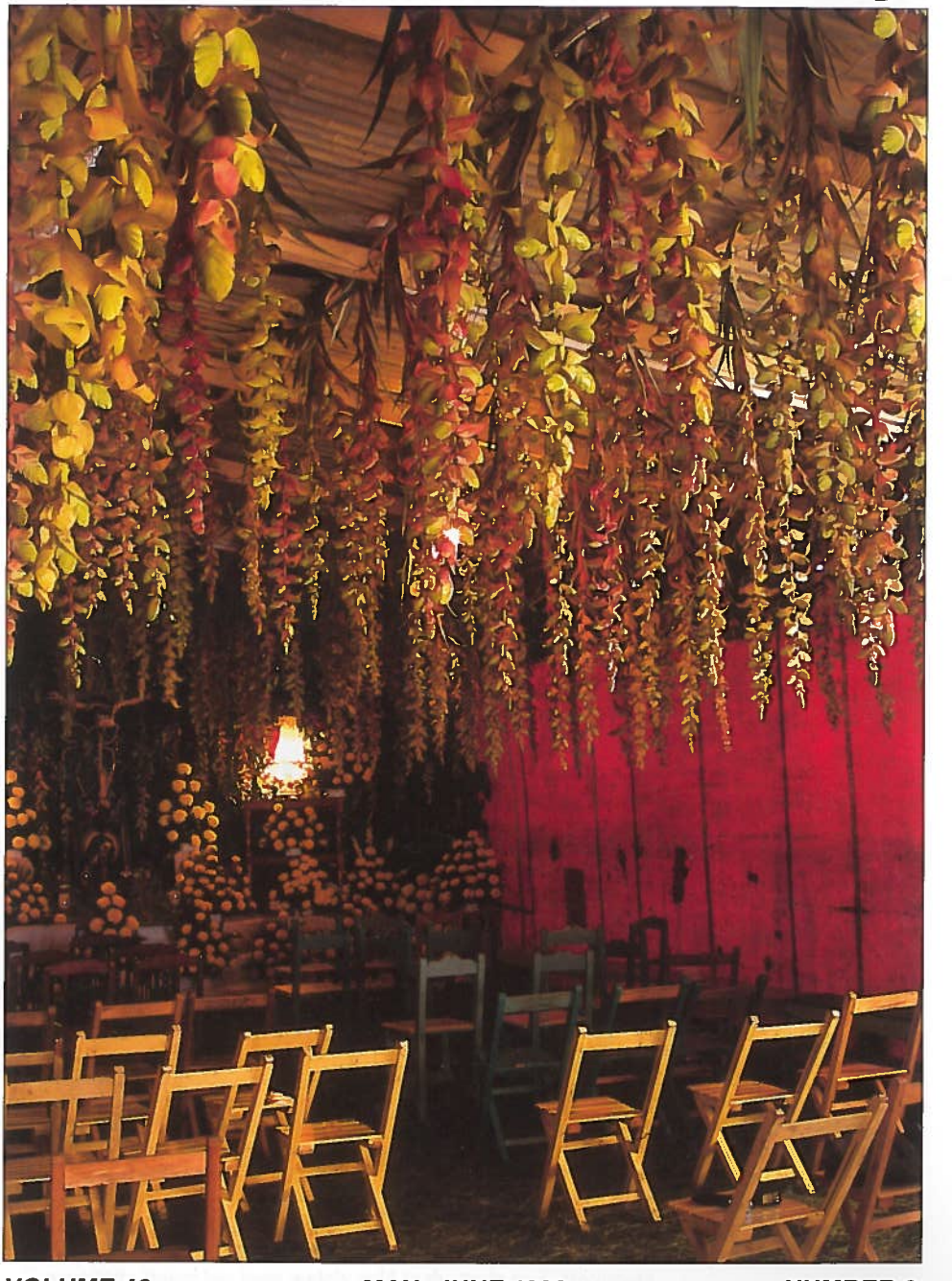
Journal of The Bromeliad Society



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Cover photographs. Front: Over 300 cut inflorescences of *Tillandsia eizii* used to adorn a home alter in San Cristobal de Las Casas, Mexico. Photo by Robert Guess. Text on page 113. Back: *Tillandsia grandis* growing on steep cliffs at its type locality, Barranca de Texolo in the state of Veracruz, Mexico. Photo by Patricia Hernandez. Text begins on page 99.

