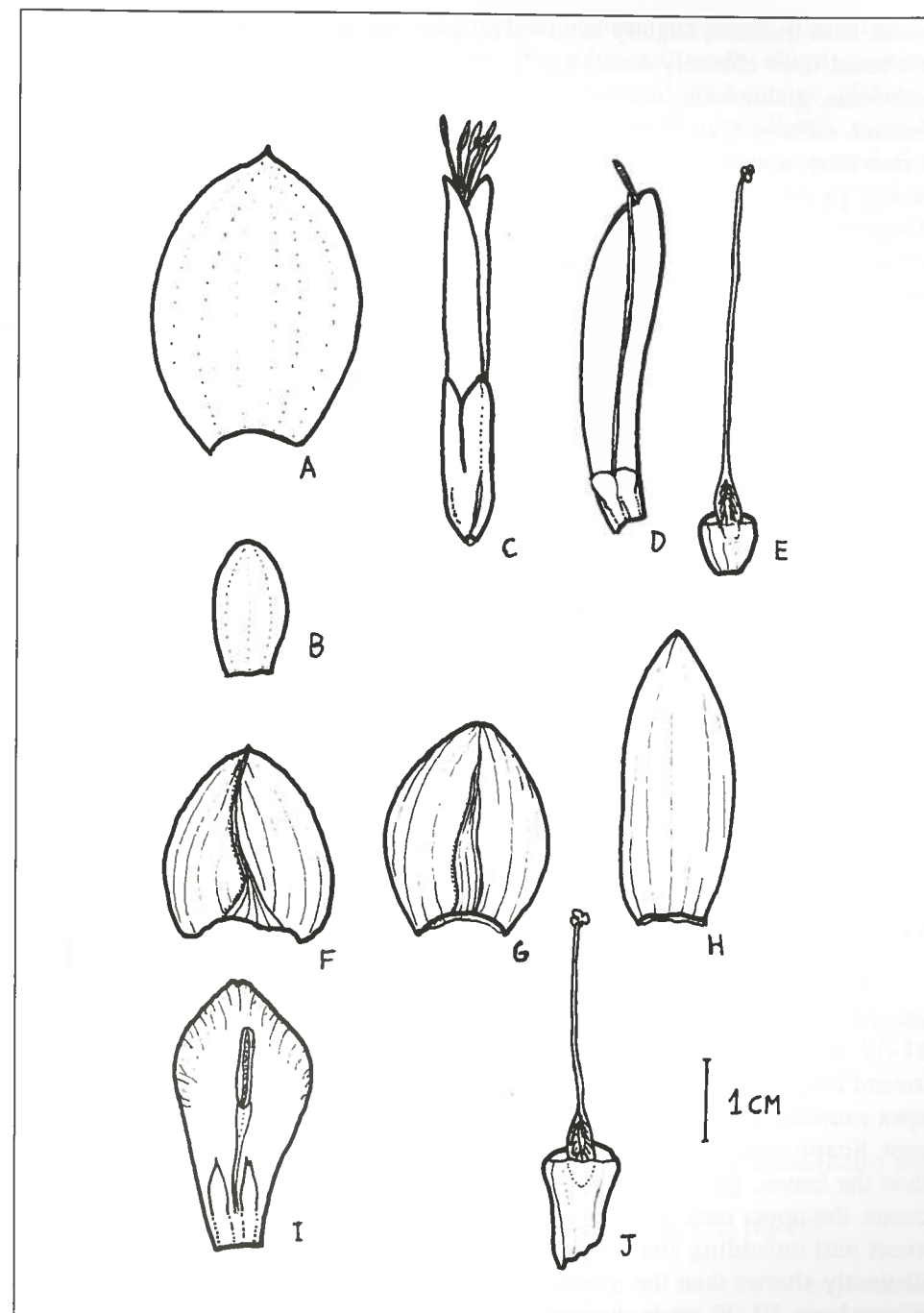
Elton Leme

Figure 1.  
*Vriesea sandrae*. This flowering specimen is shown growing in the shadiest, wettest part of the Atlantic Forest near Salvador, Bahia.



Sandra Linhares

Figure 2.  
*Vriesea bahiana*.  
The newly described species is shown in habitat.



Drawing by E.M.C. Leme

Figure 3.  
*Vriesea sandrae* (A-E): A) floral bract; B) sepal; C) flower; D) petal; E) cross-section of pedicel and gynoecium. *Vriesea bahiana* (F-J): F) basal floral bract; G) upper floral bract; H) sepal; I) petal; J) cross-section of pedicel and gynoecium.

acute, base truncate, slightly incurved at apex, corrugated when dry, ecarinate or the basal ones obtusely carinate near the apex, red, concave, inflated, densely imbricate, glabrescent, distinctly exceeding the sepals. **Flowers** distichous, not secund, suberect, ca. 5 mm long (including the stamens), pedicels stout, ca. 5 mm long; **sepals** oblong-elliptic, obtuse, 16 × 9 mm, light yellow, free, ecarinate; **petals** sublinear, apex narrowly obtuse to emarginate, 40 × 8–9 mm, bright yellow, bearing two suboblong, rounded, 6–7-mm-long appendages at base; **stamens** distinctly exerted; **anthers** linear, 5–6 mm long, base and apex obtuse, fixed slightly above the base; **style** slightly surpassed to equaling the anthers; **stigma** convolute-bladed, yellow.

This new species is closely related to *Vriesea debilis* from Espírito Santo State, differing from it by the usually compound inflorescence, the broader leaves, the ecarinate and distinctly inflated floral bracts, which give to the apical part of the spikes an almost cylindrical shape, contrasting with the complanate spike of the closest relatives, and by the longer petals bearing 6–7-mm-long appendages at base.

*Vriesea sandrae* was named after one of its collectors, the bromeliad lover, Sandra Linhares of Salvador, Bahia. It grows epiphytically in the shadiest, wettest parts of the forest at an altitude of about 1000 meters.

*Vriesea bahiana* Leme sp. nov. (figures 2 and 3, F–J).

A *Vriesea altomacaensis* Costa, cui affinis, vaginis foliorum manifesto atrobunneis, laminis foliorum latioribus, pedunculis ramorum ebracteatis, sepalis anguste ellipticis, longioribus latioribusque, petalis spathulatis basi ligulis binis 10 mm longis acuminatis vel bidentatis differt.

**Type.** Brazil. Bahia, Santa Terezinha, ca. 1000 m alt. *Sandra Linhares s.n.* (HB)

**Plant** rupicolous, flowering ca. 150 cm high; **leaves** 35 in number, rosulate, suberect, forming a broad and dense funnelform rosette; **sheaths** elliptic, 20 × 11–12 cm, densely and minutely brown-lepidote on both sides, dark castaneous toward base, very coriaceous; **blades** sublinear, 35 × 8 cm, not narrowed at base, apex rounded and very minutely apiculate, yellowish green, coriaceous, glabrescent. **Scape** stout, ca. 90 cm long, ca. 13 mm in diameter, erect, distinctly longer than the leaves, green, glabrous, sulcate when dry; basal **scape bracts** subfoliaceous, the upper ones ovate to suborbiculate, acute and apiculate, 4–5 × 3.5 cm, erect and enfolding the scape with exception of the suberect apex, green, distinctly shorter than the internodes. **Inflorescence** paniculate, laxly bipinnate, 60 cm long, 10–20 cm in diameter, erect; **primary bracts** resembling the upper scape bracts but smaller, 25–30 × 30 mm, yellowish, shorter to near equaling the sterile bases of the branches; **branches** 7–9 in number, 12–20 cm long, suberect-ascending, densely flowered at anthesis, with 10–17 flowers, peduncle ca.

30 mm long, ca. 7 mm in diameter, slightly complanate, ebracteate, rachis flexuous, ca. 5 mm in diameter, green, glabrous; **floral bracts** broadly elliptic to suborbiculate, 20–25 × 20 mm, obtuse, nervate when dry, yellowish orange, glabrescent, not enfolding the sepals and about equaling ½ of its length, slightly secund with the flowers, the basal ones carinate toward apex, apex slightly incurved, the upper ones ecarinate. **Flowers** distichous, probably nocturnal, suberect-secund at anthesis, ca. 45 mm long, pedicels stout, ca. 10 mm long, green, glabrous; **sepals** narrowly elliptic, apex narrowly obtuse or subacute, 35 × 14 mm, glabrous, free, ecarinate, orange; **petals** about equaling the sepals, subspathulate, apex emarginate, 34 × 18 mm, connate at base for ca. 3 mm, orange, bearing two narrowly lanceolate, acuminate or irregularly bidentate, 10 × 2 mm appendages at base; **stamens** distinctly included; **anthers** linear, ca. 10 mm long, base and apex obtuse, fixed near the base; **style** about equaling the petals; **stigma** convolute-bladed, densely papillose, yellow, ca. 2 mm in diameter; **ovules** long caudate.

