Journal of The Bromeliad Society

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Victoria was born in San Francisco, but moved as a young child with her family to southern California. Although without professional training in the plant world, she was recognized as an authority of the family of bromeliads and she always explained that she was a horticulturist and not a botanist. No individual has contributed more to the amateur grower about bromeliads, orally and in writing, than Victoria.

In 1927 Victoria graduated from the University of California at Los Angeles and received a Master of Arts degree in 1933 from the University of Southern California. By profession Victoria was an educator, she taught secretarial science from 1938 to 1940 at Los Angeles City College and later taught secretarial science, music, business, and English in various junior and senior high schools in Los Angeles. In 1949, she returned to City College to become an instructor in secretarial science and English until she retired in 1969.

As an active member in the Southern California Horticultural Institute for many years, Victoria served as its executive secretary from 1956 to 1971. At its annual meeting in 1972 the Institute presented its highest award to her for outstanding contributions to southern California horticulture.

In 1961 the University of Caliornia Press published her *Southern California Gardens*, sponsored by the Southern California Horticulture Institute. This extraordinary, illustrated history of horticulture and personalities associated with southern California has become a much sought-after classic by horticulturists and scholars.

When The Bromeliad Society was founded in 1950, Victoria was present and contributed many suggestions toward the formation of the basic structure of the Society. She was the Society's first secretary, and from 1960 through 1980 was the editor of the *Journal of The Bromeliad Society*. Many articles referring to bromeliads in the *Journal* and several other national publications such as *Pacific Horticulture*, *Horticulture*, and *American Horticulturist* were contributed by Victoria. She was also an honorary trustee of The Bromeliad Society.

While editor of the *Journal*, Victoria took time to produce several books. The first, *Bromeliads in Color and Their Culture*, was published by The Bromeliad Society in 1966. This book consisted mainly of a collection of important and interesting articles published in the *Journal* up to 1965. The book has long been out of print and is now a scarce collector's item. Her next book *Bromeliads* was published at her own expense and has become a classic for the amateur bromeliad collector and grower. This book has gone into a number of editions and has recently been republished as a paperback. The third book, *The Colorful Bromeliads*, she called a "coffee table book." She always thought it would be appropriate to have a publication showing a number of beautiful color plates

Fig. 2: Victoria Padilla in her garden, a portrait first published in the November-December 1982 *Journal*.

exhibiting the many colors and textures displayed by the various bromeliads. Victoria assisted in the publication of the Bromeliad Society's *Cultural Handbook* and she compiled and wrote both *A Bromeliad Glossary* and the *International Checklist of Bromeliad Hybrids*. A few weeks before she died, Victoria had completed and submitted the Bromeliaceae section for the revision of Marie C. Neal's *In Gardens of Hawaii*. Horace Clay of Hawaii asked Victoria to contribute the bromeliad portion of the revision as bromeliads have become extremely popular in Hawaii and numerous new species and hybrids have been added since the last revision in 1968.

After retiring as editor of *The Journal of the Bromeliad Society*, Victoria became an enthusiastic volunteer and fund raiser for the prospective new addition to the Brentwood Branch Library in West Los Angeles. Her love of books culminated in her being elected to the presidency of the Friends of the Brentwood Library, a position she held until shortly before her death.

Victoria Padilla was an enthusiast, an educator,

a writer, a lecturer,

a plant collector, a horticulturist,

and a friend.

Los Angeles, California

Ave atque Vale!

Racine Foster

For thirty-six years (1950–1986) Mulford and I had a steady correspondence with Victoria Padilla. The first ten years covered the problems of the fledgling Bromeliad Society and its fledgling *Bulletin.* In those difficult years she never failed to give us encouragement and support, "we must keep the *Bulletin* going" was her constant admonition.

In the changeover she became the editorial secretary, but soon was given full authority, without pay, as editor in which capacity she served for twenty-one years, working with devoted fervor and loyalty to the cause of bromeliads.

She steadily produced articles for our Society's publication. In consulting Clyde Reed's *Index to the Bulletin and Journal of the Bromeliad Society,* I find there are six full pages listing over 350 articles and editorial comments by her, more than anyone else!

In addition to the several books detailed in Elmer Lorenz's memorial in this issue, she wrote long articles for other magazines such as the historical record of bromeliads in American horticulture reprinted from *American Horticulturist* in the January-February 1985 *Journal.*

How could she produce so much when during many of those years she was teaching in Los Angeles City College, and in later years caring for her bedridden mother, both time-consuming jobs.

Victoria initiated the idea of the Bromeliad Identification Center at Selby Gardens, which became a memorial to Mulford B. Foster. She made the major change in the title of our publication from the informal *Bulletin* to the more formal *Journal* (January-February 1971). Also, she gave the *Journal* that fine edge of quality by introducing color photography which up until her efforts had been prohibitively expensive.

The last article that Victoria wrote for the *Journal* (March-April 1986) probably expresses best her long-time interest and devotion to bromeliads. She lovingly enjoyed recording the progress of seedlings as they matured from seed sent from Germany by Walter Richter thirty years before. She gloried in their colors even without flowers, but thirty years later had the reward of flowers. Amazing that she kept those records so that out of "nothing" she produced an interesting article.

Mulford Foster was the first to name a plant in her honor. His cross of *Tillandsia ionantha* with *T. brachycaulos* produced a vigorous, highly colored cultivar *T.* 'Victoria'[1,2] which will forever remind the bromeliad aficionado of her long and sustained devotion to bromeliads.

Victoria, we salute you and tearfully say farewell.

NOTES:

1. *Bromeliad Society Bulletin* 6:10; 1956. *Bulletin* 16: cover color photograph; 1966. *Journal* 23: back cover color photograph; 1973.

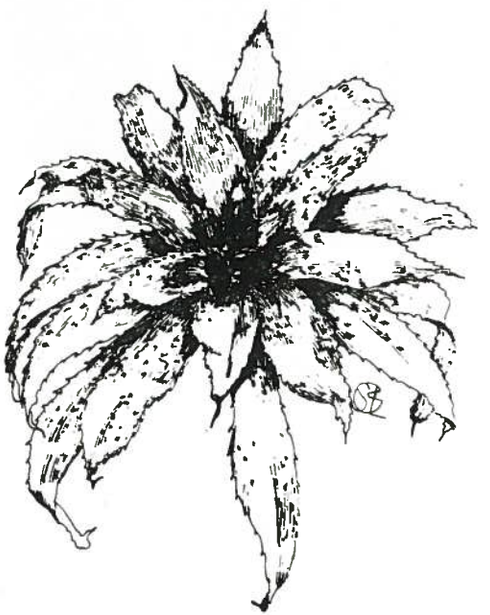
2. One or two other bromeliads carry the name "Victoriana," but these were named for the city in the state of Éspirito Santo, Brazil, near where the plants were found.

[Dr. Werner Rauh dedicated Guzmania victoriae *to Miss Padilla in his* Tropische und subtropische Pflanzenwelt *18:24-27; 1976.]*

Orlando, Florida

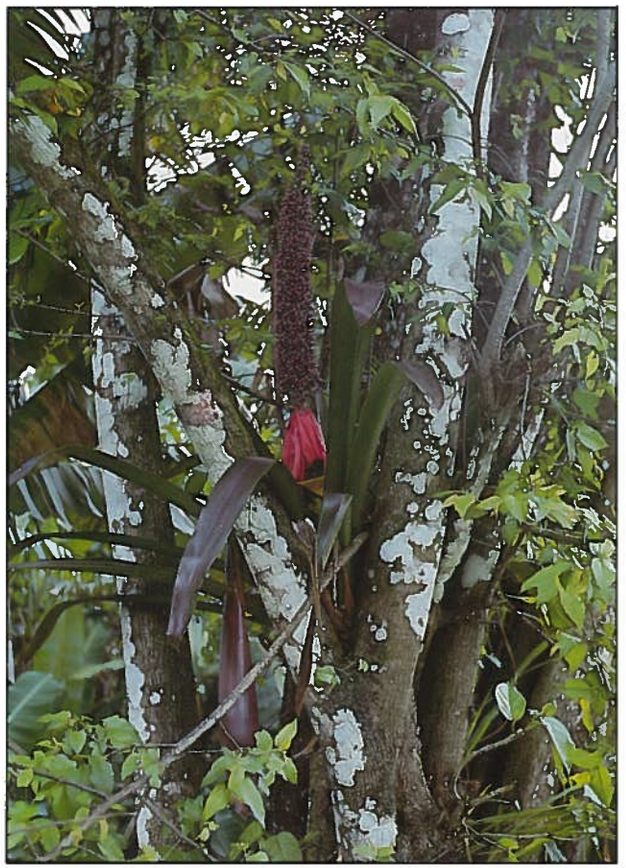
THIS VOLUME, NUMBER 37, IS GRATEFULLY DEDICATED TO THE MEMORY OF MISS PADILLA whose twenty-one years as editor remind us of her devotion to the Bromeliad Society and its purpose. The editor will be pleased to receive for possible publication any tributes and reminiscences in her honor.

—TUL



Icones Bromeliacearum IV:
Aechmea paniculigera

Robert W. Read



Author

Fig. 3: Aechmea paniculigera (Swartz) Grisebach, collected by Dr. Robert W. Read near Cave Valley, Jamaica, in 1966.

Scientific illustrations prepared in support of the publication of a new species or of information new to science are of many sorts. Line drawings, etchings, woodcuts, engravings, halftones, and full color lithographs have been used at one time or another. For the sake of example and variety, we take this opportunity to illustrate not only a method of illustration common to scientific literature, but to give an example of pitfalls that we often meet.

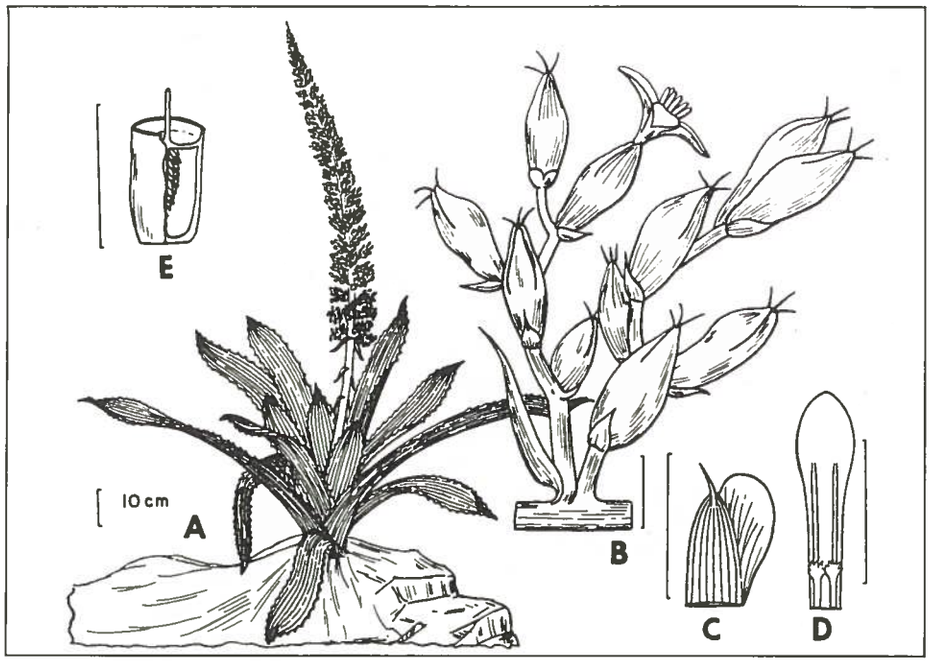


Fig. 4: Aechmea paniculigera (André 1753): A. habit; B. branch of inflorescence and bract; C. sepal; D. petal; E. section of ovary.