CONTENTS

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Tillandsia grandis: A Striking Bromeliad

Miguel J. Chazaro[1] and Burl L. Mostul[2]

INTRODUCTION

In 1828 and 1829, two German botanists, Christian Julius Wilheim Schiede and Fernindand Deppe, spent 14 months collecting seeds, dried plant material, wood samples and zoological specimens in the central part of Veracruz State and the adjacent part of Puebla State in central Mexico. They traveled by foot, horseback and muleback collecting abundant material to send back to Europe. In the process they discovered several genera and over 400 species new to science.

Most of the taxa were described by the prominent German taxonomists, Diedrich Friedrich Leonard von Schlechtendal and Adalbert von Chamisso in the German Journal Linnaea in a series of articles under the title "Plantarum Mexicanum". This was later changed to "De Plantis Mexicani", written in Latin. The articles were published between 1829 and 1845.

Schiede and Deppe discovered novelties in a number of plant families, including both nonflowering plants (Pteridophytes) and flowering plants (Gymnosperms and Angiosperms). The genus *Deppea* (Rubiaceae) and *Schiedella* (Orchidaceae) as well as numerous taxa under the specific epithets schiediana or schiedei and deppeana or deppei commemorate their names (Chazaro, 1982).

Among the Bromeliaceae found by them and new to science were *Catopsis aloides, C. apicroides,*[3] *Pitcairnia schiedeana, Tillandsia brachycaulos, T. caespitosa,*[4] *T. circinnata,*[5] *T. deppeana, T. filifolia, T. grandis, T. punctulata, T. schiedeana, T. tricolor* and others.

This is the first in a series of papers that we intend to publish which aim to provide specific data and photos on some interesting Bromeliaceae occurring in central Mexico.

Tillandsia grandis Schlechtendal

One of the authors (M. Chazaro) was born at Xalapa, Veracruz, Mexico, grew up there, and obtained his bachelor degree in Biology at the local university. He spent several years in the 1980's engaged in botanical activities and is quite familiar with the geography and flora of the area visited by Schiede and Deppe 167 years ago. The city of Xalapa is located in the heart of this area.

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[3] *Catopsis aloides* and *C. apicroides* are now synonyms for *Catopsis sessiliflora* Ruiz & Pavon.
[4] *Tillandsia caespitosa* is now synonymous with *Tillandsia multicaulis* Steudel.
[5] *Tillandsia circinnata* Schlectendal is a synonym for *T. streptophylla* Scheidweiler ex Morren. *T. paucifolia* Baker has been widely sold in the trade as *T. circinnata.*

In a couple of papers by the senior author (Chazaro, 1987 and 1988), very general information about *Tillandsia grandis* was furnished.

In July and August of 1828, Schiede and Deppe stayed six weeks at Hacienda La Laguna, 12 miles northeast of the city of Teocelo on the property of an Englishman, Mr. Heaven (Chazaro 1982 and 1989). One day they explored the big ravine of Teocelo, and as they walked down they came across a huge bromeliad thriving on the rocky cliffs. It was later described by Schlechtendal (1844) as *Tillandsia grandis,* an appropriate name since this is by far the largest bromeliad in Mexico.

Miguel Chazaro

Figure 1.
Tillandsia grandis in habitat. State of Veracruz, Mexico.