*Vriesea bahiana* was named in reference to the Brazilian state where it was found. It is very closely related to *V. altomacaensis* from the state of Rio de Janeiro, but differs from it by the dark brown leaf-sheaths, the broader leaf-blades, the ebracteate, sterile, basal segment of the branches, the sepals narrowly elliptic, longer and broader, and by the spathulate petals bearing 10-mm-long, acuminate appendages at base.

Growing in the same area where *Vriesea sandrae* was collected, *V. bahiana* differs drastically from it in terms of ecological preferences. *V. bahiana* was found on the open summit of the hill, sharing the well-illuminated environment with a huge population of *Alcantarea nahoumii* (Leme) J.R. Grant, which dominates the scenery.

Rio de Janeiro, Brazil

#### ACKNOWLEDGMENT:

I thank the collectors Sandra Linhares and Roberto Menescal for providing flowering specimens for description as well as supplementary material for additional observations.

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# Some Wild Pineapples in Venezuela

Freddy Leal<sup>1</sup> and Ernesto Medina<sup>2</sup>

Illustrations by the authors

## INTRODUCTION

In 1889, Baker described *Acanthostachys ananassoides*, a species that Lindman transferred to the genus *Ananas* in 1891 as *A. microstachys* (Smith and Downs, 1979). Later, Schultes (1892) considered it variety *microstachys* of *Ananas sativus*. Bertoni (1919) also put it in *Ananas* but under a different species, *A. guaraniticus*. Smith (1934) brought it back to the rank of a variety when he proposed *Ananas comosus* var. *microstachys*. Finally, he described it as *Ananas ananassoides* var. *typicus* (Smith 1939), characterized by its long, narrow, recurving leaves and small, slender, seedy syncarp that easily breaks off from the top of the scape. It grows in poor soil of low, open bush land.

Baker and Collins (1939) carried out explorations in South America looking for wild and cultivated forms of pineapple and presented the distribution of their collections in an area located between 14° and 29° S and 39° to 59° W. These authors described *A. ananassoides* as the "most widespread of the species," representing the highest development of drought resistance within the genus, and growing in dry, poor soils of the Cerrado of the Brazilian Planalto.

Camargo and Smith (1968) described *Ananas parguazensis* on the basis of "its combination of retrorse foliar and bracteal spines and on its infundibuliform petal-scales."

In volume 12, part 1, BROMELIACEAE, of FLORA DE VENEZUELA, Smith (1971) listed only the type collection of *Ananas parguazensis* from southwestern border of the country; *A. ananassoides* from the States of Anzoátegui, Bolívar and Amazonas. He stated that the latter species grows "on poor, stony soil in Colombia, Venezuela, Brazil and Paraguay." However, in Smith and Downs, 1979, he retracted that statement, and transferred all the specimens included in the FLORA DE VENEZUELA as *A. ananassoides* to *A. parguazensis*. In the latter treatment the authors established that *A. ananassoides* grows in open and drier habitats than the rest of the species, from near sea level up to 1000 m altitude, in Brazil, Argentina, and Paraguay. In contrast, *A. parguazensis* is found in relatively humid habitats, 45 m to 1200 m altitude from Colombia to Surinam, including Amazonian Brazil.

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Figure 4.  
Geographic distribution of *Ananas ananassoides* and *Ananas parguazensis* according to Smith and Downs (1979) and collections of Leal *et al.* and Medina *et al.*



Figure 5  
*Ananas ananassoides*.  
Fruit from the Venezuelan types.



Figure 6.  
*Ananas ananassoides*.  
Fruit of the Brazilian types.

We have identified specimens collected in numerous sites in Venezuela as *Ananas ananassoides* or *A. paraguayensis* according to the descriptions of Smith and Downs (1979).

In addition, we have studied *Ananas* populations that are very difficult to be assigned to species because of the scant morphological information on *Ananas paraguayensis*, and also because some of the population looks like natural hybrids between these two species, especially when they grow in close proximity.

In this paper, we provide detailed morphological descriptions of *Ananas* specimens found in several sites of southwestern Venezuela that we consider to belong to either *A. ananassoides* or *A. paraguayensis*. We collected those specimens of wild *Ananas* species in the southern borders of the States of Apure, Anzoátegui, Monagas, and in the northern and central regions of Bolívar and Amazonas. We brought samples of flower and fruit, where appropriate, to the laboratory for further analysis and measurement.

#### GEOGRAPHIC DISTRIBUTIONS

The distribution of specimens registered in Smith (1972) and Smith and Downs (1979), and the collections of Leal and his associates (Leal and Antoni, 1981; Leal et al. 1986, and Medina et al. 1991) are indicated in figure 4.

It is clear that *A. ananassoides* has the wider range, occurring from southern Brazil and Paraguay to Colombia and Venezuela; while *A. paraguayensis* has been reported from the Orinoco basin in Colombia and Venezuela, to Surinam and Amazonian Brazil.

#### BOTANICAL DESCRIPTIONS

***Ananas ananassoides*. Herb**, over 1 m high, with a rosette of green, slender decumbent, narrow and long leaves, glabrous on the upper surface and with trichomes on the underside. **Leaves** to 1.6 m long, 2.5 cm wide, subdensely serrate, with minute, mostly antrose spines (ca. 3 mm) spaced 5–12 mm. **Scape** erect, slender (0.5–1.2 cm in diameter) covered with an indumentum; **scape bracts** foliaceous, imbricate and long (ca. 30 cm). **Inflorescence** subcylindric, bearing spiny floral bracts. **Floral bracts** (ca. 8 mm). **Sepals** broadly elliptic, obtuse, ca. 8 mm long. **Petals** 12 mm long and 5 mm wide, white-purple, each bearing two funnellform scales (figure 7). **Fruit**, a cylindrical syncarp, 10–15 cm long and 6–8 cm wide in the Venezuelan types (figure 5) with ovaries arranged in three spirals. Its open leafy crown is 8–10 cm long (totally different in the Brazilian types, figure 6); the flesh is abundant and palatable. **Seeds** numerous. There are few offsets and slips on the stem. Heavy, mature fruits bend their long scapes and reach the soil, fruits rot and the crown already in the soil develops into a new plant.

***Ananas paraguayensis*. Herb** ca. 90 cm high, with a rosette of many (ca. 25) stiff, green or pink leaves (according to the degree of water stress),

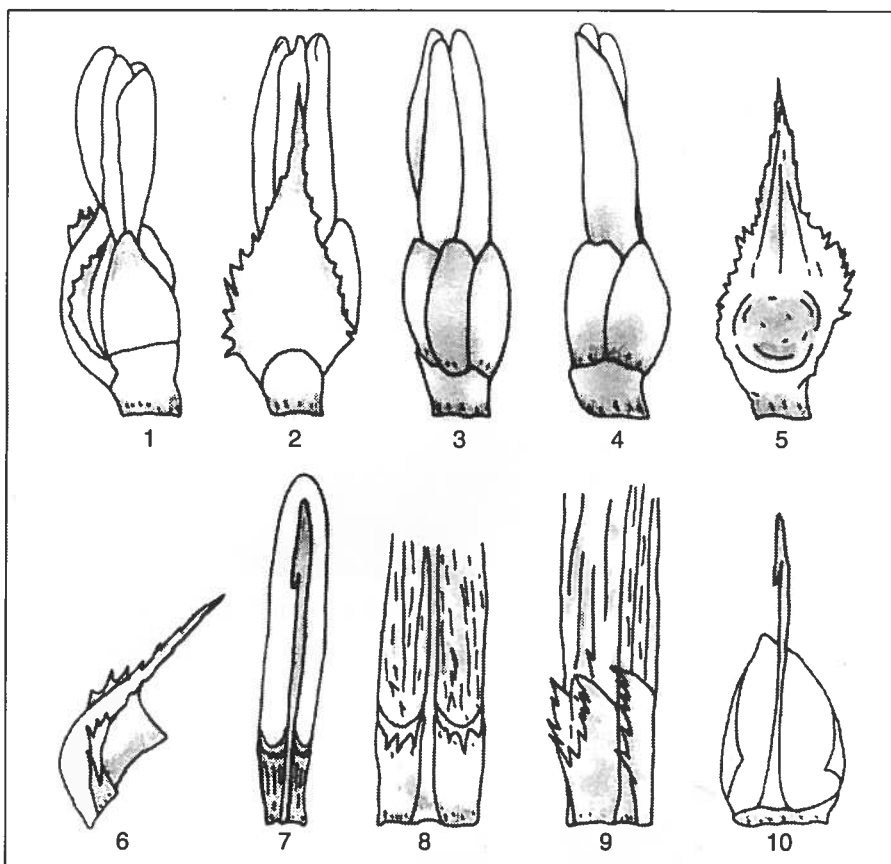


Figure 7.