Aechmea paniculigera (Swartz) Grisebach, depicted here in figure 3, is a fairly common species in Jamaica. The parentheses in this authority citation indicate that Olof Swartz was the first author to treat or name the species which he called *"Bromelia paniculigera."* The name following the parens indicates the person who transferred the species to the presently accepted genus, hence the name as it appears above.

The Smith and Downs monograph (1979) lists eight synonyms for *Aechmea paniculigera* including *A. columnaris* André, from Colombia. In this regard, André (1889; 1983) stated: *"A. paniculigera,* which is close to our species [that is, *A. columnaris*], is easily distinguished from it by large bract-like leaves at the base of the panicle, by leaves with very fine spines, and by purplish red flowers, etc." But, specimens at the U.S. National Herbarium do not support these apparent distinctions.

However, the illustration labelled *"Aechmea columnaris"* drawn by Varé from a watercolor by André appearing in the foreword of the 1983 American edition of André and in volume 25 (1878) of *L'Illustration Horticole* exhibits rather small bracts at the base of the inflorescence and exceptionally large marginal teeth on the leaves. These characters appear also in figure 627 A-E (page 1854) of Smith and Downs (1979) labelled *"Ae. paniculigera"* (figure 4).

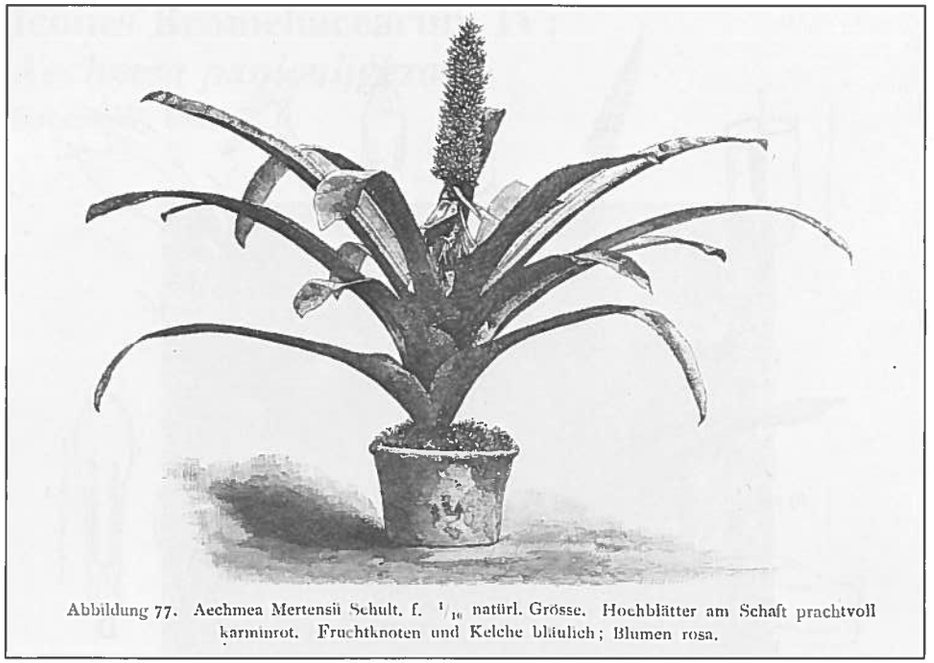


Abbildung 77. Aechmea Mertensii Schult. f. $^1/_{10}$ natürl. Grösse. Hochblätter am Schaft prachtvoll karminrot. Fruchtknoten und Kelche bläulich; Blumen rosa.

Fig. 5: An engraving of *Aechmea paniculigera* (Sw.) Grisb. as depicted by L. Wittmack (1889).

Among the other synonyms of *Aechmea paniculigera* listed by Smith and Downs is *"Aechmea mertensii* sensu Wittmack . . .non Schultes filius." the word "sensu" is used because although Wittmack (1889) used the name *Aechmea mertensii* he misapplied it. "Non Schultes filius" refers to the fact that J. H. Schultes, the son of J. A. Schultes, originally described and published the name *A. mertensii* for a different plant. Figure 5 is a photograph of one engraving which L. Wittmack used when he thought that he was introducing *A. mertensii* to his German audience, but according to Smith and Downs he used the wrong identification.

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Curator, Department of Botany
Smithsonian Institution, Washington, D. C.

A Bud Dwelling Mite (*Aceria:* Family Eriophyidae) from *Tillandsia capillaris*

Gregory K. Brown[1] and Amy Jean Gilmartin[2]

Tank-forming bromeliads have long been known for the diverse and occasionally unique, aquatically oriented faunas they support in their tanks. Some of these bromeliad-tank dwellers are even restricted in their occurrence to a single species. The kinds of tank dwellers include, but are not restricted to: bacteria (Joyner and Hazen, 1982), protozoa (Laminger, 1971), numerous insects (e.g. Frank et al., 1977), crustacea (Abele and Felgenhauer, 1979), and a few small vertebrates such as amphibians (Silverstone, 1973) and reptiles (Peters and Schwartz, 1972). Probably the best known bromeliad tank dwellers are the malaria-transmitting mosquitoes (e.g. Klein, 1967).

During floral bud dissections to obtain anthers for use in chromosome analysis, a curious looking organism (fig. 6) was observed residing inside the floral bud, especially on filaments and anther bases of the stamens. The identification as a mite was subsequently verified by Dr. G.W. Krantz, Dept. of Entomology, Oregon State University, and Dr. I.M. Smith, Agriculture Canada, Ottawa, both mite experts. Examination of larval, nymph, and adult stages, leads to the conclusion that the organism represents an undescribed species of *Aceria* (Eriophyidae), a bud mite. Thus another bromeliad dweller is added to the list, but this time as a resident of floral buds and flowers rather than leaf tanks.

The source of these mites was a collection of *Tillandsia capillaris* Ruiz and Pavon forma *hieronymii* (Mez) L.B. Smith collected in La Paz, Bolivia, by Dr. Stephan G. Beck (*Beck 9330 & 9331,* 27 Sept. 1983). The plant voucher and photographs are in the Ownbey Herbarium (WS), Washington State University.

Only one other eriophyid has been described from a bromeliad: *Phyllocoptrute sakimurae* Keifer on fruit of *Ananas sativus* Schultz (pineapple). Eriophyid mites are very strongly host-specific, and this new species came from a host plant from which no eriophyids have ever been described. A formal taxonomic description of this new species of bud mite awaits a comprehensive taxonomic treatment of the genus *Aceria.*

The specimens of *Tillandsia capillaris* harboring these bud mites are of botanical note in that they produce two distinctly different flower forms. These forms are known technically as chasmogamous and cleistogamous flowers. Chasmogamous flowers are representative of most flowers, that is, the flower

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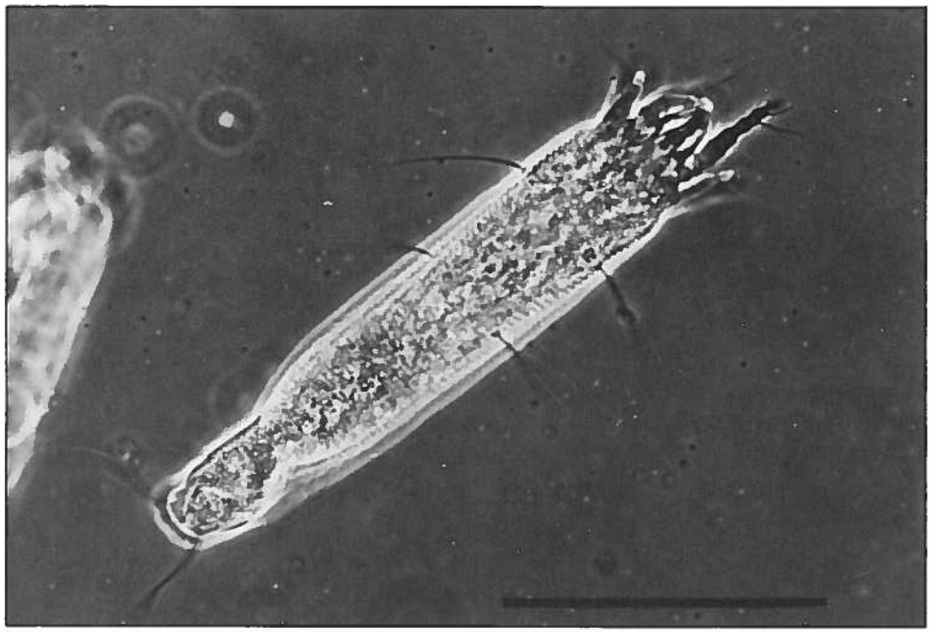

Brown & Gilmartin

Fig. 6: An undescribed species of *Aceria* (Eriophyidae), a bud mite.

opens and is presumably cross-pollinated. On the other hand, cleistogamous flowers do not open and are self-pollinated within the mature flower that outwardly appears to be a bud. This is the only known occurrence of true cleistogamy in the Bromeliaceae (see Gilmartin and Brown, 1985 for details), although the phenomenon is known from at least 58 other flowering plant families. Thus far the *Aceria* reported here has been found only in floral buds of open (chasmogamous) flowers. The infestation does not seem to preclude the transfer of pollen within the flower, fertilization, and production of normal, seed-filled capsules.

We wish to thank Dr. G.W. Krantz and Dr. I.M. Smith for their willingness to examine the mites, their expert determinations, and their comments on *Aceria* taxonomy, and also Dr. Meredith Lane for her comments on the manuscript.

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THE EFFECT OF LOW TEMPERATURES ON BROMELIAD PIGMENTATION

Several years ago one of our hybrid neoregelia seedlings developed yellow crossbands on its otherwise red leaves. I immediately jumped to the conclusion that we had produced a new and uniquely desirable plant. Our Christmas cards that year were made from a Kodachrome slide of this plant.