Although geographic distribution of this plant ranges from central Mexico down to Guatamala, Belize, and Honduras (Chazaro, 1987), our field experience with this taxon comes from the central part of Veracruz (Xalapa–Orizaba region), including the type locality at Teocelo ravine. It grows abundantly there, usually forming colonies on rocky cliffs, both of volcanic and limestone substrate; from 400 up to 450 masl. It always grows in frost free areas, hence it is not hardy. Therefore in northern or southern temperate countries it should be cultivated in a greenhouse. *Tillandsia grandis* is strictly a rupicolous (grows on rocks) species, occurring in the nearby tropical subevergreen forest, the montane rain forest, or in cloud forest. Rainfall in these altitudinal belts measures from 1500 up to 2000 mm per year.

In Mexico, *Tillandsia grandis* is restricted to the southeast in the states of Veracruz, Oaxaca, and Chiapas. It is unknown from the western states.

The inflorescence forms a big columnar structure with the spikes pointing upward (see photos). The ephemeral flowers emerge from among the bracts of the spikes from January to March. Due to the white color we assume that they are nocturnal and as a consequence the pollinators should be moths.

Miguel Chazaro

Figure 2.
Candelabra-like inflorescence of *Tillandsia Grandis.*

Miguel Chazaro

Figure 3.
Single flower of *Tillandsia grandis.*

It is of interest to cite the data by Graf (1957) that the inflorescence can reach 11 feet and take 35 years to produce flowers, according to observations made by Mulford Foster in plants cultivated at his home.

Finally, we would like to point out that *T. grandis* was not included among the numerous species treated by Isley (1987).

ACKNOWLEDGMENTS

We would like to express our thanks to the BSI, which provided a small grant through the Victoria Padilla Research Fund which allows us in part to carry out this field work.

M. Chazaro is grateful to the Sistema Nacional de Investigadores (CSNI) of the Consejo Nacional de Ciencia y Tecnologia (CONACYT) in Mexico City for their economic support.

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And finally to Prof. Manual Morales and Prof. Evangelina Salinas, director and secretary of the School of Geography, University of Guadalajara for their academic support.

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Zapopan, Jalisco, Mexico

Puya butcheriana

Derek Butcher **Photograph by the Author**

Eureka!...roughly translates as "It has just been found!", but let us start at the beginning.

In the late 1970's I was getting cactus seed from Karel Knize of Lima, Peru and also obtained seeds of various named species of Puya. One was labeled as "P. filifera," a name that I could not trace in any botanical literature to which I had access. Most of these puyas grew and were continually repotted until they became so large that I donated them to the Adelaide Botanical Garden. The one exception was this "P. filifera" which stayed relatively small, and various plants were circulated amongst the keen Adelaide growers of prickly things. I kept one plant for my front garden.

It was not until 1991 when Len Colgan and I were discussing the merits of this plant that we decided to send bits to Harry Luther for naming. I borrowed an inflorescence and one leaf from Len and sent them in a package to Selby Gardens. Harry wrote back that he could not find a name but that he would refer the matter to Dr. Lyman Smith. All went quiet until 1995 when I found out from Renate Ehlers that her friend Lotte Hromradnik was the German expert on *Puya.*

I sent her a photograph and other information because after all, I could not part with an inflorescence from my own plant! She felt the plant might be *P. humilis* which was very common in Bolivia and this had me rushing to my bible — Smith and Downs.[1] However, here it said petals were green and drying to blue or violet. Mine had live petals that were black (Figure 4). My plant also differed from the description in other ways, so I did not change the label. Perhaps I should add here that Harry Luther says there is only one bromeliad with black petals and that is a *Pitcairnia.*

Just before Christmas, 1995, a parcel arrived from Selby Gardens with SELBYANA volume 16, number 2 inside with a usual laconic note from Harry Luther saying something like, "Thought you'd be interested." In skimming through the pages I was somewhat aghast to see that I had been Latinized!...the first Aussie to have had this done to him for the family Bromeliaceae.