Morphological characteristics of floral structures and bract of *Ananas ananassoides*. 1, Flower and bract, lateral view (6x). 2, Flower and bract, dorsal view (6x). 3, Flower, ventral view (6x). 4, Bract, lateral view (6x). 5, Bract, ventral view (6x). 6, Bract, lateral view (6x). 7, Petal, ventral view and stamen (6x). 8, Scales of the petal base, ventral view (12x). 9, Scales of the petal base, lateral view (25x). 10, Sepal and stamen, ventral view (12x).

glabrous on the upper surface, minute trichomes on the underside. **Leaves** to 1.2 m long and 3.2 cm wide, serrate, with retrorse basal spines, more resistant and less fleshy than those of *Ananas ananassoides*. **Scape** slender, elongate, at times decumbent (depending on fruit size) covered with indumentum; **scape bracts** foliaceous and numerous. **Inflorescence** globose, bearing small, entire, floral bracts. **Floral bracts** densely serrate with retrorse spines at base (figure 8). **Sepals** asymmetric ca. 7 mm long, green to bronze; petals ca. 12 mm long and 5 mm wide, pink to white, bearing 2 funnellform scales. **Fruit** 8–10 cm long and 6–8 cm wide; **berries** between 60–70, arranged in three spirals (figure 9). Its leafy crown reaches 30 cm in height, covered with antrorse and retrorse spines (ca. 3.5 mm long); the flesh is palatable, sweet-sour and extremely aromatic. **Seeds** few or none. There are few or scarce offsets or slips present on the stem.

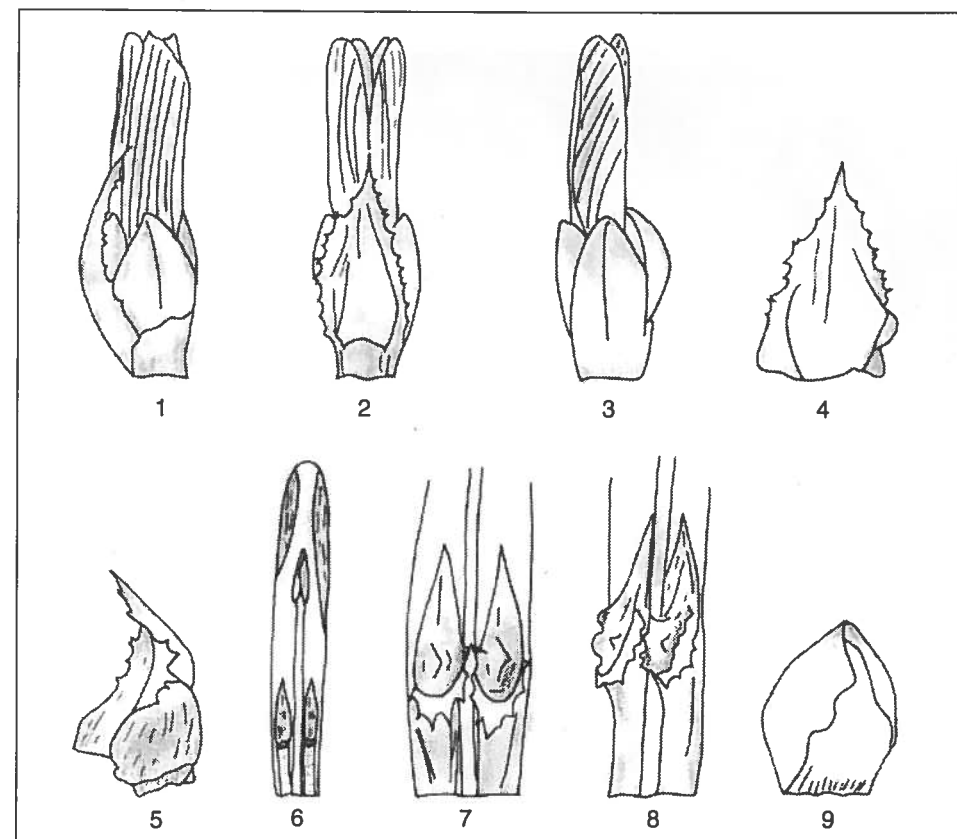


Figure 8.

Morphological characteristics of floral structures and bract of *Ananas parguazensis*. 1, Flower and bract, lateral view (6x). 2, Flower and bract, dorsal view (6x). 3, Flower, ventral view (6x). 4, Bract, ventral view (6x). 5, Bract, lateral view (6x). 6, Petal, ventral view and stamen (6x). 7, Sepal, ventral view (6x). 8, Infundibuliform scales of the petal base (12x). 9, Infundibuliform scales of the petal base, lateral view (25x).

## CONCLUSIONS

- *Ananas ananassoides* and *Ananas parguazensis* are very closely related species without differentiating floral characteristics. Only the general habit of the plants and the leaf morphology, wider leaves, and retrorse spines in *A. parguazensis* allow identification of morphotypes.

- In general, fruit shape is cylindrical in *A. ananassoides* and more spherical in *A. parguazensis*, also the fruit length is larger in *A. ananassoides* than in *A. parguazensis* and the leafy crown is larger in spread (> 20 cm) in *A. parguazensis* as compared to the one in *A. ananassoides* which is shorter (8–10 cm) and compact.

- In terms of ecology, it is possible to differentiate populations belonging to one or the other morphological type and that appear to differ in their physiological requirements. *A. ananassoides* normally grows in both partial shade and full



Figure 9.  
*Ananas paraguayensis*.  
Fruit from Venezuela.

sun while *A. paraguayensis* appears to be restricted to shadier environments. When the latter is found growing under full sun, it is always in humid habitats along streams in the rain forest. Water-stressed populations of *A. paraguayensis* develop leaves with a pronounced reddish color. *Ananas ananassoides* appears to have a higher water use efficiency than *A. paraguayensis*.

• Venezuelan and Brazilian fruits differ in

shape and crown development; so the question is raised: do they belong to the same species or are they different varieties of one species?

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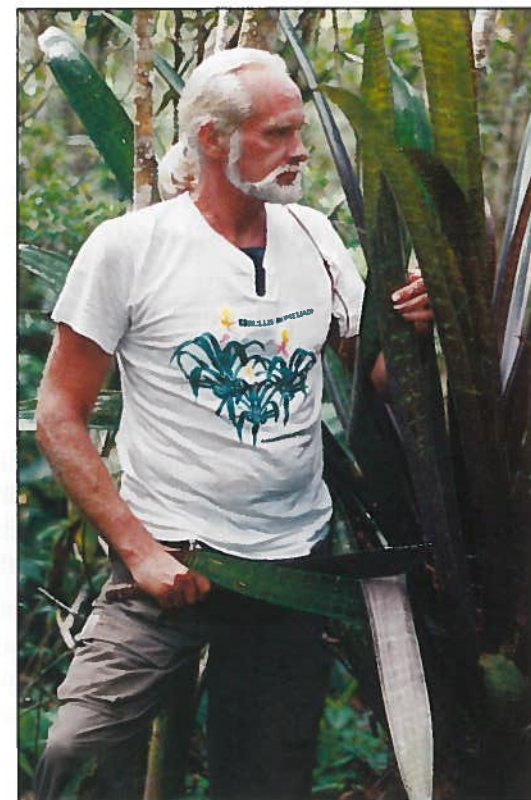
## The Discovery of *Guzmania bismarckii*

Lee Moore

I first encountered *Guzmania bismarckii* in the area of Moyobamba, Peru, 33 years ago, in 1962. At that time, Moyobamba was a tiny town of about 4,000 inhabitants that was accessible only by weekly flights—if it was not raining. The dirt airstrip was situated on top of a mesa in the middle of a long valley nestled between the forest-shrouded mountains. Once there, if it was raining, one could sit for a couple of weeks for a flight to get out again. The only way to and from the only rickety hotel was by foot with little boys carrying luggage in wheelbarrows. It could have been a town right out of a Tolkien storybook with a large, mystical-looking, sugarloaf mountain rising from the valley into the clouds. The quaint adobe houses were covered with moss over barrel tile roofs with clusters of orchids and bromeliads dripping down into the neat yards full of exotic fruit trees equally laden.

This town ceased to exist when, in 1967, it was destroyed by a giant earthquake. Today, with the cutting of a road from the coast, it has been rebuilt into a bustling town of 20,000. The road, which extends through Moyobamba to Tarapota and ends at Yurimaguas on the Huallaga River, has brought an influx of settlers and merchants. Today, there is a twice-daily jet service into the nearby town of Rioja connecting Moyobamba with Lima, Tarapoto, and Iquitos in a matter of minutes, a trip that took me over half a day in the past in the old prop puddle jumpers.

I found the first stands of *Guzmania bismarckii* on my first expedition from Moyobamba across the Mayo River and over two mountain ranges to an area known to the locals as "Jesus del



Author

Figure 10.  
Lee Moore with specimen of *Guzmania bismarckii* collected recently in the Moyobamba area, Peru.

Monte." I had found numerous patches of that species covering several acres each in deep forest cover growing on the ground in the jungle leaf humus. They were so thick that one could not walk through them without cutting a path with a machete. These were documented by photographs taken in 1962 for Bromeliad Society BULLETIN, volume 14, pages 33-37. In that publication they were referred to as *G. lindenii* because Dr. Lyman Smith mistook the herbarium material that I had sent to him between 1962 and 1964 for that species.