Disillusionment came quickly in the form of a letter from our good friend, Goodale Moir, in Hawaii. He wrote:

> I was very amused at your picture of the hybrid neoregelia. While the plant was very much younger and all the leaves were down in the cup you had a sudden drop in temperature and the water cooled off quickly and all color was stopped. It was not a freeze or it would have killed the tissue. It was only cold enough to stop very temporarily the color in the tissues. We see this in several crops here, especially sugar cane and the fields look odd in their piebald or banded leaves. There is no killing of tissue except when the very young growing tip is at the water level and then it comes out brown. . . . Your picture shows the leaves grew at different rates, but the yellow lines were all started at the same time. The evidence for this is the development of only one crossband to each leaf.

His diagnosis was further confirmed when the leaf tissue in the areas of yellow banding showed a tendency to deteriorate and fail as the plant aged. I finally gave up all hope of having a yellow-banded red plant when none of the offsets displayed a tendency to develop any form of banding.

George H. Anderson
Metarie, Louisiana

Again, *Aechmea alopecurus*

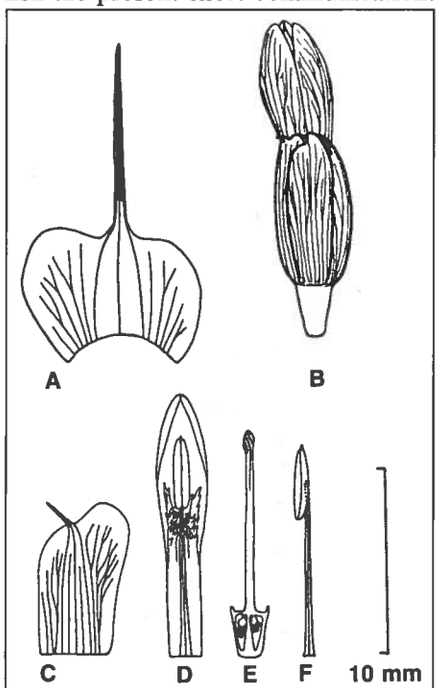
Walter Till

Recently this species was the subject of an article written by E. Pereira and E. Leme in volume 35, number 5 of this journal. They mention the rediscovery of this striking *Aechmea* and emend the description; unfortunately, they are not able to give any geographic collecting data. Further, they establish a neotype, and this has been the impulse to publish the present short communication.

According to Smith & Downs (1979) the holotype of this species (Pohl 5230), deposited in the herbarium of the Museum of Natural History in Vienna, Austria, was destroyed in the final troubles of World War II and declared lost now. In fact, a small part of the museum's bromeliads has survived and is still kept there (a complete list is in preparation), among them the type of *A. alopecurus* Mez in Martius.

I have boiled a single flower in 1n NaOH; the floral details are shown in figure 7. A photograph of the complete type specimen is presented in figure 8. The existence of a type specimen, in our case, the one and only in the Museum of Natural History of Vienna (Naturhistorisches Museum, Wien, internat. abbreviation: W), makes the presence of a neotype superfluous: *Aechmea alopecurus* Mez in Martius, holotype Pohl 5230, Brasilia, without further locality, det. Carl Mez 1894 "Specimina in monographia Bromeliacearum citatum" (W, F photo 29963).

It is noteworthy that the inflorescence in the type specimen is curved in a rather unusual way: the scape is strictly erect, but the inflorescence is divergent in an angle of more than 90°! The scape is in no way broken at the upper end as would be done by artificial cracking for the purpose of pressing the specimen; this obvious curving (fig. 8) seems to be natural. In all remaining characters the descriptions of Mez, Smith & Downs, and Pereira & Leme are good and need not to be extended here.



A: Floral bract, flattened, ventral, 6 mm without the 9.6 mm long mucro
B: Flower, subsessile, 17 mm long
C: Sepal, dorsal, 8.2 mm maximally, 7 mm wide in the middle
D: Petal, ventral, with rhaphides, 14.2 mm long, slightly cucullate; inner stamen adnate to the petal for nearly the whole length of the filament
E: Gynoeceum, style and stigma 9.6 mm long, stigma of type II (conduplicate-spiral)
F: Outer stamen, dorsifix filament ± 9 mm long, anther 4 mm long, 0.8 mm ∅

Author

Fig. 7
Diagnostic drawing of *Aechmea alopecurus* from a specimen in the Museum of Natural History in Vienna, until now presumed lost.

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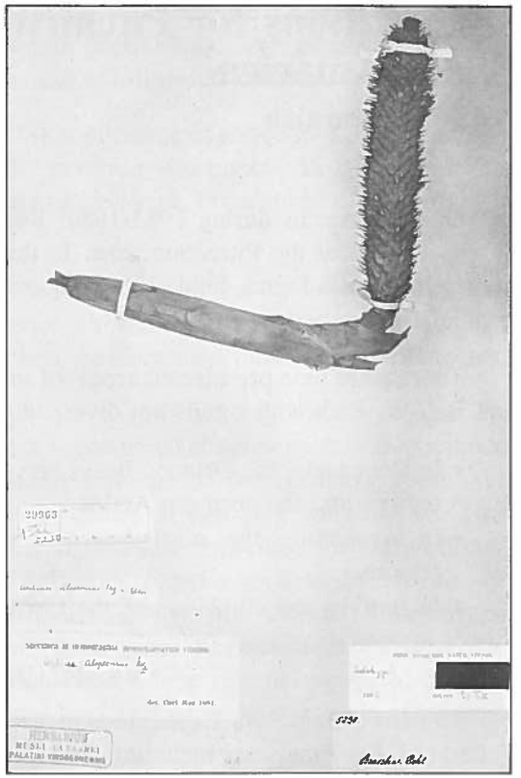


Fig. 8: Photograph of type specimen of *A. alopecurus* in the Museum of Natural History in Vienna.

Author

RESEARCH GRANT AVAILABILITY

The Bromeliad Society wishes to announce the availability of modest research grants. Awards will range normally between $100 and $500. Projects may be oriented toward any aspect of bromeliad biology. Applied or basic problems may be addressed. Judgments will be based on the intrinsic merit of the written proposal, specifically its probability of yielding important new knowledge about the Bromeliaceae. Proposal reviews will be conducted by a panel of expert growers and botanists. Applications will be reviewed three times each year. The deadlines will be the first of January, May, and September. For 1987 only, the January deadline is extended to the first of March. Reviewer comments will be provided to all applicants.

Anyone interested should contact the chairman of the Research Grant Committee, David H. Benzing, Department of Biology, Oberlin College, Oberlin, Ohio 44074, for additional details including a copy of the grant request guidelines.

Explorations for Pitcairnioideae in South America

G. S. Varadarajan

For eight months during 1983-1984, I explored areas of South America for specimens of the Pitcairnioideae. In this account I describe the geographic areas, the species found, field observations of growth habit, habitat, flowers, and population variability.

There were nine preselected areas[1] of investigation in Venezuela, Argentina, and Bolivia, each with significant diversity of pitcairnioid genera.

- In Venezuela, the Orinoco Basin, the Coastal Cordillera, the Pantepui region, and the northern Andes.
- In Argentina, the northeastern, north central, and northwestern regions.
- In Bolivia, the altiplano and the Cordillera Oriental.

VENEZUELA

The Orinoco Basin. Expeditions in the Orinoco Basin were in the Territorio Federal (T.F.) Amazonas including the region of the Sipapo and Guyapo rivers, the tributaries of the Orinoco. The major means of transportation here was the ferryboat rented at Puerto Ayacucho, capital of T.F. Amazonas. Pitcairnoid species were searched out in the predominant savanna and rain forest vegetation. Sudden and intermittent showers, particularly in the early afternoon often made travel and field work problematical and even dangerous because of the mountainous terrain.

In the region of the Sipapo-Guyapo rivers, lowland savannas, classified as the "llanos type" (Huber 1982), are associated with riverine habitats. Elsewhere in the Orinoco Basin, the "grassy inundated type" savannas can be recognized by the sandy soil. The few pitcairnioids encountered in the latter habitats were mostly not flowering.

Members of the Pitcairnioideae in these savannas were sometimes restricted to the granitic rock outcroppings called "lajas" (Steyermark 1979). Three species of *Pitcairnia* were important here: *P. armata* Maury, *P. bulbosa* L. B. Smith[2] and *P. pruinosa* Humboldt, Bonpland & Kunth. The population size of the *P. armata* and *P. bulbosa* ranged from 15–35 individuals and exhibited considerable morphological variability. Between-population variability was higher than the within-population variability for both species. Among the variable features of *P. armata* populations, the density of indument (hairs) on leaves, and frequency

of the simple and panicled inflorescences were notable. The former varied between populations and the latter within populations. The populations of this species varied in individual plant size, and in inflorescence color and branching.

Previous records (Steyermark 1979) of pitcairnioid collections of the Orinoco Basin indicate the occurrence of *Pitcairnia wurdackii* L. B. Smith with apparently the same habitat preference as *P. bulbosa.* Populations of *P. wurdackii* were sterile during my visit.

Pitcairnia pruinosa was occasionally present in the savanna habitats and attractive with its bright red inflorescence. Populations of this species were much smaller (about five individuals) and less variable than those of *P. armata* and *P. bulbosa.*

Rain forests are the most prominent vegetational characteristic of the Orinoco Basin. *Pitcairnia epiphytica* L. B. Smith was one of the very few species of Pitcairnioideae found. Other *Pitcairnia* species in this area were sterile. This region appears to have some taxonomic significance especially for the proliferation of species treated in *Pitcairnia* subgenus *Pepinia* such as *P. armata, P. bulbosa,* and *P. pruinosa* (Smith and Downs 1974). My account of habitats of *Brocchinia* (1986) recognized *Pepinia* as a genus distinct from *Pitcairnia* to include all of the species with a particular seed type resembling *Puya.* Several morphological and anatomical features lend further support to this taxonomic elevation of *Pepinia.*

The Coastal Cordillera. This geographic region including Districto Federal and the adjoining states in northern Venezuela is characterized by a chain of mountains along the Caribbean coast. Vegetation zones are abruptly delimited here with transition areas between the dry, thorny scrub and the cloud forest at about 1,500 m elevation in the H. Pittier National Park (Aragua state). Cloud forests were inhabited mainly by *Pitcairnia heterophylla* (Lindley) Beer and *Puya floccosa* (E. Morren) Linden. The former was collected from shady slopes and the latter from more open and peripheral sites. Both species are widely known from several other parts of South America, especially the Andes. The notion of a common origin of the floras of the Coastal Cordillera and the Andes (Steyermark 1979) is supported by the presence of the predominantly Andean pitcairnioids in the Coastal Cordillera. In general, pitcairnioid flora in this region is less diversified than that of the Caribbean or the Andes.