This information had me immediately contacting Trevor Christensen, the curator of the bromeliad collection at the Adelaide Botanic Gardens, so that he could correct their label. Alas, we could find no reference to "P. filifera" but on further discussion he did have an unknown Puya with black flowers which sounded like the one I was talking about. So my wife and two grandsons piled

[1] Smith, L.B. and R.J. Downs. 1974, Flora Neotropica Monograph 14, Part 1. Hafner Press, New York, NY.

into the car to pay a visit to the Botanic Gardens. Yes, the plants were there and the dried inflorescences were very suggestive of MY plant. These plants had been grown from seed collected by Myron Kimnach in 1984 (#2784) at 3300 m elevation at KM 79 on the Cochabamba – Epizana road in Bolivia. If these plants can be linked to my plant then at least we would have habitat details. Seeds from the same collection (Kimnach #2784) were grown by the International Succulent Institute (I.S.I.) and seedlings offered for sale in 1988 and 1989 under the Identification number of ISI#867.

Figure 4.
Puya butcheriana H. Luther.

I have found that although this *Puya* does form clumps, its offsets are very difficult to root, meaning propagation would be mainly from seed. It is a small plant which grows well in a 20 cm pot. If you don't mind a few prickles, it is a welcome addition to any bromeliad, or dare I say it, succulent collection. The clone of the type specimen is alive and well in Adelaide, albeit in the collection of Len Colgan.

Needless to say, it was quite an honor to be Latinized, but now I have to worry about getting lost in synonymy. If that does occur, I'll accept it with the greatest humility, but I'll be forever stating that the petals on "mine" are black and not green, **and** the plant in my front yard will still continue to bear the name *Puya butcheriana* proudly printed on the label.

Fulham, South Australia

Puya butcheriana: A New Species

Harry Luther

Puya butcheriana H. Luther, sp. nov. (Figure 5).

Type. Origin unknown, probably Peru or Bolivia, flowered in cultivation in Australia; grown from seed sold by K. Knize, Lima, Peru as "Puya filifera", 24 January 1992, *D. Butcher s.n.* (Holotype: SEL).

A *P. humilis* Mez, cui affinis similisque, planta majoribus, inflorescentia longiore exilique, bracteis florigeris minoribus et minute serratis differt; a *P. tunarensis* Mez, cui similis, planta minoribus, inflorescentia exili, bracteis florigeris minute serratis differt.

Plant flowering to 37 cm tall. **Leaves** densely rosulate, spreading, 25–30 cm long, grey-green adaxially, silver abaxially. **Leaf Sheaths** broadly elliptic, 25 × 20 mm, somewhat castaneous, glabrous, lustrous. **Leaf Blades** narrowly triangular, acute, pungent, 7–11 mm wide, appressed cinereous lepidote especially abaxially, serrate with slender, antrorse, reddish spines 3–4 mm long. **Scape** erect, 12 cm × 5 mm, white stellate lepidote. **Scape bracts** erect, imbricate, the lowest foliaceous, the upper elliptic, acute to attenuate, entire, thin coriaceous, nerved, cinereous lepidote, rose. **Inflorescence** erect, simple, very slenderly cylindric, 21 × 1–2 cm, ca 80–flowered. **Floral bracts** erect and tightly imbricate in life, spreading to somewhat recurving at the apex when dried, elliptic to oblanceolate, broadly acute, apiculate to pungent, 12–21 mm long, inconspicuously and irregularly serrate, thin coriaceous, nerved, white lepidote, rose. **Flowers** with a stout 1–2 mm long pedicel, erect to slightly spreading. **Sepals** elliptic, broadly acute, 12–14 mm long, thin coriaceous, the adaxial pair carinate, white lepidote, pale green. **Corolla** with slightly spreading lobes. **Petals** spathulate, obtuse to emarginate, 16–18 mm long, dark blue-violet. **Stamens** and **style** included.