That misidentification was unfortunate for me since in 1965 after two major plane crashes I took a long leave from plant exploration to dedicate my efforts to pre-Columbian art and Maya ruins in Mexico and Central America. When I resumed my explorations for orchids and bromeliads in 1984 I found that my discovery had been named in honor of Klaus von Bismarck by Dr. Werner Rauh and described in Bromeliad Society JOURNAL volume 34, pages 114-116.

I was the first ever to explore the Moyobamba area for orchids and bromeliads. I established a small, rustic nursery near Iquitos to cultivate and identify the many discoveries that I had made in the Peruvian Amazon since 1958. That place served as a base of exploration giving me the opportunity to go to Moyobamba often. Since then I have made several hundred collecting trips to and around that area, which has produced many new species of orchids and bromeliads for me and continues to do so. I have purchased land surrounding the old municipal airport and plan to establish my home, nursery, and airstrip there.

*Miami, Florida*

## Recent Gifts to the Society

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

Broward County Bromeliad Society  
Dennis and Linda Cathcart  
Elizabeth Girko  
Ed Hartsell  
David Judge  
Marilynn's Gardens  
Barry Saures

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# ORLANDIANA 96

Twelfth World Bromeliad Conference • Orlando Florida

July 1-8, 1996

**B.C. McKinney**

I've been trying to entice you to ORLANDIANA '96 with a series of descriptive articles. My piece in the January-February issue was a general introduction. The March-April issue had me assuming that my first article was a smashing success, and you had decided "Let's go for it—the whole family." You knew all about bromeliad conferences, and you wanted to know about the hotel. Having done a superb job of that, I decided that in the May-June issue I would tell you about the major attractions for which Orlando is recognized world-wide.

Now in this issue, our registration chairman, Betsy McCrory, is tantalizing you with a registration form insert, and I'm following up with information about some of the interesting places you can visit that aren't so well known. I know that many of you, especially the Californians, have visited attractions similar to our major ones near your home. Others of you have visited Orlando previously and taken in one or more of them here.

You are plant people, so I assume that you are interested in nature. Right here in Orlando we have the Leu Botanical Gardens. This was the estate of Harry P. Leu, a man who loved and collected plants from all over the world. It was deeded to the City of Orlando some time ago and has been slowly developed. Recently, it took off, however, and the city built a beautiful new garden center where the Bromeliad Society of Central Florida meets monthly. It lured away the former director of the Atlanta Botanical Gardens, and he has plans for making this a world-renowned botanical garden.

Over in Tampa where you might visit to see Busch Gardens Dark Continent, there is a wonderful new Florida Aquarium. It takes more than a million gallons of water to tell the State's water story from underground springs to open sea. In planning the aquarium, the designers picked the most successful features from other aquariums such as those in Baltimore, New Orleans, and Monterey Bay, California.

Gatorland, "The Alligator Capital of the World," located between Orlando and Kissimmee (pronounced Kis-'sim-mee), is popular with tourists. You'll see thousands of 'gators in their natural habitat as well as other animals. Bok Tower Gardens, a gift to the American people from author and publisher Edward W. Bok, is located on Florida's highest point (898 feet) near Lake Wales. The tower houses a wonderful

carillon, and the surrounding gardens present thousands of blooming plants in season.

There is Cypress Island near Kissimmee where you can see exotic animals and take airboat rides and seaplane flights. Then there's Silver Springs near Ocala where you can tour the world's largest artesian spring formation by glass-bottomed boat and take jungle trips down the Silver River by boat and jeep. You Napa Valley, California, folks might like to look over your Florida competition, sample the product, and tour the facilities at Lakeridge Winery and Vineyards, Clermont.

Crazy about splashing around in water parks? Wet 'n Wild is just up International Drive from your hotel. It features the Stuka, a 76-foot, almost vertical, drop that sends you screaming down a water slide. Then there's Water Mania near Kissimmee and Wild Waters at Silver Springs. Not to be outdone, Disney World has come up with Blizzard Beach where you shoot feet-first down a 120-foot drop with no tubes, mats, or companions to hold on to. As the name suggests, it has a winter theme with everything covered with "snow."

If museums are your bag, we've got the Orlando Science Center and the Orlando Art Museum, both in Loch Haven Park, Orlando. For history buffs, there is the Orange County Historical Museum, also in Loch Haven Park. For you flyboys, we have Flying Tigers War Bird Restoration Museum at Kissimmee Airport.

If you have the urge (and the bucks), Carnival Cruise Lines and Premier Cruise Lines operate ocean cruises to the Bahamas and the Caribbean from Port Canaveral. On a smaller scale we have cruise ships offering trips from Sanford up the St. Johns River (it flows north!) to see Florida as it used to be. Locally, there is the Scenic Boat Trip on the Winter Park chain of lakes which offers a peek at the waterfront homes of our famous retirees and affluent citizens.

For just flat-out entertainment, restless kids (and their parents) will enjoy Fun 'n Wheels with everything from a ferris wheel to bumper cars to miniature golf. It's just up International Drive from your hotel. At Universal Studios Florida, you rock music fans can enjoy the food and sounds of Hard Rock Cafe Orlando which you can access without entering the park. Also at Universal is Nickelodeon Studios in which the kids can participate in shows being taped for television. Medieval Times in Kissimmee is a dinner theater where you can enjoy an 11th-century banquet (eating utensils hadn't been invented then) while you watch knights on horseback do fancy riding, jousting, then get down from their steeds and fight with swords. Splendid China offers tours of reduced-scale models of famous Chinese buildings. There is Chinese entertainment and Chinese food galore.

All right, sports fans, I didn't forget about you. There is the Orlando Predators pro-arena football at the Orlando Arena. Do we still have baseball? Yes! At Tinker Field, Orlando, you can eat your hot dogs and watch the Orlando Cubs, a farm team of the Chicago Cubs, battling other Southern League teams.

730 Springview Drive, Orlando, FL 32803-6932

## Two Unexpected Encounters and an Old Story

Jürg Rutschmann

*Confusions in synonymy are always*

*regrettable in science.* E.F. André, 1888

A few days before last Christmas—having returned the day before from a month's trip to Ecuador—I went down to the local supermarket to replenish the household stocks. When passing the flower corner, I could barely believe my eyes. There stood some bromeliad arrangements in china pots each consisting of a guzmania, a cryptanthus, some greeneries and a beautiful, very well cultivated *Tillandsia dyeriana*. I bought two at about 15 dollars apiece to rejuvenate my very aged group and to save them from almost certain death in the hands of inexperienced buyers. Later, I saw similar arrangements in other stores all over. So, some brilliant Dutch or German nurserymen had succeeded again in mass producing a formerly very rare and precious plant, as they had done some years ago with *Tillandsia wagneriana*.

Ten days before, my wife and I had been driving up the Río Jubones valley (figure 11) on our way from the hot Pacific coastal plain of Ecuador to Cuenca. That stretch, extremely scenic and interesting when we were there 15 years before, has suffered greatly by the building of a new highway, which has disturbed or destroyed most of the formerly overwhelming xerophytic vegetation on the wayside. The narrow valley would be a rocky desert were it not for the most complete cover of saxicolous bromeliads living on the fog coming in from the west on most days around noon. In the lower and moister part below about 1,000 m, *Tillandsia disticha*, *complanata*, *fendleri*, *cyanea*, and *Racinaea fraseri*, *multiflora*, and other species abound on the low bushes and the slopes. Higher up, where it becomes drier and very windy, the spectrum of species shifts to *T. tectorum* and *caerulea* that cover the steep mountain sides and basalt walls with large, silvery cushions and with the giant *T. secunda* and *T. mima* in between. Towards the top of the ascent *T. latifolia* var. *divaricata* takes over.

We were driving in the transition zone at about 900 m looking for the few places on the roadside where the vegetation had been left intact when I suddenly saw something unexpected. About 10 m above the road in a patch of undisturbed rocky slope among agaves and some other xerophytes there were several very showy, rosette-type bromeliads, 40–50 cm wide with brown- to purple-spotted leaves (figure 12). With difficulty, I climbed up and recognized the plants as very well developed *T. venusta*, some with inflorescences in seed. The surprise of this find was its setting. Based on the habit of the species I had always assumed it to

be an epiphyte of wet forests. Here it grew on the ground in a desert-like environment.