The Pantepui. The Pantepui (Steyermark 1979, 1982) is a vast expanse of highlands in sections of Venezuela and the neighboring Guiana and Brazil. Tabletop mountains occupy the highlands. These mountains, are spectacular, separated, and flat topped. Their unusual physiography is related to the underlying Raraima sandstone formation. Maguire (1979) applied the term "Guayana Highlands or Guayana" to include all of the table mountains in the Pantepui

Author

Fig. 9

Cottendorfia guianensis from the Gran Sabana region in Venezuela.

Author

Fig. 10

Puya floccosa is one of the few widely distributed species of *Puya*. It occurs in diverse geographical regions in Venezuela.

known also by names such as cerros, tepuis, and mesetas. They are difficult to scale and they harbor some peculiar flora. My field studies in the Pantepui covered several parts of the low elevation (± 570 m) Gran Sabana area and of the table mountain, Auyan Tepui (± 2,500 m).

I was fortunate to have the company of a horticulturist interested in bromeliads, Mr. Francisco Oliva-Esteva, whom I met accidentally in Caracas. He arranged for a vehicle to go to the Gran Sabana. But for him, matters would have been more difficult. After a nearly 700 km drive from Caracas, we entered into the Gran Sabana. Passing through the zones of montane forests beyond the El Dorado area was not easy because of the sandstone rocks, poorly maintained roads, and occasional landslides. In the Gran Sabana, we were amazed to see that the pitcairnioid flora was largely represented by *Brocchinia* species (e.g. *B. reducta* Baker, *B. steyermarkii* L. B. Smith). Principal habitats for these pitcairnioids were savannas (Varadarajan 1986a). Huber (1982) has classified the savannas of the Gran Sabana as the high elevation type (± 750 m), distinct from the lowland types (less than 500 m) in the Orinoco Basin.

The landscape of the Gran Sabana presented a very luxuriant character because of the several isolated zones of montane (evergreen) forests intermingled with savannas. Areas intergrading between the savanna and montane forest were interesting from an ecological standpoint. In transition areas we collected the new *Brocchinia* species, *B. gilmartinii* Varadarajan (Varadarajan 1986b). Francisco and I found other pitcairnioid species in the Kavanayan, Paurai tepui areas that had been only occasionally reported: *Cottendorfia guianensis* (Beer) Klotzsch ex Baker (fig. 9) and *Puya floccosa* (fig. 10). Unlike brocchinias, these two examples were hard to collect because they were growing on the surface and in the crevices of the sandstone rocks.

To get to the top of Auyan Tepui, I had to start the expedition from an Indian village, Kamarata, about 800 km southeast of Caracas. I hired two Indians from there, one for general help and the other as a trail guide. We walked three and a half days each way with each of us carrying 20–30 kgs of luggage. Our ascent was from 500 to 2,500 meters. We had to sleep in small caves and in some temporary camps. There were several perpendicular walls that had to be climbed and several times the Indians saved me from falling.

It is interesting that Auyan Tepui typifies some general characteristics of the table mountains. This fact has been emphasized in the endemic species, the peculiar geological history, and the general species composition of the summit flora (Maguire 1970; Steyermark 1979, 1982). Pitcairnioid flora of the summits are generally represented by species of *Connellia, Cottendorfia,* and *Navia.* On the summit of Auyan Tepui (El Libertador area), I located the elusive and little understood pitcairnioid genus *Ayensua* in full bloom. This monotypic genus is presently known from only two locations: Auyan Tepui and the neighboring

Fig. 11

Dots indicate the author's collecting localities of Pitcairnioideae in South America.

Author

Uaipan Tepui. I also collected an unusual plant on a remote sandstone bluff (Descanso area), which I later recognized to be a new species of *Connellia.*[3] It was a very fortunate find. This plant had been bypassed by other explorers of this tepui because the sandstone bluff on which it grew is nearly enveloped in clouds most of the time. While searching this site for more specimens I narrowly escaped falling some 500 meters, but managed to stop myself with a shrub, and the Indians helped me back up.

After passing through the different kinds of savannas and montane forests at various altitudes, we arrived at the summits of Auyan Tepui. There we found many moist habitats and isolated groups of stunted, shrubby, evergreen vegetation. Among the pitcairnioid species from the lower elevations of the tepui, *Pitcairnia ctenophylla L. B. Smith (fig. 12) and Navia splendens* L. B. Smith deserve mention. Both were in bloom and were very striking with their brightly colored inflorescences. Massive populations of these two species were growing along the talus slopes (Guyaraca area) at an elevation of about 1,000 m. Members of *Cottendorfia* and *Brocchinia* heavily colonized the savannas at 1,300–1,900 m altitude. At about the same elevations, *Pitcairnia maidifolia* (C. Morren) Descaisne displayed an unusual habit. This species occurs widely as a tall, luxuriant, and shade-loving undershrub in several tropical areas of Central and

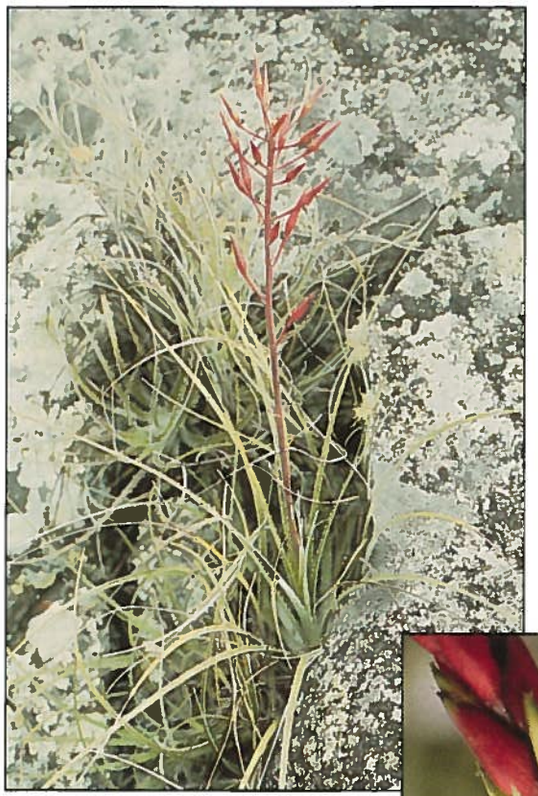
South America. However, on Auyan Tepui (El Penon area) it appeared in isolated and stunted colonies along the more open and rocky habitats.

Pantepui is of special phylogenetic significance to my current research for several reasons. More than a third of the total genera *(Ayensua, Brewcaria, Connellia, Cottendorfia, Navia,* and *Steyerbromelia),* and about 140 of nearly 750 species in the subfamily are represented only in the Pantepui. Several species of *Brocchinia, Pitcairnia,* and *Puya* occur in this geographic region. This wide representation of Pitcairnioideae implicates the Pantepui as a major geographic zone of specialization (i.e. center of diversity) for the subfamily. On the other hand, it may have been a refuge zone for some extant pitcairnioids such as *Ayensua, Navia* or their ancestors of early geologic times (see also Steyermark 1979, 1982). This restricted geographic distribution of some of the members of Pitcairnioideae in the Pantepui has also been emphasized in several taxonomy-oriented studies, for example Smith (1934), Robinson (1969), Varadarajan and Gilmartin in MS 2).

The Northern Andes. Most regions that represent the eastern offshoot of the eastern Cordillera of Colombia have been classified as the Northern Andes or the Mérida Andes (Simpson 1975). The Mérida Andes include Táchira, Mérida, Barinas, and Trujillo states in Venezuela. They are widely separated from their western counterpart, the Perijá mountains, by Lake Maracaibo. *Pitcairnia* and *Puya,* the two pitcairnioid genera represented in the Mérida Andes, were found in several habitats, especially in the montane forests, cloud forests, subpáramos (all below 2,500 m), and páramos (above 3,000 m).

Starting my explorations from the lowlands in Portuguesa, Barinas, Trujillo, Mérida and Táchira states, I reached the highlands. My field program in the Mérida Andes lasted for five weeks. *Pitcairnia maidifolia* and *P. schultzei* Harms were the important species in the cloud forest understories. I encountered two strikingly different populations of *P. maidifolia* in several localities of the northern Andes (fig. 13). My studies assessing the intra- and inter-populational variability await comparisons with other populations of this species from several locations of tropical America.

Pitcairnia heterophylla, a species found in the Coastal Cordillera, occurred in open, rocky slopes of the cloud forests, mostly sympatric with *P. brevicalycina* Mez in several localities in Barinas and Mérida states. Both species presented several interesting characteristics to compare and contrast, especially from the point of view of modes of pollination. *Pitcairnia brevicalycina* exhibits two disjunct forms in Peru, Ecuador, and Venezuela. Venezuelan populations of this species inhabit moist, shady habitats in the Andes, including cloud forests (ca. 2,300 m) and montane forests (2,900 m). On the other hand, *P. heterophylla* is more widespread since it has been found from Mexico to Venezuela and Peru. Petal appendages that are occasional in *Pitcairnia* were noticed in *P. brevicalycina*



Author

Fig. 12

Pitcairnia ctenophylla, an attractive, saxicolous species found at low elevations of the sandstone mountain, Auyan Tepui, Venezeula.

Author

Fig. 13

Two strikingly different populations of *Pitcairnia maidifolia* were found in Venezuela by the author, this one distinguished by red bracts.

and *P. heterophylla.* Their morphology, however, as well as nectar storage differed in both taxa. The scarlet flowers of *P. heterophylla* displayed a complex bidentate petal scale and contained abundant nectar. *Pitcairnia brevicalycina* showed paired, ear-like, lobed petal scales that contained little nectar. These two sympatric species apparently present instances of differing pollination modes as indicated by their contrasting flower color, petal appendages, and relative amounts of nectar (Varadarajan and Brown in MS).

Pitcairnia meridensis Klotzsch ex Mez and *P. nubigena* Planchon & Linden are two similar *Pitcairnia* species from Hérida and Táchira states of the Northern Andes that illustrate the importance of field work. Taxonomic separation of these species is often difficult. Alate-carinate sepals distinguish *P. nubigena* from *P. meridensis* (Smith and Downs 1974) although this is often not clear in pressed specimens. Difference in flower color turned out to be a good field character not emphasized previously. In addition, altitudinal limits of each species provided distinction. *Pitcairnia meridensis* had been collected from montane forests and montane forest-páramo transitional areas, at elevations from 2,700 m to 2,900 m. On the other hand, the altitudinal range for *P. nubigena* was found to be within cloud forests, generally below 2,300 m.

There are many species of *Puya* in the alpine zones of the Andes, specifically the punas and páramos.[4] The diversity of *Puya* increases southwardly from Colombia to Argentina. The northern Andes provide habitats for several *Puya* species in a wide range of sites. The northern limits of *Puya* are in Costa Rica and the Sierra Nevada de Santa Marta in Colombia.