This new, rather dwarf species of *Puya* seems most closely related to the Bolivian *P. humilis* but can be distinguished from it by its greater size and taller, very slender inflorescence and smaller, minutely serrate floral bracts. Using the latest key to the genus *Puya* (Smith & Downs 1974), dried material of *P. butcheriana* would (due to recurving floral bracts) key out as *P. tunarensis,* also from Bolivia; but the former can be separated by its smaller stature, more slender inflorescence, and inconspicuously serrate floral bracts. The floral bracts of *P. butcheriana* are also softer and thinner-textured.

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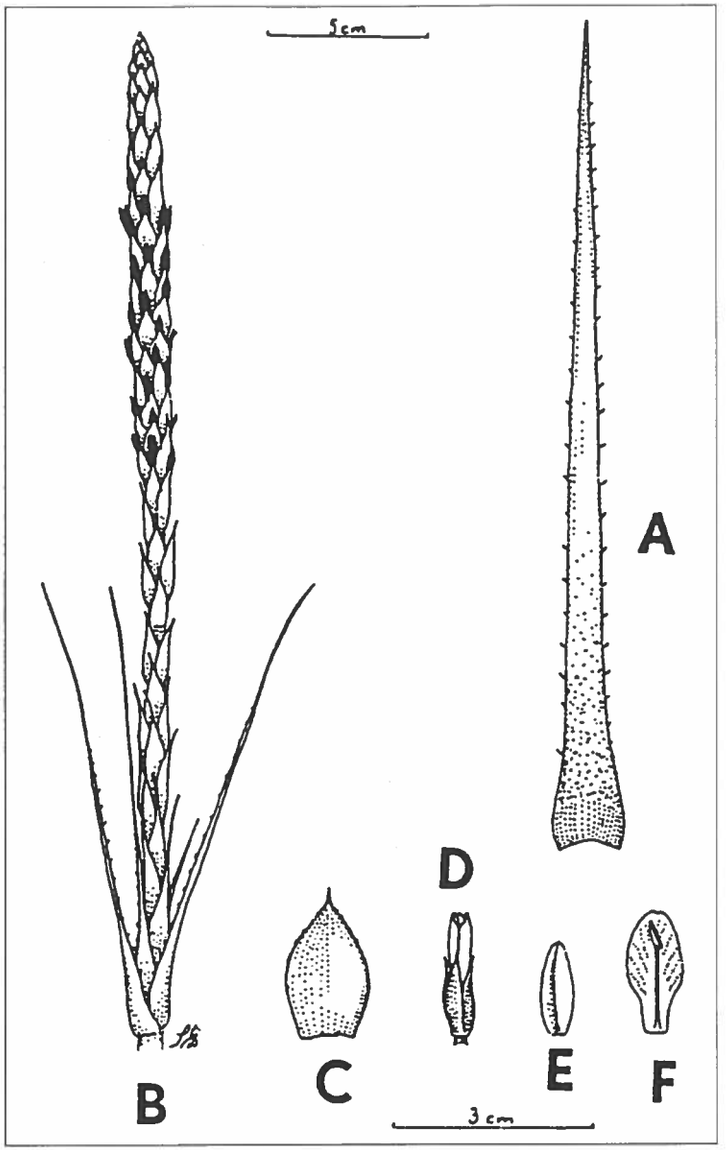

Figure 5.
Puya butcheriana. A, leaf, adaxial surface; B, inflorescence; C, floral bract; D, flower; E, sepal; F, petal and stamen.

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

Reprinted in part from SELBYANA, "Miscellaneous New Taxa of Bromeliaceae (X)," 16(2), 235–238.

A Study of Evolutionary Relationships in Bromeliaceae Based on Comparison of DNA Sequences from the Chloroplast Gene *ndh*F

Randall G. Terry and Gregory K. Brown

Molecular biology is having a major impact upon other biological disciplines, including plant systematics. Data from DNA molecules (e.g., DNA sequence), also known as "molecular data", are having a powerful impact on resolving longstanding evolutionary and taxonomic questions. These molecular data are being used to produce robust hypotheses of molecular evolution that likely reflect at least some component of the natural history of the group under study. Note, however, that molecular data have some of the same limitations inherent to traditional types of data (e.g., morphological). See Doyle (1993) for a discussion of these recognized limitations.