These two encounters reminded me of the old story about *Tillandsia dyeriana*, *T. venusta*, and *T. "rutschmannii"*. In the 1960s, tillandsia aficionados, among them Prof. Werner Rauh, Dr. Richard Oeser, Alfred Blass, and I occasionally received plants from Mrs. E. Naundorff<sup>1</sup> in Quito. One of the first plants to arrive was a species generally (and wrongly) regarded as *T. dyeriana* characterized by brown-spotted leaves, bipinnate inflorescence and white flowers. In 1965 I again got one of the exciting packages containing a different spotted species with tubular habit and bluish green, waxy leaves. It was later described as *T. brenneri* by Rauh. Mrs. Naundorff in her characteristic style called it *T. "pintada,"* the painted one, and wrote that it had been brought by a missionary from the Oriente near Macas. Among the adult "pintadas" was a small youngster which, though also brown-spotted, looked somewhat different. Therefore, I took special care of it and after three years the plant, having formed a narrow vasselike rosette of only a few leaves, flowered for the first time. It was a most unusual and striking sight with its simple,<sup>2</sup> brilliantly scarlet, nutant inflorescence, the white petals turning black after a day.<sup>3</sup> I sent a colour photograph to Prof. Rauh and later a flowering pup, noting that according to the provisional key of Dr. L.B. Smith in PHYTOLOGIA 1970 I had arrived at *T. dyeriana*, and asked for his opinion. The conviction that we knew very well what this species looked like was so deep-rooted that Rauh considered the plant to be new and apparently Dr. Smith, after having inspected a picture, agreed. So, in 1974, the plant was described as a new species and was named *T. rutschmannii* (1974).<sup>4</sup>

When the second part of the Smith-Downs monograph became available in 1977, we, of course, recognized the reproduction of the original drawing of André's *T. dyeriana* from his 1889 work. The record was set straight by Rauh's correction (1979), the identification of *T. "dyeriana"* as *T. venusta* by H.E. Luther (1982), and his final article on the two species in question in 1984.

So it came about that "my tillandsia" was condemned to the hell of synonymy. But all the same I still enjoy recalling the time when *T. dyeriana*, certainly one of the most attractive bromeliads known, flowered for the first time in cultivation in my collection. I still have descendants of the original plant although they seem to have lost some vigour in the course of all these years. They flower every winter and the stronger ones can be brought to produce two to

<sup>1</sup> Mother-in-law of Charley Hirtz (godfather of *T. hirtzii*) and grandmother of Alex Hirtz, the renowned explorer of Ecuadorian orchids and bromeliads.

<sup>2</sup> Very rarely with one or even two spikes.

<sup>3</sup> See J. Bromeliad Soc. 45:31 fig. 19 (1995), or ibid. 32 March-April cover (1982).

<sup>4</sup> As to the provenance of my original plant, I have no doubt that it came from the Pacific coast, perhaps Esmeraldas, where Mrs. Naundorff (it was reported) liked to go. It was then mixed up with the "pintadas" because of the superficial similarity in habit.

[text continued on page 167]



Photos by the Author

Figure 11.  
A general impression of the bromeliad vegetation of the Jubones valley including *Tillandsia secunda*, *T. minima*, *T. tectorum*, and *Puya* species.



Figure 12.  
*Tillandsia venusta* "on the rocks." Río Jubones valley, Azuay, Ecuador, ca. 900 m.

# The Resurrection of *Alcantarea*

Jason R. Grant

The following is the abstract of a paper published in *BROMELIENSTUDIEN* (Tropische und subtropische Pflanzenwelt, 91 (1995), *Akademie der Wissenschaften und der Literatur, Mainz*.

This is the first in a series of papers that will review generic limits in the Tillandsioideae. The intent is to circumscribe the boundaries of individual genera in order to develop a natural and phylogenetic system of generic-level classification within the subfamily. Here, *Alcantarea* (Morren ex Mez) Harms is resurrected to the generic rank from its previous subgeneric position under *Vriesea*. It is distinguished from *Vriesea* by its spectacular, linear-long fusiform, ephemeral, distinctly flaccidescient, spiralescent petals, the seeds with both basal and apical comas. The history, nomenclature, taxonomy, and generic relation-



Alice R. Tangerini

Figure 13.

*Alcantarea brasiliana* (L.B. Smith) J.R. Grant. Typical flower of *Alcantarea*. Note the conspicuously exerted pistil and stamens, and the linear-long petals that become flaccid soon after anthesis. Drawn life size from Read S.I #77-168.

ships of the genus are discussed. Ten species form the genus, eight of which are newly added:

*Alcantarea brasiliana* (L.B. Smith) J.R. Grant, comb. nov.

*A. duarteana* (L.B. Smith) J.R. Grant, comb. nov.

*A. extensa* (L.B. Smith) J.R. Grant, comb. nov.

*A. farneyi* (Martinelli & Costa) J.R. Grant, comb. nov.

*A. geniculata* (Wawra) J.R. Grant, comb. nov.

*A. imperialis* (Carrière) Harms

*A. nahoumii* (Leme) J.R. Grant, comb. nov.

*A. odorata* (Leme) J.R. Grant, comb. nov.

*A. retina* (Vellozo) Harms

*A. vinicolor* (Pereira & Reitz) J.R. Grant, comb. nov.

*Alcantarea* is restricted to the Brazilian states of Rio de Janeiro, Espírito Santo, Minas Gerais, and Bahia, the area of the center of diversity of *Vriesea*.

## Two Unexpected Encounters and an Old Story

[continued from page 165]

three pups in succession. I did not succeed in reproducing them from seed as my plants up to last Christmas were one clone and evidently not self fertile.

With the general introduction of *Tillandsia dyeriana* into horticulture, the problems with this species are solved. However, there remains an enigma in the group of Ecuadorian plants to which it belongs, namely *T. nubis* Gilmartin.

Is this a "good" species or is it identical with *Tillandsia hamaleana* E. Morren, also a very attractive plant with large blue petals? It was a favourite of Mrs. Naundorff who called it "palma del pair." I hope to live to answer this question based on the possible candidates growing slowly in my greenhouse.

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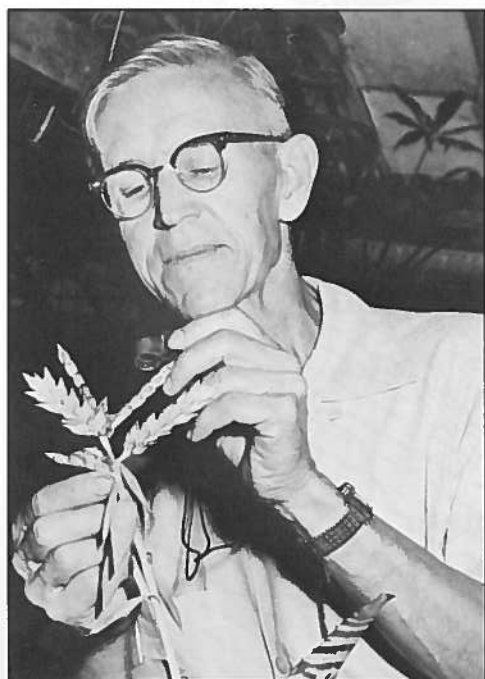
# BRAZIL

## (A Series of Reprints)

### PREFACE

Mulford and Racine Foster created their own monuments as plant explorers, horticulturists, hybridizers, and authors. Mulford was a founder and the first president of The Bromeliad Society, the first editor of the BULLETIN, and a lecturer. Racine was his helper in preserving wild plant specimens, keeping records, researching, and conducting world-wide correspondence. She succeeded Mulford as editor after having shared those duties with him during the first seven years of the BULLETIN. These may not have been their only achievements, but this list may attract the attention of new readers and remind long-term Bromeliad Society members who they were and what they did for the bromeliad world.

Victoria Padilla stated in her book BROMELIADS that Mulford Foster [with Racine's help] made bromeliads popular for the greenhouse, living room, and subtropical garden. She added that during his [and their] collecting trips to Mexico, the West Indies, and Central and South America he brought back over 200 bromeliads new to horticulture, a number of discoveries never before approached even by predecessors such as Humboldt, von Martius, André, and Glaziou.



ORLANDO SENTINEL STAR

Figure 14.  
Mulford B. Foster, 1888–1978

The book BRAZIL is the record of trips that they made to Brazil in 1939 and 1940. It was published by the Jacques Cattell Press, Lancaster, Pennsylvania, in 1945. As published, the title page says BRAZIL, but the publisher added the binder's subtitle "Orchid of the Tropics." It is obvious that he failed to understand what the book was all about. Racine was always unhappy with that meddling. We plan to reprint in this and successive issues of the JOURNAL pages of the book relating primarily to the Fosters' plant searches, how they prepared botanical specimens and recorded their work. There will be editorial notes from time to time to provide continuity but, otherwise, the material will be just as they wrote it.

This information is interesting in many ways. It is a record of how

different conditions were just fifty years ago: the environment, the problems of moving from place to place, and matters of living accommodations. It mentions people who helped the Fosters and provides answers to the basic question, why. As Racine wrote: "We do not go into the jungles seeking adventure or to get a 'thrill'. The plants guide our steps and our procedure is guided by their habitats. From it all we find an interpretation of the romance of the plants. Every plant gives us a thrill whether it be in your garden, our garden, or in a Brazilian jungle." Even as recently as this year, Harry Luther, director of the Bromeliad Identification Center at Selby Gardens, reread this book before returning to Brazil to explore for bromeliads. We, also, may expect to find useful information for ourselves and possibly some entertainment in these excerpts.