My explorations suggest that the northeastern boundaries of most *Puya* are the Mérida Andes.[5] Some *Puya* species here are perhaps extremely sensitive to climatic changes as shown by the apparent extinction of several widely known populations of *Puya* recorded by local botanists such as Ruíz-Téran and Lopéz-Palacíos during the 1970s. Since this plant community, from my observations, has been undisturbed by man, grazing animals, or introduced plants, I can reach no other conclusion. This characteristic may suggest that *Puya* species from the northern Andes are an ancient, phyletic lineage as is sometimes believed.

Puya aristeguietae L. B. Smith has been previously recorded from several páramo sites in Mérida and Trujillo states. I did not encounter this species in eight of the nine páramo localities explored, nor did I find any other *Puya* species formerly reported from these sites. This observation implies that *P. aristeguietae* populations are locally extinct.

My field collection of *Puya aristeguietae* from the páramo de Zumbador, section Portachuelo was the first record of this taxon from Táchira state (a southern locality), and that of *P. trianae* Baker (formerly known from Colombia) from the same locality was the second record of Venezuela. It is interesting to note that

in the relative species distribution, *Puya floccosa* emerges as a highly successful species in the genus occurring in several parts of northern South America (the Coastal Cordillera, the Pantepui, Colombia, and western Brazil). Its altitudinal range is also relatively high (250–2,800 m). Yet this taxon was notably absent from the páramos of the Mérida Andes.

Further studies of the distributional patterns from the northern Andes may be helpful in understanding whether there is any receding of the northeastern latitudinal limits of *Puya*.

[To be continued]

NOTES:

1. Terminology of the regions follows Steyermark (1979) for Venezuela and adjacent areas, and Simpson (1975) for Bolivia and Argentina.
2. A detailed account of the population variablity in *P. bulbosa* is to be submitted for publication in a later issue of this journal.
3. Dr. Julian Steyermark confirmed that it was new, and he and Dr. Lyman Smith kindly named it after me (Smith 1985).
4. See also Werner Rauh, "Chile and Its Bromeliads," J. Brom. Soc. 35:159-166; 208-213.
5. Information on the locality sites of Puya species in the Mérida Andes was obtained from herbarium collections and records housed in two Mérida herbaria and at the Venezuelan National herbarium at Caracas, and Smith and Downs (1974).

ONCE IN A LIFETIME BROMELIAD

The *Puya raimondii* shown opposite and on the back cover, flowered from August through November, 1986, at the University of California-Berkeley Botanical Garden. *P. raimondii* flowers only once in 50–150 years and then dies, but this monocarp specimen flowered only 28 years after planting. Rarely witnessed flowering even in its natural habitat at 7–13,000 feet in the Bolivian Andes, this specimen flowered only a few hundred feet above San Francisco Bay.

According to the press release, Alejandro Quesada brought the seed of *Puya raimondii* to the Garden. John Yellen, who regularly observed and photographed this cultivated specimen, says that its statistics of size and other characteristics closely correlate with those recorded by Mr. Foster (*Journal* 34:147–156; 205–211). The flowering, however, was only intermittent along the top five feet of the stalk and produced about 10–15 percent fewer than the usual 8,000 blossoms.

Readers are asked to report other specimens to the editor. Many thanks to Mrs. Foster for bringing the news of this rare event to our attention and to John Yellen for the photographs.

NOTE:

Mr. Yellen photographed this plant twice daily for five weeks using several camera formats. Call or write to him for information about prints: 1400 Woolsey St., Berkeley, CA 94703; (415) 841-6500.

TUL

DIGEST OF THE MINUTES OF THE ANNUAL MEETING OF THE BROMELIAD SOCIETY, INC.
BOARD OF DIRECTORS
New Orleans, Louisiana, 22 May 1986

Officers and directors present:

Edgar L. Smith	President
Harold W. Wiedman	Vice-President
Thomas U. Lineham, Jr.	Editor
Linda Harbert	Membership Secretary
Connie Johnson	Recording Secretary
David Gardner	Treasurer

George H. Anderson, Bobbie H. Beard, Chet Blackburn, Nat De Leon, B. Dean Fairchild, William E. Frazel, Jack B. Grubb, Wayne B. Guthrie, Paul T. Isley III, Carol M. Johnson, Thomas J. Montgomery, Jr. Stan Oleson, Herbert Plever, Gerald A. Raack, Hedi Guelz Roesler, Ronald Schoenau, Robert E. Soppe, Ervin J. Wurthmann.

Minutes: The minutes of the last annual meeting were approved.

Reports were accepted from all of the officers and chairmen of standing and special committees except that there were no reports from the Conservation Committee, the M. B. Foster Bromeliad Identification Center, the Seed Fund, and the Slide Library.

Treasurer: The financial report for 1985 and the approved budget appear in addenda 1 and 2.

Election results: (The president and vice-president are elected for three-year terms; all other officers and committee chairmen to one-year terms.)

Officers:

Corresponding Secretary, Danita Rafalovich-Smith; Editor, Thomas U. Lineham, Jr.; Membership Secretary, Linda Harbert; Recording Secretary, Jack B. Grubb; Treasurer, David Gardner.

Chairman of Standing Committee:

Affiliate Shows, Charlien Rose; Affiliated Societies, Stan Oleson; Awarded Cultivars, Thomas J. Montgomery, Jr.; Conservation, Mark A. Dimmitt; Finance and Audit, Gregory A. Reid; Hybrid Registration, Nat De Leon; Judges Certification, William E. Frazel; Nominations, George H. Anderson; Publications, Annie A. Navetta; World Bromeliad Conference, Gerald A. Raack.

Chairman of Special Committees:

Bylaws Revision, Gerald A. Raack; Bromeliad Research Grant, David H. Benzing; Mulford B. Foster Bromeliad Identification Center, Harry E. Luther; Seed Fund, Harvey C. Beltz; Slide Library, Mary E. Musleh.

Editor: 1. The Board approved as policy the following–

a. The *Journal* is the official publication of the Society and takes precedence over other Society publications.

b. The *Affiliates Newsletter* is the informal means of disseminating information quickly to the affiliates when there is a need.

2. The editor is authorized to contract for services required for *Journal* purposes within the limits stated in the approved annual budget and subject to review in the treasurer's annual report.
3. The Recording Secretary will forward to the editor a digest of the minutes of the annual Board meeting with the treasurer's report for publication in the next available issue of the *Journal.*

Affiliated Societies Committee: The Board approved the policy of mailing the *Affiliated Societies Newsletter* to the affiliated societies only.

Bylaws Revision Committee: 1. A motion to recommit the draft of the revised bylaws to committee passed.

2. Gerald A. Raack was elected chairman of the committee with authority to form the committee and to seek the advice of a parliamentarian.

Hybrid Registration Committee: The chairman was instructed to submit to the Board the proposed form and procedure for the registration of all cultivars.

Judges Certification Committee: 1. It was decided that a minimum of 10 accredited judges is required to form a region and to elect a representative to the committee; however, if the number of judges of a region falls below 10, the region will not lose accreditation and will retain one representative.

2. The committee was instructed to proceed without delay to secure the comments of all affiliates concerning changes to the *Handbook for Judges and Exhibitors*.

3. A motion to adopt a policy which would remove all B.S.I. definitions concerning the conduct of shows by affiliates and the significance of B.S.I. awards for use at such shows was tabled.

4. A motion to rescind the authority of the Judges Certification Committee to revise and publish the *Handbook* failed.

Membership Secretary: 1. A motion to pay the membership secretary $450.00 monthly during an evaluation period of 12 months for contract services relating to membership activities passed.

2. It was directed that life members be listed by name in the secretary's annual report along with the percentage of total membership by region.

Membership Directory Revision Activity: 1. A motion to permit members to signify their agreement to having their telephone numbers listed in future directories passed.

2. The members of the activity were instructed to evaluate and report on the cost of a biennial directory.

Professional Parliamentarian: [The president hired a professional parliamentarian to assist at the meeting. Her services have been retained for the next 12 months.]

1. It was decided to require the parliamentarian to put any advice in writing.

2. A motion to authorize the president and all directors to call on a parliamentarian for advice after notifying all members of the Board of the intent and purpose of the action was tabled subject to action by the Bylaws Revision Committee.

Publications Committee: 1. The president, the treasurer, and the committee chairman were authorized to set publications prices.

2. A monthly storage expense of $20.00 was authorized.

3. The purchase of 10 videotapes of Grace Goode's garden from an Australian vendor was approved.

Research: 1. A Bromeliad Research Grant Committee with authority to administer approved funds including the intern fund was approved. Its activities will be reviewed annually.

2. A grant of $500.00 to Dr. Gregory Brown for bromeliad research was approved.

Slide Library: Motions to impose refundable rental fees of $20.00 and a $20.00 deposit, payable in advance, on slide shows were approved.

Other business: 1. Roberto A. Kautsky of Brazil was elected honorary trustee.

2. It was agreed that the 1987 Board meeting will be held in Dallas, Texas.

3. The Greater New Orleans Bromeliad Society was thanked for being host to the Board and for conducting the 1986 world conference.

4. A motion to reimburse Connie Johnson $221.83 for telephone bills passed. It was noted that authority for approving any telephone vote rests with the president.

ADDENDUM #1A: FINANCIAL STATEMENT AS OF DECEMBER 31, 1985

ASSETS		
CURRENT ASSETS		
Cash in Bank - Texas Commerce Bank #09-601908	$ 5,259.08	
First Commerce Bank #02-0072-7	$ 1,441.76	$ 6,700.84
Dean Witter - Bromeliad Identification Account #015893649	$ 6,846.87	
General Account #015860686	74,228.93	
Life Membership Account #015893630	5,361.54	86,437.34
Advances - Corresponding Secretary:		
Danita Rafalovich	$ 200.00	
Owana Jo Myers	200.00	
Editor	500.00	
Membership Promotion Chairman	100.00	
Multi Media Chairman	375.00	
Affiliated Societies Chairman	100.00	
Publications Chairman	100.00	
Seed Fund Chairman	100.00	1,775.00
Loans Receivable - World Bromeliad Conference Greater New Orleans		1,000.00

FIXED ASSETS	Cost	Reserve For Depr.	Book Value	
Apple Computer	$ 1,706.97	$ 136.56	$ 1,570.41	
Library	901.89	162.19	739.70	
Typewriter	814.62	283.08	531.54	
File Cabinet	169.00	13.52	155.48	
	$ 3,592.48	$ 595.35	$ 2,997.13	2,997.13
Inventory				52,440.67
Stock - 2 Shares Burroughs Corp.			200.00	
TOTAL ASSETS				$ 151,550.98
LIABILITIES				
CURRENT LIABILITIES				$ –0–
NET WORTH				$ 151,550.98
TOTAL LIABILITIES AND NET WORTH				$ 151,550.98