Recent studies have used DNA sequences from the chloroplast gene *ndh*F to examine evolutionary relationships in Bromeliaceae (Terry et al. 1996a, 1996b). Exemplars from 52 species were sequenced for *ndh*F (Table 1). Generic representation (sensu Smith & Downs 1974, 1977, 1979) per subfamily included 15 of 30 genera for *Bromelioideae,* 8 of 15 genera for *Pitcairnioideae,* and 6 of 6 genera for *Tillandsioideae.* DNA was extracted from leaves (Doyle and Doyle 1987), a segment of DNA containing most of the *ndh*F gene was amplified using the polymerase chain reaction (PCR), and the nucleotide sequence of the amplified *ndh*F was determined using standard methods (Sanger et al. 1977).

Diagnostic changes in the DNA sequence shared between two or more taxa were used to construct phylogenetic trees using PAUP (Phylogenetic Analysis using Parsimony; version 3.1.1; Swofford 1993). DNA sequencing studies with the chloroplast gene *rbc*L indicate the Rapateaceae to be the family most closely related to the Bromeliaceae (Duvall et al. 1993). Thus Rapateaceae *(Stegolepis)* is included in the analysis as the "outgroup" to establish the direction of character–state change in the "ingroup", (i.e., the Bromeliaceae). Consult Terry et al. (1996) for details of all the methods used.

The phylogenetic analysis of *ndh*F sequences identified four principal lineages in Bromeliaceae: 1) *Brocchinia;* 2) Tillandsioideae sensu Smith & Downs (1977); 3) Pitcairnioideae sensu Smith & Downs (1974) minus *Brocchinia* and *Puya;* and 4) Bromelioideae sensu Smith & Downs (1979) plus *Puya* (Figure 1). With respect to subfamily relationships, Bromelioideae is the sister-taxon to a paraphyletic Pitcairnioideae (i.e., these two lineages share a most recent common ancestor), and the Tillandsioideae is basal to the Bromelioideae–Pitcairnioideae lineage. *Brocchinia* is positioned at the base of the Bromeliaceae, and represents the sister–taxon to the remainder of the family.

Tillandsioideae and Bromelioideae (Smith and Downs 1977, 1979) are monophyletic in the molecular phylogeny (i.e., each subfamily consists of groups of genera that share a most recent common ancestor; Figure 6). This finding suggests that those morphological features useful in defining Tillandsioideae and Bromelioideae are attributable to the common ancestry of constituent species. In contrast, *ndh*F sequence data indicate that Pitcairnioideae (Smith & Downs 1974) is paraphyletic, (i.e., not all members of the subfamily are derived from a common ancestor). Most notable is the resolution of *Brocchinia* at the base of Bromeliaceae. This placement supports the common ancestry of *Brocchinia* with all other members of the family and, considering the distinctive qualities of many *Brocchinia* (Smith and Downs 1974; Benzing et al. 1985), has important implications for character evolution in the family. The paraphyletic status of Pitcairnioideae (sensu Smith & Downs 1974) in the molecular phylogeny is further evidenced by the inclusion of *Puya* in a lineage with Bromelioideae.

The basal resolution of *Brocchinia,* and studies of character evolution in Bromeliaceae (Terry, unpubl. data), indicate that Pitcairnioideae are most ancestral-like with respect to ecological habit (i.e., terrestrial with C3 photosynthetic metabolism). This finding suggests that an ancestor similar to the extant pitcairnioid ecological habit served as an ancestral stock from which the principal lineages of the family arose (see Smith 1989). Epiphytism appears to have arisen independently in Tillandsioideae, Bromelioideae, and *Brocchinia,* suggesting a predisposition towards this adaptive strategy in ancestral Bromeliaceae.