While it is possible that the entire book could be reprinted, it would have to be done without the valuable original photographs, which are not available. We will, however, reproduce here many of Mulford's drawings from the book.

The copyright of the book was transferred to The Bromeliad Society, Inc. on January 10, 1995 through the generosity of Racine's sister, Jeanne Sarasy Denny, the personal representative of her will. We are grateful to her and to Mulford's son Bert for their interest and cooperation.

Contrary to our usual editorial policy concerning permission to reprint material from the JOURNAL, no part of this text or illustrations may be reproduced in any form without the express written permission of the editor.—TUL



Figure 15.  
Racine Sarasy Foster, 1910–1991



In April, 1939, Mulford and Racine Foster sailed from New York City on the Norwegian cargo ship *Troubadour* to Rio de Janeiro and arrived there sixteen days later. They studied Portuguese and examined maps while sailing and thought about Dr. Lyman Smith's advice to explore the area around Ilhéos in the state of Bahia and his cautions about the difficulties of preparing specimens. On arrival in Rio, friends and acquaintances helped them get started. They visited the Museu Nacional, spent most of one day at the Jardim Botânico and waited, and waited for their collecting permits to be issued. During that waiting period they went to São Paulo by train to visit Dr. F.C. Hoehne (one of the original BSI honorary trustees), director of the Instituto Botânica and originator of the FLORA BRASÍLICA which was to include descriptions of the Fosters' new species. While still awaiting the permits, Dra. Bertha Lutz, who had been introduced by Lyman Smith, took them to explore the nearby restinga and that is where the collecting began.



Friend Bertha Lutz and two assistants from the Museu Nacional took us on our first collecting trip in Brazil. We drove along a fine beach and out into the country south of Rio into a section called Restinga. All about were huge granite rocks which appear to be devoid of any substance that would sustain plant life, yet on these, in the blazing sun, were flourishing delicate lichens, and several species of bromeliads and cacti.

It seemed entirely out of place to see thousands of *Tillandsias* with delicate white flowers clinging on these brutal rocks with hardly a crevice for a roothold or fissures for refreshing water to seep through. Yet, these sturdy but fragile-looking plants find their happiness in this habitat. The *Tillandsia puchella* in particular, with grey tomentose stiff leaves, sending forth into the glaring heat of the noon-tide, most delicate chaste white blossoms held by a series of lovely pink bracts, seemed cool and inconsistent with its surroundings, and its delicate self was near enough to the ocean to be swept by the destructive salt spray in high winds.

Mulford turned to Dr. Lutz and exclaimed, "Imagine having to cling to the perpendicular side of your own great granite tombstone all of your life and liking it!" Knowing that dislodgment meant death at the foot of this tombstone, because this plant has forgotten how to live in the earth.

Here too, was the beautiful *Billbergia amoena* with brilliant red flower bracts covering delicate, cool green, purple-tipped flowers. Its beauty was quite breath-taking and so harshly niched that we again and again raised our praise for the family Bromeliaceae who seemed to live on so little and give so much.

We had a long drive through the littoral before we actually came to the open beach and at noon stopped at the water's edge of the Atlantic where we had a splendid lunch which Dr. Lutz had thoughtfully prepared. Although lunch was brief it was too long for Mulford, who was skipping from one plant to another, sandwich in hand, eyes eager for every flower, unconcerned about relaxed eating.

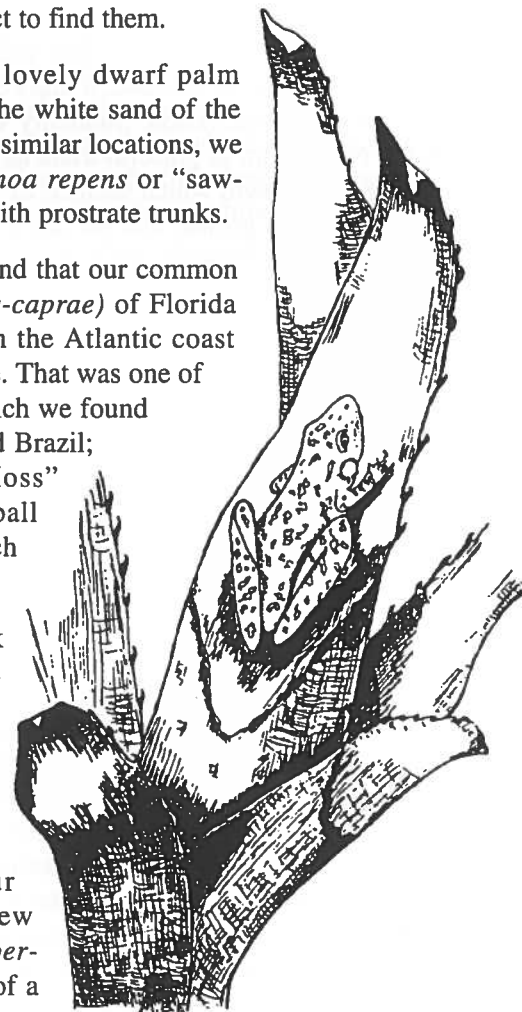
Several unexpected botanical oddities occurred here. *Schinus terebinthifolius*, or as we would call it in the States, "Brazilian pepper," grew right down to the front line "trenches" which might be sprayed with the waves of high tide. Then we found ourselves sitting on small stunted "Surinam cherry" plants (*Eugenia uniflora*) whose delicious tart red fruit is called "pitanga" by the Brazilians.

It was a friendly feeling to see some of the plants which grew in or had been adopted by our Florida gardens, growing down there natively in the pure white sand—a place we would least expect to find them.

*Diplothemium maritima*, a lovely dwarf palm without trunk, also grew there in the white sand of the ocean front. At home in Florida, in similar locations, we were accustomed to see the *Serenoa repens* or "saw-tooth palmetto," also a dwarf but with prostrate trunks.

Yet another surprise was to find that our common beach morning glory (*Ipomea pes-caprae*) of Florida had followed us all the way down the Atlantic coast and was at home the entire distance. That was one of the only three species of plants which we found that year native to both Florida and Brazil; the others were the "Spanish Moss" (*Tillandsia usneoides*) and the "ball moss" (*Tillandsia recurvata*) which had traveled by air.

Only a short distance back from the sea were the rocks where we were all soon busily engaged in our respective collecting. Dr. Lutz and the men were hunting for small frogs that live in the water-filled leaf cups of the bromeliads. This coincided nicely with our searches and started for us a new interest in bromeliads, the little *per-ereca* whose home is in the heart of a



bromeliad. Subsequently we found to be true what Dr. Lutz told us, "that most frogs like a deep, dark, narrow cylindrical habitation, hence bromeliads interest them. I believe bromeliads make frogs independent of climate and environment, by creating a special environment for them."

In many dry sections of the country, water-filled bromeliads were havens of refuge for the little frogs as well as many insects, toads, lizards and small snakes. We found that only certain forms of each type of fauna inhabited these "tank epiphytes." Here, near Rio, we were intrigued with *Hyla goeldi*, a bromeliad frog which carries her eggs on her back. Near the shoreline other bromeliads (*Quesnelia liboniana* and *Aechmea nudicaulis*) disclosed a casque-headed frog inhabitant, *Corythomantis brunoi*.

Some distance back of the rocky shore we explored in a nice swampy section of dense matted growth. We found ourselves entangled in a bramble that would out-bramble any thicket we had ever experienced or read about. Stout, thick thorns in every direction, vine-like growths twining and inter-twining, as tough and difficult to cut as bamboo; a mass of growth so thick and impenetrable that it defied human penetration. Suddenly we realized that it was a growth of *Bactris* palm. Not a palm of graceful trunk as we generally know them but one of vigorous, vine-like growth which seemed to lack beginning or ending, certainly the least like any palm growth that we had ever seen before. We have been torn and jagged trying to go through a thicket of "saw-tooth palmettos" in Florida, but in comparison that would be like walking through grassy meadows. This was one jungle we did not cut our way through; we went around.

As we proceeded to higher ground we came into a more open wood in which we found our first terrestrial orchid with beautiful variegated leaves and we were destined to find that same orchid (*Eulophidium maculatum*) growing not only on the coast but also in almost every interior section of Brazil that we visited.

New bromeliads and orchids appeared every little while as we took the ups and downs, the very wet with the dry, over that peculiar area which should be called a swamp-bramble. The great blue sea, the harsh granite mountains, distant islands rising out of the sea, noisy white sand which crackled with every step and fresh-water pools on the ocean's edge were mingled confusingly with countless new flora.

This was but a mild introduction to the diverse experiences that Brazil was to give us in the months to come . . .

To make up for some of the disappointments of [another day of waiting] we finished off the afternoon by going up the Corcovado, the "Hunchback" mountain, over 2,000 feet high, which we had seen from the boat and the Jardim Botânico. It is the highest mountain in Rio, whose summit is crowned with a beautifully executed monolithic statue of the Christ whose arms outstretched in a

paternal gesture of blessing over the city and harbor, give the statue the appearance of a great cross.