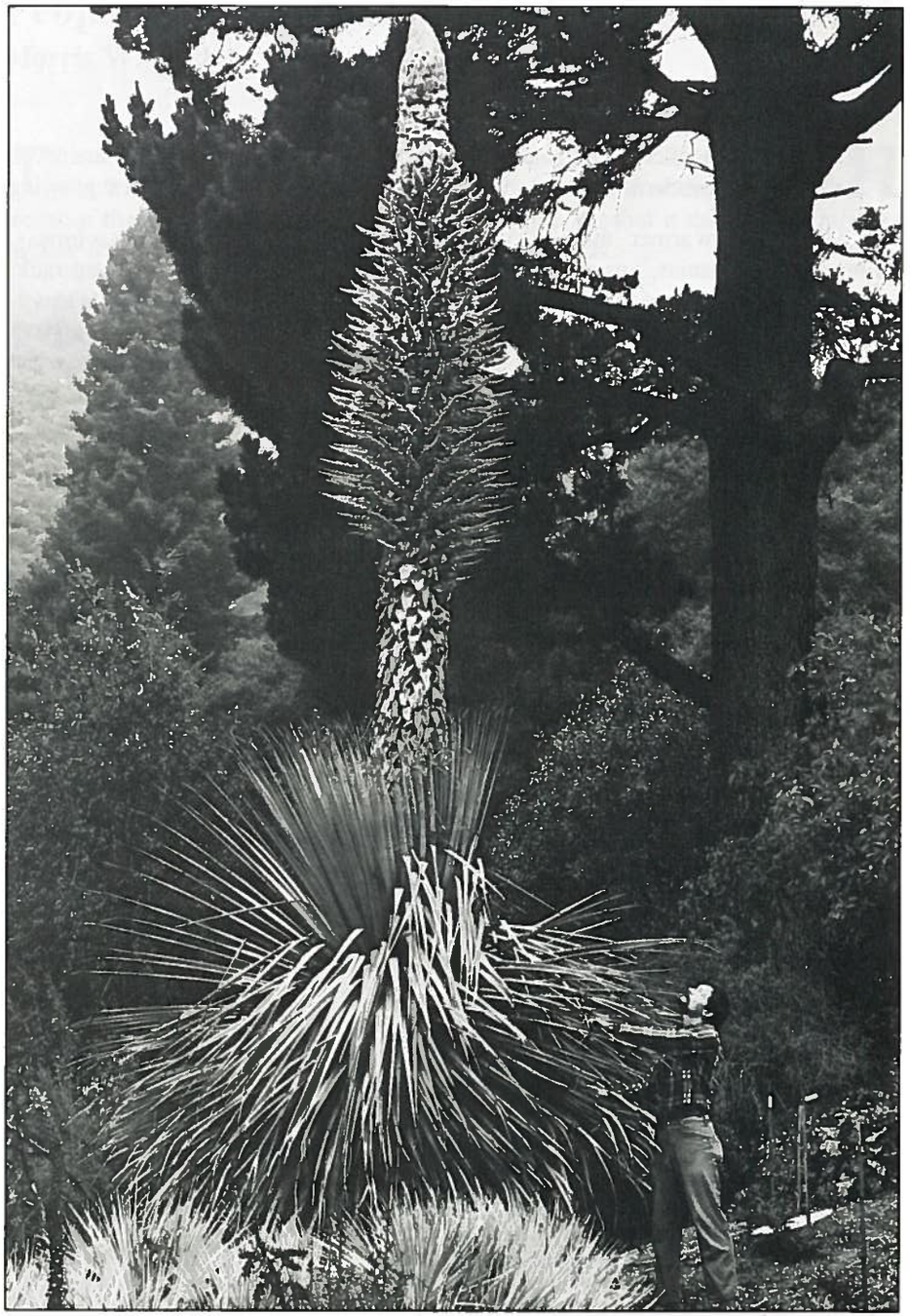
ADDENDUM #1B: PROFIT AND LOSS STATEMENT FOR TWELVE MONTH PERIOD ENDING DECEMBER 31, 1985

GROSS RECEIPTS		
Advertising	$ 5,426.50	
Back Issues	3,234.61	
Books, Binders & Other Publications	4,608.17	
Bromeliad Identification Center	130.00	
Color Plates and Separations	258.60	
Cultural Flyers	998.19	
Dividends	5.20	
Interest	6,934.97	
Judges Certification	6,934.97	
Medallions/Trophies	320.00	
Membership	29,688.68	
Postage	285.15	
Seed Fund	526.40	
Victoria Padilla Books	932.80	$ 54,908.60
EXPENSES		
Advertising	$ 1,058.06	
Affiliates Newsletter	335.65	
Back Issues of Journal	6,275.00	
Bank Handling Charges (Foreign Checks)	58.60	
Books, Binders & Other Publications	6,238.75	
Bromeliad Identification Center	2,000.00	
Cultural Sheets	764.33	
Depreciation	358.57	
Director/BSI Meetings	722.40	
Dues - Council of Garden Clubs	15.00	
Editor - Journal	2,651.08	
Journal	37,768.30	

Judges Handbook	2,505.75	
Medallions/Trophies	1,153.16	
Membership	1,966.57	
NSF Checks	15.00	
Printing & Stationery	547.96	
Secretarial	29.09	
Seed Fund	626.94	
Slide Chairman	233.83	
Taxes - Franchise Tax	30.03	65,354.07
NET LOSS FOR TWELVE MONTH PERIOD ENDING DECEMBER 31, 1986		$ (10,445.47)

ADDENDUM #2: APPROVED BUDGET FOR TWELVE MONTH PERIOD ENDING JUNE 30, 1987

PROJECTED RECEIPTS			
Advertising		$ 6,300.00	
Back Issues		1,200.00	
Books, Binders & Other Publications		8,059.80	
Cultural Flyers		1,200.00	
Dividends		5.20	
Interest		6,500.00	
Medallions/Trophies/Entry Tags		2,800.00	
Membership		33,500.00	
Seed Fund		600.00	
Slide Library		200.00	
Video Tapes		400.00	$ 60,765.00
PROJECTED EXPENSES			
Affiliates Newsletter		500.00	
Bromeliad Identification Center - General Fund		1,000.00	
Bromeliad Research Grant Committee		2,500.00	
Conservation Committee		100.00	
Cultural Flyers		1,200.00	
Directors Annual Meeting		500.00	
Editor Journal - General	$ 1,200.00		
Vehicle	1,800.00	3,000.00	
Insurance		180.00	
Journal		38,700.00	
Judges Certification Committee		250.00	
Medallions		1,800.00	
Membership - General & Postage	$ 1,200.00		
Labor	5,400.00	6,600.00	
Mulford Foster Trophies		1,000.00	
Office Supplies & Stationery		600.00	
Parliamentarian Retainage		1,200.00	
Postage		100.00	
Seed Fund		600.00	
Slide Library		225.00	
Storage Rental		240.00	
Video Tape		350.00	
Miscellaneous		120.00	$ 60,765.00



San Francisco Examiner photo by Fran Ortiz

Fig. 14: Puya raimondii shown blooming at the University of California-Berkeley Botanical Garden, a rare event.

Another Benefit of Good Air Circulation

Phil Asprelli

Here in Connecticut it is possible to grow fine bromeliad specimens even though the sometimes severe winter weather is not conducive to good growing.

During the warmer months of the year, my collection of 75 aechmeas, billbergias, guzmanias, ananas, neos, and tillandsias are outdoors on a plant rack, four feet wide and eight feet long, raised 18 inches off the ground for easy accessibility. The rack is under two maple trees which provide sufficient protection against strong summer sun during the heat of the day, but which allow morning and late afternoon sunlight. Under these conditions they grow well and provide me with many pups and an occasional blossom. As the cooler months of fall approach, I bring all plants indoors and place them at a sliding glass door with a southern exposure.

During the cold months of January and February, the outside temperature sometimes falls to 0° F [-18° C] and lower. With my plants on the floor near the glass door, the inside air near the door gets very cold (even though there is a double thickness of clear plastic over the door) and drifts downward to the floor and flows over the plants. Two winters ago I lost an *Aechmea chantinii* which rotted in its cup because of the temperature of the surrounding air.

Last winter I solved the problem by setting a small fan in a warmer area of the room to direct the warm air through and around the plants. This action was especially beneficial at night. I sense that my plants are happier and healthier now. I know that this simple solution has given me peace of mind.

North Haven, Connecticut

VENTILATION

At this time of year with fluctuating temperatures, the danger to the dry growing tillandsias can be caused by too high a humidity, or levels of dampness in the air. Although the species lost may be endemic to locations similar to those that survive, it can be the actual taxonomy of the plant that creates the problem. Species like *argentea* and *magnusiana* retain the old leaves and these can become too moist, attracting the development of fungal spores. If it doesn't deform the plant too much, it is advisable to prune down the old leaves to the minimum length close to the stem.

A similar situation can arise when more mature specimens of plants with a bulbous base, such as *T. caput-medusae,* build up into clumps, the conglomeration of basal leaves prevents the circulation of air around the plants. Here again, some pruning can improve matters.

V.P.

Propagation of Poor Puppers, Revisited

Morris W. Dexter

This is a supplement to an article ["A Propagation Hint for the Courageous"] which first appeared in volume 27, number 2, page 86 of the *Journal* in 1977. Because there have been some reports of failure I felt that it might be helpful to review the procedure and to emphasize certain details.

Method. An 18-inch length of solid #9 aluminum clothesline wire is straightened. One end is flattened for about one inch then filed to a point so that it resembles a small spear. The other end may be formed into a loop for a better grip. Iron is better, but more difficult to fabricate.

The sharp end is inserted into the exact center of the bromeliad cup then forced down with a twirling motion. The objective is to destroy the cluster of cells which give rise to apical growth (meristem). Destruction of the meristem usually induces lateral budding. Since it is difficult to determine how far down in the cup the meristem exists, we routinely force the drill until it emerges among the roots. In this way the meristem is sure to be destroyed. Rarely, the drill does not pass through the meristem. The plant will then continue growing in the normal way and not produce pups.

The plant so treated is grown in the usual fashion. In the course of three to five months new plants will become visible. When they are about three-quarters the size of the parent they are removed as one removes any other pup.

Fig. 15:
Here is convincing evidence that the seemingly violent procedure described by Dr. Dexter can produce unusual numbers of offsets.