Although *ndh*F sequences maintain the monophyly of Tillandsioideae (Smith and Downs 1977), the inclusion of *Catopsis* and *Glomeropitcairnia* in this lineage are weakly supported (Figure 7). A group containing representatives from *Tillandsia, Vriesea, Guzmania,* and *Mezobromelia* is more strongly supported, as are groups containing a component of *Vriesea* subgenus *Vriesea* section *Xiphion (V. gladioliflora, V. vittata,* and *V. viridiflora)* and *Catopsis (C. montana* and *C. wangerinii).* The *ndh*F phylogeny indicates that *Tillandsia, Vriesea,* and *Guzmania,* as well as several subgenera of *Tillandsia* (Subg. *Anoplophytum, Allardtia, Tillandsia)* and *Vriesea* (subg. *Vriesea* sect. *Vriesea,* subg. *Vriesea* sect. *Xiphion),* are paraphyletic. A lineage consisting largely of species from *Tillandsia* and *Guzmania* is identified, suggesting a close relationship between these genera. *Mezobromelia* appears to be more closely related to a component of *Vriesea* subg. *Vriesea* sect. *Xiphion.*

A notable feature of the *ndh*F phylogenies of Terry et al. (1996a, 1996b) is the lack of resolution and poor branch support for many evolutionary lines. This result is surprising, considering both the length of *ndh*F (> 2000 base pairs) and mutation rates documented for the gene (Olmstead et al. 1993; Wolfe 1991; see Terry et al. 1996b). Gaut et al. (1992) have documented a decreased mutation rate for the chloroplast gene *rbc*L in Bromeliaceae compared to several other monocot families. In addition, the mutation rate of *ndh*F appears to be comparable to that of *rbc*L in Bromeliaceae, although *ndh*F evolves over twice as fast as *rbc*L in several

other groups of flowering plants (e.g., Olmstead and Reeves 1995; Scotland et al. 1995). These observations are consistent with an overall decreased rate of molecular evolution in the chloroplast genome of Bromeliaceae, and indicate that molecular data from other regions of DNA, perhaps from the nucleus, will be required to resolve relationships among some Bromeliaceae.

Despite these shortcomings, results from phylogenetic analysis of *ndh*F sequences represent an initial attempt at understanding evolutionary relationships in Tillandsioideae using molecular data, and are consistent with a previous study addressing relationships among bromeliad subfamilies using restriction site data (Ranker et al. 1990; see Terry et al. 1996a). Relationships maintained by *ndh*F sequences provide hypotheses that can be tested with other data sets, both molecular and traditional, and are an important contribution to the understanding of evolutionary relationships in Bromeliaceae

Table I. Sources of plant material included in the studies of evolutionary relationships among Bromeliaceae using *ndh*F sequences (Terry et al., 1996a, 1996b).

RM	Rocky Mountain Herbarium, University of Wyoming, Laramie, Wyoming.
SEL	Selby Botanical Gardens, Sarasota, Florida
HB	Herbarium Bradeanum, Rio de Janeiro, Brazil
WIS	University of Wisconsin Herbarium, Madison, Wisconsin

Family/Subfamily	Species	Voucher
Rapateaceae	*Stegolepis hitchcockii* Maguire	Givnish s.n. (WIS)
Bromeliaceae		
Bromelioideae	*Aechmea haltonii* H. Luther	SEL 85–1447 (SEL)
	Ananas ananassoides (Baker) L.B. Smith	Brown 3129 (RM)
	Areaococcus pectinatus L.B. Smith	SEL 85–231 (SEL)
	Billbergia macrolepis L.B. Smith	SEL 91–6 (SEL)
	Bromelia sp.	Brown 3128 (RM)
	Canistrum giganteum (Baker) L.B. Smith	Brown 3183 (RM)
	Cryptanthus beuckeri E. Morren	SEL 89–499 (SEL)
	Hohenbergia disjuncta L.B. Smith	SEL 83–393 (SEL)
	Lymania alvimii (L.B. Smith & Read) Read	SEL 90–297 (SEL)
	Neoregelia pineliana var. *pineliana* (Lem.) L.B. Smith	SEL 86–261 (SEL)