A cog railway carries passengers up the steep sides almost to the top, then an elevator lifts you the last hundred feet, where is seen a vast breath-taking panorama. The Bay and the mountains and the pulsing city all seen in perspective gave new meaning to the beauty of Rio. It was late in the afternoon and we saw all this vastness in the light of a setting sun. It was a rhapsody of soft nuances in light and shadow.

The next day we hurried through early morning *café* in order to meet Doutora Lutz and her assistants, this time for a collecting excursion near Petropolis, a city some distance from Rio outside of the Distrito Federal and high in the mountains.

We did not realize that this excursion would take us so high into the Organo Mountains, nor would we have believed that it could have been more tropical the higher we went. At about 800 meters above sea level we turned off the main road, drove a short distance and parked the car at the edge of a thick tropical jungle. We walked through boggy swamp land where cattails and sphagnum moss and high reeds abounded until we reached the lovely *Tibouchinas* covered with veritable showers of blooms ranging from white to royal purple. They formed almost an outer edge wall to the thick mass of growth beyond. A marvelous floral curtain of the jungle through which one could see vivid reds, orange and yellow blossoms of the bromeliads in the thick growth of trees beyond. Entering this fairyland we found the air gardens in the trees, festooned with fuchsias, ferns, philodendrons, gesnerias, with orchids, anthuriums and seemingly a thousand other epiphytic plants clinging to every limb and trunk.

Quite at home was the *Zygocactus*, or "Christmas cactus" as it is commonly called in the States, blooming profusely in the cool month of May, the beginning of Brazil's winter season.

Great was our surprise to find a plant which in appearance was for all the world like an orchid, having similar pseudobulbs, leaves and roots; but it was a *Philodendron (canefolia)*.

Near the ground were the *Billbergias*, *Nidulariums*, *Neoregelias* and *Aechmeas*, bromeliads, which seemed to have given up their hopes of living in the tops of trees and had been content to take what available space there was left below. Our eagerness to reach and collect these plants was very often dampened, and quite literally so, for there were deep mud holes welcoming the first misstep. Thin, climbing, tangled palms, and masses of unknown growth persuaded us to take our time; wrapped and twined around each other they silently and securely held you a prisoner and only the *facão* could free you. Here within an area of an

ordinary city block one could botanize and collect plants, finding more subjects than one would expect to find even in the wildest dreams.

This, then, was our introduction to a lush Brazilian mountainside jungle, truly an air plant paradise which contained more different species of bromeliads than we had ever expected to find in so short a time. Many of them we had seen in the botanical collections, in fact we had a number of them in our own collection at home, but it was a great satisfaction to find them growing natively. It reminded us of the first time we saw the poinsettia growing wild in Mexico. After seeing countless thousands of these plants cultivated in the States one would not imagine that another poinsettia plant could give much pleasure. But finding one growing wild you have a new sensation, the sensation of seeing something belonging where it grows. Maybe it's that same funny slant we have on other things. We have always enjoyed seeing people, but the primitive in his simple native setting has given us a greater thrill than to see the transplanted humans swarming in the big cities.

By dark we had gathered more bromeliads than we could carry comfortably. At the last moment, when it was already dark, some large bromeliads in bloom were discovered high above in a tree tangled with bamboo. And since Dr. Lutz desired specimens of the flower, and Mulford too was very anxious to get the species, he scaled up the tree monkey fashion and brought down a huge *Vriesea (philippo-coburgii)* brilliant with long red flower bracts and yellow flowers. It was a rough tree, and bamboo with sharp spurs was awaiting everywhere to catch the flesh. Unfortunately, he lost his footing on a slippery branch and although he did not fall far, he caught himself in such a manner that he burned his arm skidding over the rough bark. It made an ugly scar which lasted the entire trip through Brazil.

Such scars, however, soon pass and are forgotten; but not forgotten is *Vriesea petropolitana*, our first new species, named in honor of that beautiful city near by. This makes a record that will live on long after we and the scars are forgotten. Here also we found a new variety *vagans* (traveling) of *Vriesea philippo-coburgii* as well as a new natural hybrid of a *Vriesea* not yet named.

[To be continued]

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#### PLEASE NOTICE: INCREASE IN MEMBERSHIP DUES.

Effective 1 November 1995, the dues schedule (Standing Rule 12) will be increased in all classes except Life as follows: a) Individual: \$25.00, b) Dual: \$30.00, c) Fellowship: \$40.00, e) Commercial: \$55.00. Please add \$5.00 for international mail. For domestic and international airmail add \$10.00.

We are really sorry to have to make this change knowing that it will affect in particular the members overseas whose exchange rates are already a burden.—LH

## Esthetics and The Choice of a Vase

Inêz Braconnot

The idea of choosing a plant, growing it, and studying each detail of the species individually requires special attention as to how it should be displayed. The result should be a harmonious marriage between the vase and the plant. It does not matter how beautiful the vase is in shape or color; what matters is that it form an integrated whole and complement the beauty of the bromeliad.

Choosing a vase for your bromeliad is just as important as choosing a frame for a picture. Its shape, size, and color depend on the shape, size, and color of the plant.

Any kind of sturdy recipient can be used as a vase. Preference should be given to those made of natural materials such as clay, hard-shelled fruits (coconuts, Brazil-nut fruits), tree bark and stones. Tree fern fiber should not be used because this arborescent fern from southern Brazil is an endangered species.

The "rule of thirds" is valid for bromeliads. Based on this rule, the base should not be more than one-third as tall as the plant and it also should not be over one-third the width, with a few rare exceptions. Bromeliads with full rosettes and recurved leaves, which form a ring atop the base, should be placed in a recipient that is tall enough to keep the lower leaves up off the supporting surface (floor, table, etc.), at a distance equal to about one-third the height of the plant.

Vase color should contrast to that of the plant. Therefore, a green plant should never be grown in a green vase. An interesting pattern is formed by hues that simulate the colors of tree bark and earth, as is found in nature. Vase color should complement plant type. A robust plant with dark leaves should be placed in a plain, sturdy vase, while a delicate plant with muted colors requires an equally delicate vase. Bromeliads like those of the genus *Cryptanthus*, for example, are usually low plants, resembling starfish. They are more esthetically pleasing when planted singly or in groups in shallow vases or trays.

Reprinted from *Bromélia*,  
the magazine of  
*Sociedade Brasileira de Bromélias*,  
volume 1, number 3,  
September 1994

## *Tillandsia eizii*; an Ornithophilous Plant

Robert Guess

*Tillandsia eizii* L.B. Smith is an epiphytic bromeliad that grows in oak and pine forests of highland Chiapas, Mexico, and northwestern Guatemala. It is a species that thrives in moist, cool areas usually at altitudes varying between 1200 and 2500 meters. It depends solely on seed production and dispersal for its survival. An adverse condition is that the Maya Indians of the region gather and use the striking inflorescence for adornment in their religious ceremonies. Many specimens are also collected for sale in urban centers. In the process of a long-term study of this plant, I have observed hummingbirds pollinating its flowers thereby confirming ornithophily in the species.

The specimen plants used in this study were inspected for development *in situ* at 2250 meters elevation near San Cristóbal de Las Casas, Chiapas. As they approached maturity, they were selectively removed from their forest habitat. Each plant was carefully placed in an undisturbed, secure area with environmental conditions comparable to those from which they originated. The plants developed normally through their reproductive phases, progressing from inflorescence growth, flower development, anthesis, pollination, to seed formation and dispersal.

As flowering began (figure 16), two species of hummingbirds, considered common, year-round residents of the region, carried out pollination: the White-eared Hummingbird (*Hylocharis leucotis*) and the Magnificent Hummingbird (*Eugenes fulgens*). These two pollinators visited *Tillandsia eizii* flowers on an almost daily basis during the most productive flowering months of December through February. They usually appeared in the early morning hours and one to two hours before sunset.

*Hylocharis leucotis* is a relatively small hummingbird measuring 9 cm in length. In contrast, *Eugenes fulgens* is large for a hummingbird often reaching a length of 12.5 cm and having a relatively long, curved bill. Both species habitually approached the extended violet flowers of *T. eizii* with minimal hovering or timidity. Both are extremely territorial and interact aggressively whenever they encounter one another while foraging, especially *H. leucotis*. At least one of these hummingbirds, *E. fulgens*, has used seeds from dried *T. eizii* plants for nest lining (figure 17).

Once the inflorescence of *T. eizii* dries and the capsules rupture, the liberated seeds are widely dispersed in the environment. Trees in the general vicinity of dried plants usually exhibit seeds clinging to areas of rough bark or in crevices. When the inflorescence is cut and removed from the plant body before seed dispersal, as frequently occurs, its natural reproductive cycle is terminated. Thus, widespread harvesting of these inflorescences by the Indians as well as the destruction of forested areas pose a problematic issue for the survival of this species.