Author

[Continued on page 31]

Pitcairnia aphelandriflora

Werner Rauh

Almost attractive *Pitcairnia* of the subgenus *Pepinia, P. aphelandriflora* Lemaire forms big bushes up to 3 m high on sandy river banks. With its long, leafless, woody stems which bear a terminal rosette of bright green linear leaves, the plant resembles in its vegetative state a small *Dracaena* or a *Cordyline*, often cultivated as houseplants. The length of the stems has been reported as 50 cm by André,[1] 30 cm by A. J. Gilmartin,[2] and nearly 3 meters (!) by A. Hirtz of Quito.[3]

A single *plant* has a long, erect, woody stem of a diameter of 2 cm, covered with the sheaths of the deciduous, elder leaves; the living *leaves* form a dense, terminal rosette as shown in the cover picture. The foliage is homomorphic. The *sheaths* are conspicuous and enfold the stem: the *blades* are linear-lanceolate, attenuate, up to 25 cm long and 1.5 cm wide, narrowing toward the base, but not petiolated, dark green above, pale green beneath with a prominent midrib,

Author

Fig. 16:
This specimen of *Pitcairnia aphelandrifolia* was induced to flower at the Heidelberg Botanic Garden by the ripe-apple-in-the-bag trick.

glabrous on both sides, minutely serrulate at the margin; the *scape* is very short, 4–7 cm long, marked only by the dark wine-red color of the smaller scape bracts. The *inflorescence* (fig. 16) is simple, up to 20 cm long, dense, cylindrical; the *rachis* erect, carmine-red, glabrous and slightly angled. The *basal floral bracts* are subfoliate, mostly exceeding the flowers, with a wine-red, laxly lepidote, nerved sheath, and a short, spreading, green, glabrous, serrulate blade; the *upper floral bracts* are bladeless, wine-red, and shorter than the *sepals*; these are 15–17 mm long, 7 mm wide, acute, the posterior ones carinate, bright cinnabar-red, white at the base. *Flowers* subsessile, up to 5 cm long and slightly zygomorphic. The *petals* are lanceolate, 4.5–5 cm long with a small ligule at the base, bright cinnabar-red, yellowish at the base. *Stamens* and *style* included. *Ovary* 3-angled, flattened, more than half superior. *Ovules* obtuse, not caudate.

This diagnosis is made from a specimen collected by Alexander Hirtz (no. 849, 2.2.1983). It is cultivated in the Botanical Garden Heidelberg under the number 59 165. The locality is the banks of the Rio Napo (600 m), Prov. Napo, east Ecuador.

This specimen differs from the original description of André in the following characteristics: The *plant* becomes very big (up to 3 m high), the *scape* of the inflorescence up to 7 cm; the *petals* have a small dentate ligule and the *anthers* of the stamens are included, not exserted, as seen in plate V of André. The differences are not sufficient to erect a new species, but a variety which could be named *longicaulis*.

The behaviour of the flowers is unusual for a *Pitcairnia*. They are open for some days, and then the petal-tube curves downwards. Normally, *Pitcairnia* flowers are open only one day and then the whole flower curves downwards by elongating the pedicel, but in *P. aphelandriflora* there is no pedicel.

Since the plants which we cultivate did not flower after two years, the bromeliad gardener of the Botanic Garden, K. Piepenbring covered the plant with plastic and put some ripe apples under the cover. The ripe apples produce ethylene gas and this induces the plant to produce an inflorescence. Indeed, some weeks after the treatment, the biggest plant entered into the floral phase and one month later it was in full flower. Our plant is self-fertile and produces seeds without pollination.

NOTES:

1. *Ill. Hort.* 17:32-34.
2. *The* Bromeliaceae *of Ecuador.* Lehre, Germany: J. Cramer; 1972.
3. I am very indebted to A. Hirtz for sending living material which we cultivate in the Heidelberg Botanical Garden.

Institute for Systematic Botany and
Botanical Garden of the University of Heidelberg
West Germany

Bromeliad Flower Arrangement, No. 13: *Aechmea fulgens* var. *discolor*

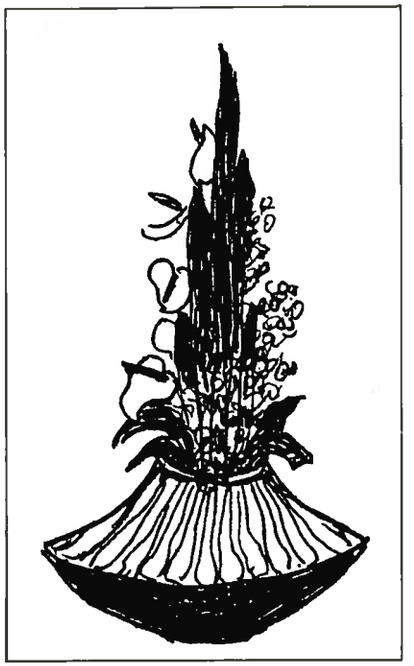
May A. Moir

Robert Chinn for the Honolulu Academy of Arts

Fig. 17:
A dual arrangement of Aechmea fulgens var. *discolor* and bright red anthuriums supported by nearly black ti leaves.

A small kenzan (needle holder) and a slender heliconia stem were used to support the almost black ti leaves *(Cordyline)*. This strong, central column of black was good balance to the heavy, squat, bronze container. The black leaves were a perfect foil for the bright red anthuriums on the one side and the intricate texture of the *Aechmea fulgens* berries on the other side. A dramatic effect is often achieved by grouping like colors or textures.

Honolulu, Hawaii



Propagation of Poor Puppers, Revisited

[Continued from page 27]

Observations. One always fears that contaminating the heart of the plant with all manner of fungi, bacteria, and protozoa would surely start a fatal infection. So far this has not occurred in spite of the wide variety of genera and species where this method has been used. I no longer use fungicides or other antimicrobials. Bromeliads, like most other living things, produce protective substances capable of suppressing or killing most microorganisms. I suppose that sooner or later we will introduce a pathogen which will kill the plant.

This method provides an additional benefit. New pups produce roots more eagerly than old plants. Early production of copious, active roots will give the new plant a good start toward maturity.

Yet another application of this procedure is to salvage a variegated plant which progressively produces leaves with less and less chlorophyll. Such plants will die eventually. If new pups are induced before the old plant is too far gone, some may have better markings with enough green tissue to enable the pups to survive, even if the parent dies. Pups which are nearly all green or all white should be removed at the earliest possible stage and discarded.

Belleair, Florida

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Allan G. Edgar

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The ballots were counted by 18 members of the Mississippi Bromeliad Society under the supervision of the vote tally chairman at a meeting held on 14 September 1986. I certify the results correct.

Vote Tally Chairman
Jackson, Mississippi

Directory of Affiliated Societies

Please add to the directory appearing in the November-December 1986 issue:

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11038 Fernald
Dallas, TX 75218

Growing Epiphytic Tillandsias

Harry E. Luther

The genus Tillandsia contains more than 400 species of mostly epiphytic bromeliads found from the southeast United States to Chile and Argentina. Many tillandsias are small- to medium-sized (2–12 inches in height) gray-leaved plants that are naturally found in situations where they dry thoroughly between infrequent waterings. These are most adaptable for mounting to produce interesting and decorative additions to porch, patio or greenhouse collections of exotic plants. A number of tillandsias are rather odd or grotesque and this undoubtedly adds to their appeal.

To ensure success with epiphytically grown tillandsias two conditions must be met.

Proper Growing Conditions. Tillandsias nearly all require bright filtered light or early morning and/or late afternoon direct sunlight. Considerable air circulation is also very important. If these conditions are not met, tillandsias (as well as other bromeliads) may be lost to disease. Screened pool cages provide nearly perfect conditions for most gray leaf tillandsias. Mounted plants of nearly all kinds require more fertilization and watering than similar plants in pots. While most bromeliads will live and reproduce without any artificial feeding they will

Bob Wands for Selby Gardens

Fig. 18: Popular materials for growing mounted tillandsias are cork, treefern slabs, and driftwood free of preservatives or sealing materials.

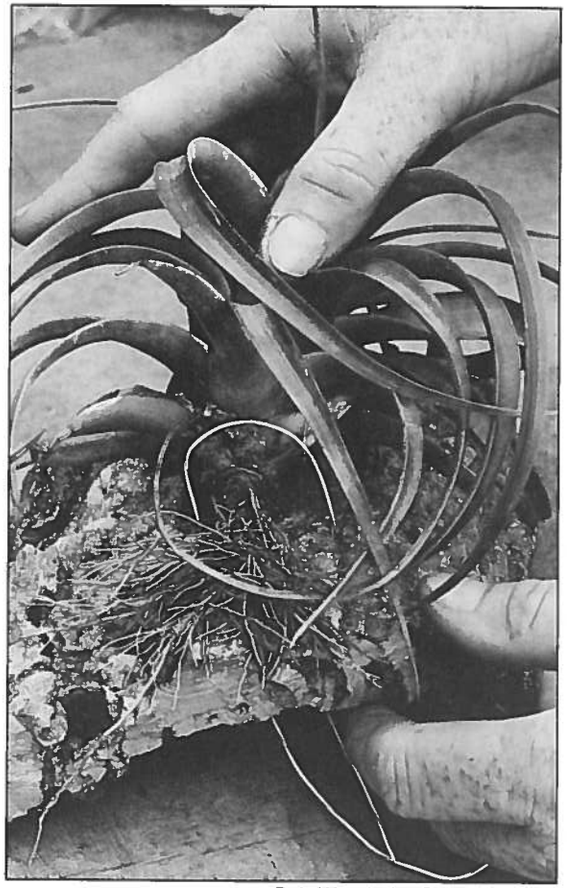

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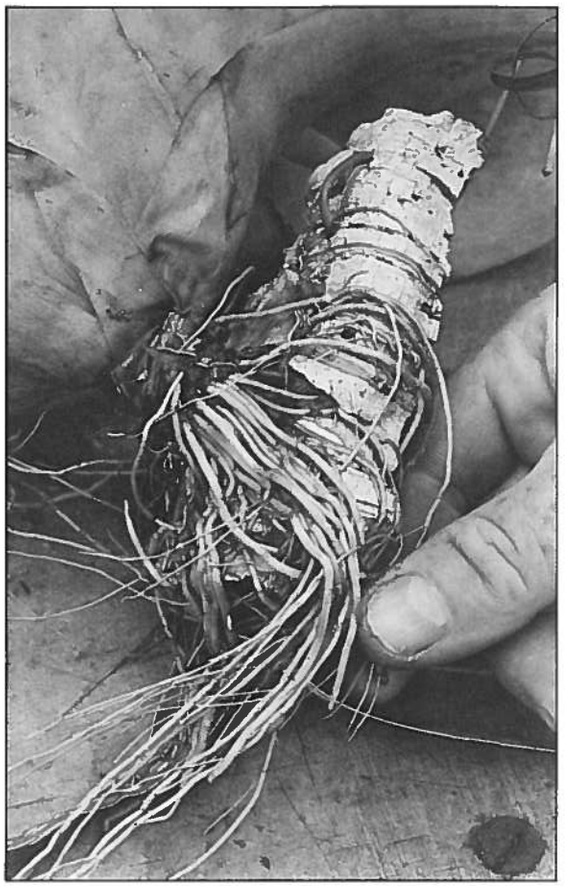
Fig. 19

A demonstration of tying *Tillandsia rothii* to a cork base. Note that the insulated wire will be secured just above the roots and just below the living leaves.

not be as vigorous as well fed specimens. Any good liquid fertilizer applied at ⅓ to ½ the recommended strength every two to four weeks will suffice.

Watering frequency will vary with environmental conditions: water more often in hot, dry situations; much less often during cool, dull times. If the plants are outside with natural 50% or greater relative humidity, twice weekly soakings will be about right. If grown inside, they should be misted daily and drenched at least weekly. Tillandsias should alway dry somewhat between wettings. **Regarding winter protection: the majority of commonly grown tillandsias are hardy to about 32 degrees F if kept slightly on the dry side. A few can tolerate several hours of below freezing if properly conditioned.**

Proper Mounting of the Plants. The greatest source of failure in establishment of mounted tillandsias is incorrect mounting. The material chosen as a support should be firm and with a slightly irregular or porous surface. This helps



Bob Wands for Selby Gardens

Fig. 20

Mature roots of this *Tillandsia* species are shown adhering to the cork base in this photograph.

the roots secure a firm contact with their substrate. Popular materials for growing mounted tillandsias are cork and treefern slabs and driftwood (fig. 18). The material chosen should not have any preservative or sealer applied as this will often prevent rooting and may kill the plant. The material should be large enough to give the plants space to grow but should not be overpowering.

The plants must be very securely tied to their mounting. This can not be overemphasized as loose or wobbly plants will never root adequately. Good materials for tying the plants are fishing line and insulated bell wire. Avoid bare copper or galvanized wire as it may burn the stem or leaves. The plants must be tied near their base just above the root system and just below the living leaves (fig. 19 and 20). If the plant has an extensive root-system or a hard woody stem, this greatly facilitates mounting. A second set of wires may also be required higher up the plant if it is top heavy. These wires may be removed later after the roots have grown and firmly attached the plant to its new home. Once securely mounted, the plant should be placed in its proper growing conditons where it should quickly

(within several weeks to several months) produce new roots and top growth and become tightly attached to its new support.

The following annotated lists of easily grown and obtained species are intended to help the beginner grower. The first ten plants are inexpensive and particularly suitable for anyone with no prior experience but with an interest in these strange and beautiful bromeliads:

1. *Tillandsia aeranthos:* this native of southern S. America is particularly hardy and produces a brilliant inflorescence of red bracts and dark purple flowers.
2. *Tillandsia araujei:* an unusual trailing species with a pink and white inflorescence.
3. *Tillandsia baileyi:* native to Texas and northeast Mexico, very hardy and easily grown, pink bracts and violet flowers.
4. *Tillandsia brachycaulos:* brilliant red foliage with purple blooms.
5. *Tillandsia bulbosa:* rather grotesque, red bracts and purple flowers. Easy if protected from freezing.
6. Tillandsia fasciculata: Florida native with red and yellow bracts and purple flowers. Easy to naturalize on trees.
7. *Tillandsia ionantha:* a delightful miniature with red leaves and tubular violet flowers. Drought and sun tolerant.
8. *Tillandsia meridionalis:* this Bolivian native often blooms at Christmas, pink bracts and white flowers.
9. *Tillandsia streptophylla:* a medium- to large-sized very bulbous and contorted rosette with dusty pink bracts and lavender petals. Protection from freezing is required.
10. *Tillandsia stricta:* very beautiful Brazilian miniature with rose bracts and pale blue flowers. Quickly grows into a specimen cluster and only requires protection from hard freezing in the coldest sites.

The following ten *Tillandsia* species are somewhat less available but equally suitable for most gardeners. Most require winter protection.

11. *Tillandsia argentea:* a Mexican miniature.
12. *Tillandsia argentina:* dark rose flowers from (you guessed it!) Argentina.
13. *Tillandsia bergeri:* very cold-hardy, pale blue flowers.
14. *Tillandsia butzii:* a bulbous and curly Mexican native.
15. *Tillandsia capitata:* quite variable, the best forms are bright red.
16. *Tillandsia concolor:* hard gray leaves with a red or yellow inflorescence.
17. *Tillandsia filifolia:* very delicate fine foliage, pink flowers, from Mexico.
18. *Tillandsia geminiflora:* gray-green leaves and rose bloom.
19. *Tillandsia seleriana:* another odd, bulbous plant from Mexico and Central America, pink bracts with lavender flowers.
20. *Tillandsia xerographica:* a spectacular, large plant with white foliage and yellow and orange bracts, from Guatemala and El Salvador.

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

[Reprinted from the spring and summer issues, 1986, of the Marie Selby Botanical Garden Bulletin *with permission. For a more detailed discussion see Dr. Mark Dimmitt's articles in the* Journal, *November-December, 1984; and May-June, 1985.]*

Questions & Answers

Conducted by Bob Heer and Tom Montgomery

All readers are invited to send their questions and observations about growing bromeliads as a hobby to the editor. Answers will be sent directly to you and some questions will be published.

Q. What fertilizer should be used for terrestrial bromeliads?

A. Cryptanthus, dyckias, hechtias and puyas all seem to thrive on constant moisture and fertilizer. If the plant has a wick and a wet table, or if a suitable reservoir is available, then a balanced fertilizer (20-20-20) can be used at one-quarter strength. Otherwise a balanced fertilizer applied at each watering can be used. Occasionally, it is wise to water with plain water, wait thirty minutes, then flush the pot thoroughly. Time release preparations can be used to good effect by following the manufacturer's directions for the size of the pot involved.

Q. What fertilizer is best for epiphytic bromeliads?

A. We have two definite types of bromeliads that are commonly grown epiphytically, the tank type and the atmospheric type, the tank type being represented by aechmeas and neoregelias, while tillandsias best represent the atmospheric type. Fertilizer requirements for the two types should be considered separately. As we are dealing with plants that have only anchor roots or, perhaps, no roots at all, foliar feeding will have to be utilized as the main source of nutrients. Tank types respond well to feeding every third or fourth watering, using a balanced formula at about one-quarter strength. Since much of the nutrients are retained in the tank, there exists a longer period of absorption. Atmospheric types, having no tank, can tolerate more frequent feeding. This is a distinct departure from the growing instructions of only a few years back. At that time most instructions called for only an occasional misting and fertilizer was seldom mentioned. Now many growers mist with one-quarter strength fertilizer every bright, warm day. It is necessary to use chemicals that are immediately available to these plants, as little can be expected from the roots of mounted plants and there is no potting mix to hold bacteria. Fertilizers compounded for the express purpose of foliar feeding would be most suitable.

Q. What should I use as a potting mix for my variegated pineapple?

A. Terrestrial bromeliads are probably best grown in a crumbly, organic medium containing some soil. These include such genera as *Ananas* (pineapple), *Cryptanthus, Dyckia, Hechtia* and *Puya*. The mix might contain varying amounts of peat moss, top soil, compost, chipped tree bark and some

inorganic material to keep the mix loose and help it to drain—such as sharp sand, fine gravel, vermiculite, perlite, lava rock or haydite. The primary objective is to have a mix with high humus content which holds moisture well, yet drains quickly and is not soggy. You might try one part by volume of each of the following materials: compost or peat, top soil, vermiculite and lava rock or haydite. Most of these genera respond well to 10-30-20 fertilizer.

Q. After many generations of vegetative reproduction do some clones degenerate until they are very difficult to grow and maintain?

A. This is a highly controversial question but, in my opinion, the answer is "yes." Several of my favorite bromeliads in a variety of genera grown, as far as possible to tell, under the same conditions as in past years, have simply gone down over a few generations until that clone is lost or disposed of in the trash. Reacquisition of the plant has eliminated the problem. Other hobbyists tell me they have not experienced a similar problem, so perhaps this problem is related to my growing techniques. As so much natural habitat of wild species is being destroyed, it might be well to investigate this possibility. If true, it would be wise to consider a long term program to propagate our endangered species by seed. Comment from our readers will be appreciated. Send your comments in care of the *Journal* editor.

CORRECTION: Volume XXXVI, Number 4, July-August, 1986, page 182 top line should read: two-thirds full, add one *tablespoon* of 0-18-0 superphosphate or one teaspoon of. . .

WARNING: The use of straight perlite has been recommended in this column. It is an excellent medium when handled properly; however, certain precautions must be observed. This material must be sifted to remove dust and fine particles. Failure to include this operation can result in an almost solid mass resembling plaster of Paris, especially if using material from near the bottom of the bag.

Sift the material through 1/8-inch mesh hardware cloth. Use the material that does not shake through and retain the fine material for another use. The sifting process should never be attempted without an adequate mask. Breathing the large amount of dust generated could produce lung irritation and other long-term problems.

The large particles that you now have should be poured in the pot around the roots, tapped gently to settle and watered immediately. The result will be an open, porous medium that is easily kept damp, capable of complete nutrient control and, most important, air circulation that seems so vital to root health in epiphytes. Do not pack. Perlite is an excellent tool to add to your growing techniques, but like so many tools, its faults and dangers must be respected.

Internationally Accredited Bromeliad Society Judges and Student Judges in Good Standing, October 31, 1986

William F. Frazel

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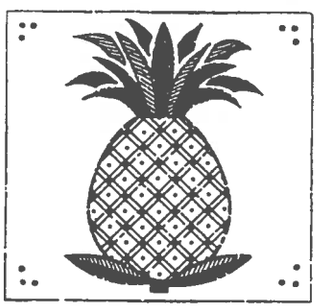

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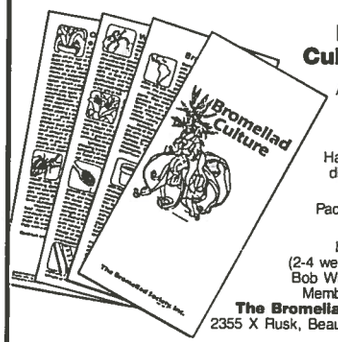

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Calendar of Shows

Send notices for the Calendar to the editor at least 60 days before the *Journal* closing date. For example, the May-June closing date is 1 March. We will always try to fit in late notices, but cannot alter pages once typeset. Show notices are normally limited to events sponsored by Bromeliad Society affiliates or those in which affiliates are taking a major part.

March 22 — First Florida State Bromeliad Auction, sponsored by The Florida Council of Bromeliad Societies, Inc. to be held in the Orlando area. For details contact Carol Johnson (305) 322-7945, or William E. Frazel (305) 474-1349.

May 2-3 — Bromeliad Society of Broward County competitive show. Theme, "A Kaleidoscope of Color." Diecke Auditorium, 5801 Cypress Rd., Plantation, FL. Saturday, 10 a.m. to 5 p.m.; Sunday 10 a.m. to 4 p.m. Maureen Frazel (305) 474-1349.

The Berkeley, California, *Puya raimondii* shown above in full growth and below with flower detail. Please see page 24.

Calendar of Shows is on page 47.