P.O. Box 1176, Santa Barbara, CA 93102-1176



Figure 16.  
Mature *Tillandsia eizii*  
with flower.

Photos by Author



Figure 17  
Nest of Magnificent Hummingbird (*Eugenes fulgens*) lined with  
*Tillandsia eizii* seeds.

## Regional Reflections

### Seeds and Seedlings

Andrew Flower

Waiting for Seed—Oh!

Somebody once translated a rather aimless Samuel Beckett play as "Waiting for Godot." I doubt whether the play's deep and subtle meaning sheds much light on human nature, but it does have a plot line similar to that which may befall the unwary who might wait for tillandsia seed to mature. The play involves two blokes who spend their time waiting for old Godot to arrive—which he doesn't! The same can happen if you wait too long for tillandsia seed to mature; it is often the case in cultivation that by the time the seed capsule opens the seed has died of old age. I have found with a number of tillandsias that naturally released seed will not germinate but if I collect the seed from unopened pods, the seed does germinate. Examples this summer have been *Tillandsia albida*, *elizabethae*, *fasciculata*, *makoyana*, and *pamelae*.

Here are the germination results with seed from *T. pamelae*:

941034	several pods, naturally opened, brown seed	0
951049	several pods, naturally opened, brown seed	0
951059A	pod still dark green, shiny, some separation between ovaries, seed 3 mm, fat, testa smooth dark red. Picked and opened while still green	0
951059B	pod duller green than A, few seed, brown, 1 mm	0
951059C	pod as A, seed brown in one ovary, dark red in others	1
951059D	pod as A, only 6 seeds, dark red and fattish	0
951059E	pod opened naturally, seed all brown and small	1
951060A	pod dullish green going brown, seed brown & dry	0
951060B	pod as 951060A, seed brick-red and fat, 3 mm	80%
951060C	pod as 951060A, seed brick-red and fat, 3 mm	100%
951060D	pod as above, seed fractionally darker red	80%
951068	20 pods, artificially opened and red, fat seed selected from about 6 of them	100%

When *T. pamelae* was flowering in December 1993 we cross-pollinated some flowers with *T. bourgaei*. Many of the remaining *T. pamelae* flowers were hand-pollinated from other *T. pamelae* flowers. The first seed pods opening naturally were *bourgaei*-pollinated and were sown as lot 941034 on 24/12/94.

When some selfed pods opened, they were sown as lot 951049 on 9/1/95. All these seeds were thin and brown, and when nothing germinated we figured we had better try some green pods or the plant might be lost altogether. On 22/1/95 I sowed the 5 selfed pods 951059A–E and the 4 hybridized pods 951060A–E. Whilst only 2 seeds germinated in the 951059 lots, the virtually full germination in the 951060 lots was sufficiently encouraging to prompt us to pull the remaining selfed pods off plant, and I sorted out the seeds that still looked "right," i.e. brick red, and nice and plump. Some of these I sowed on 4/2/95 as lot 951068 and the remainder went into the seed bank

I assume that these plants must mature their seed more quickly in their native habitats. Perhaps those that flower in the summer mature their seeds in the following autumn? Does anyone have any information on this?

Reprinted from *Bromeliad Society of New Zealand, Inc. Bulletin*, February and March 1995.

### Navia Propagation

The BSI Seed Fund has recently been offering *Navia* seed again so it is timely to offer some observations on my attempts to raise *Navia splendens*. Bromeletter<sup>1</sup> reprinted an article by Peter Franklin on his experience with what seems to be the same batch of seed I tried (from the BSI in November 1991).

Apparently we raised our seed in rather similar ways. We both had very good germination rates, sowing the seed in controlled, warm, moist environments indoors, and both struck problems when we moved the small plants out into our greenhouses. Unfortunately all Mr. Franklin's plants rotted off, a disaster he attributed to the temperature dropping below 10 degrees (presumably Celsius). I wonder... perhaps soil mixture and/or light contributed?

Not long after I moved my plants out to the greenhouse in April 1992, having potted the stronger ones on, they, and some "Pitcairnia species nova" seedlings also from BSI seed, showed signs of stress. Memory is not good, note-taking failed, but I think the first symptoms were leaf tip dieback, followed by eventual rotting off in the center of the plants. I moved the two *navia* survivors under the bench along with a dozen *pitcairnia*s. I did this because my assumption was they were receiving too much light (23,000 lux on a clear day at noon)—reinforced by some habitat photos of *navia* where they seemed to be almost growing in the dark.<sup>2</sup> A few of the plants moved under the bench (10,000 lux at the same time as the above-bench reading) were too far gone and died off soon

<sup>1</sup> Journal of The Bromeliad Society of Australia, Inc.

<sup>2</sup> F. Oliva-Estevé and J.A. Steyermark, *Bromeliaceae of Venezuela* (1987), 332-254.

after, but the remainder including the two navias survived and in the late spring of 1992 began to show growth again. This despite greenhouse temperature falling to a minimum of 5° C in May, and an average nightly minimum of 8° C for May and June 1992. None of these seedlings was watered until November '92. The pitcairnia seedlings left on top of the bench all died off. Winter temperatures were about 2 degrees warmer in 1994, by which time the navia were the same size as the pitcairnias, about 25 cm diameter and off-setting. Then, disaster! In the late spring of 1994 both navia rotted off and died—I think because I watered them too soon. They, and the pitcairnia appear to be very intolerant of wet feet even during the warmer months so for the survivors I water their soil very infrequently (once or twice a season only) and just hose them briefly from overhead once or twice a week when it is warm.

Suggestions: Once navia seedlings have reached their second growth stage and are ready for pricking out, grow them on moderately shaded (about 10,000 lux or 1,000 foot-candles maximum) and be very conservative with the water around their roots. Regarding temperatures, I think they will be O.K. at something less than 10° C provided they are not watered AT ALL during late autumn/winter/early spring in cool or moderate climates.

*Reprinted from Bromeletter March/April 1995.*

*Mr. Flower, as mentioned before, is editor of the BULLETIN of the New Zealand Bromeliad Society and custodian of that seed bank. His address is P.O. Box 11-375, Manners Street P.O., Wellington, New Zealand.*



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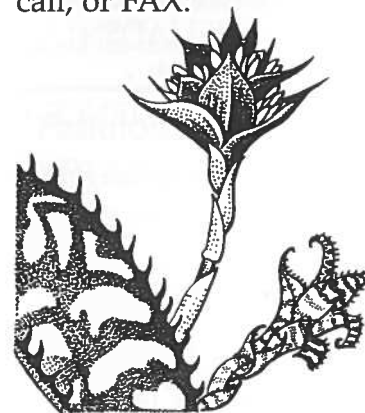
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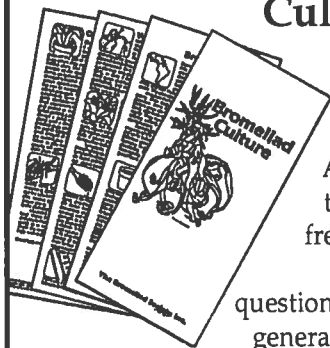
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Membership and subscriptions to the JOURNAL: Please see inside front cover.

Mulford B. Foster Bromeliad Identification Center: Send specimens and contributions to Harry E. Luther, at the Center, The Marie Selby Botanical Gardens, 811 South Palm Ave., Sarasota, FL 34236. FAX: 813-951-1474.

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Robert Guess

An example of *Tillandsia eizii* inflorescences cut for sale on the streets of San Cristóbal de Las Casas, Chiapas.

## Calendar

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|----------------------|--|
| 14–17 September      | 5th Annual International Cryptanthus Conference and Bromeliad Guild of Tampa Bay Annual Show. Wyndham Harbour Island Hotel, Tampa, Florida. Early registration \$65 (until June 30), \$85 after June 30. Registration includes auction, tours, banquet, seminars and more. Lyla Shepard, Registrar, 4703 S. Renelle Drive, Tampa, FL 33611. 813-839-4791.                                |
| 23–24 September      | River Ridge Bromeliad Society 14th Annual Show and Sale. City Park Botanical Gardens, Victory Ave., New Orleans, Louisiana. Show hours: Saturday, Sept. 23, 1 p.m. -5 p.m.; Sunday, Sept. 24, 10 am -5 p.m.; Sale hours: Saturday, Sept. 23, 10 a.m. - 5 p.m.; Sunday, Sept. 24, 10 a.m. -5 p.m. Tom Aldridge, 504-833-9859.   |
| 30 Sept. – 1 October | 24th Annual Southwest Bromeliad Guild Show and Sale. Host: Tarrant County Bromeliad Society, Fort Worth Botanic Garden Center. Green Oaks Inn, Fort Worth, Texas. Registration \$35 includes show entry, banquet, auction and tours. Show hours: Saturday, 1 p.m. -5 p.m.; Sunday, 1 p.m. -5 p.m.; Sale Hours: Saturday, 9 a.m. -5 p.m.; Sunday, 1 p.m. -5 p.m. Flo Adams, 817-467-7500. |