Family/Subfamily	Species	Voucher
	Nidularium selloanum (Baker) E. Pereira	Leme 1830 (HB)
	Orthophytum gurkenii Hutchinson	SEL 88–268 (SEL)
	Quesnelia marmorata (Lem.) Read	SEL 83–68 (SEL)
	Ronnbergia petersii L.B. Smith	SEL 78–907 (SEL)
	Wittrockia leucophoea (Baker) Leme	Leme 987 (HB)
Pitcairnioideae		
	Brocchinia acuminata L.B. Smith	SEL 81–1937 (SEL)
	Dyckia sp.	Brown 3131 (RM)
	Encholirium sp.	SEL 84–364 (SEL)
	Fosterella penduliflora (C.H. Wright) L.B. Smith	SEL 69–1976–12 (SEL)
	Navia splendens L.B. Smith	SEL 83–288 (SEL)
	Pepinia hirtzii H. Luther	SEL 93–294 (SEL)
	Pitcairnia carinata Mez	Brown 3173 (RM)
	Puya aequatorialis André	SEL 93–211 (SEL)
Tillandsioideae		
	Catopsis montana L.B. Smith	SEL 91–0003 (SEL)
	Catopsis wangerinii Mez & Wercklé ex Mez	Palací 1235 (RM)
	Glomeropitcairnia penduliflora (Griseb.) Mez	Givnish s.n. (WIS)
	Guzmania monostachia (L.) Rusby ex Mez	SEL 82–0225 (SEL)
	Guzmania nicaraguensis Mez & C.F. Baker ex Mez	SEL 86–0773 (SEL)
	Guzmania plicatifolia L.B. Smith	SEL 85–1345 (SEL)
	Guzmania rhonhofiana Harms	SEL 80–1130 (SEL)
	Guzmania sanguinea (André) André ex Mez	SEL 80–0527 (SEL)
	Guzmania spectabilis (Mez & Wercklé) Utley	SEL 99–0661 (SEL)
	Guzmania wittmackii (André) André ex Mez	SEL 73–0004–038 (SEL)
	Mezobromelia pleiosticha (Griseb.) Utley & H. Luther	SEL 81–1986 (SEL)
	Racinaea fraseri Baker	Brown 2910 (RM)
	Tillandsia bergeri Mez	Brown 3217 (RM)
	Tillandsia complanata Benth.	SEL 79–0519 (SEL)
	Tillandsia dodsonii L.B. Smith	Brown 3218 (RM)

Family/Subfamily	Species	Voucher
	Tillandsia funckiana Baker	Brown 3219 (RM)
	Tillandsia geminiflora Brongn.	SEL 81–1942 (SEL)
	Tillandsia secunda Humb., Bonpl., & Kunth	Brown 2909 (RM)
	Tillandsia tricholepis Baker	SEL 81–1293 (SEL)
	Tillandsia utriculata L.	Brown 3211 (RM)
	Vriesea espinosae (L.B. sm.) Gilmartin	Brown 3207 (RM)
	Vriesea gladioliflora (H. Wendl) Antoine	SEL 80–0485 (SEL)
	Vriesea glutinosa Lindl.	SEL 86–0303 (SEL)
	Vriesea malzinei E. Morren	SEL 78–0757 (SEL)
	Vriesea splendens (Brongn.) Lem.	SEL 90–0817 (SEL)
	Vriesea triligulata Mez	SEL 85–0677 (SEL)
	Vriesea viridiflora (Regel) Wittm. ex Mez	SEL 90–0282 (SEL)
	Vriesea vittata (Mez & Wercklé) L.B. Sm. & Pittendr.	SEL 91–9138 (SEL)

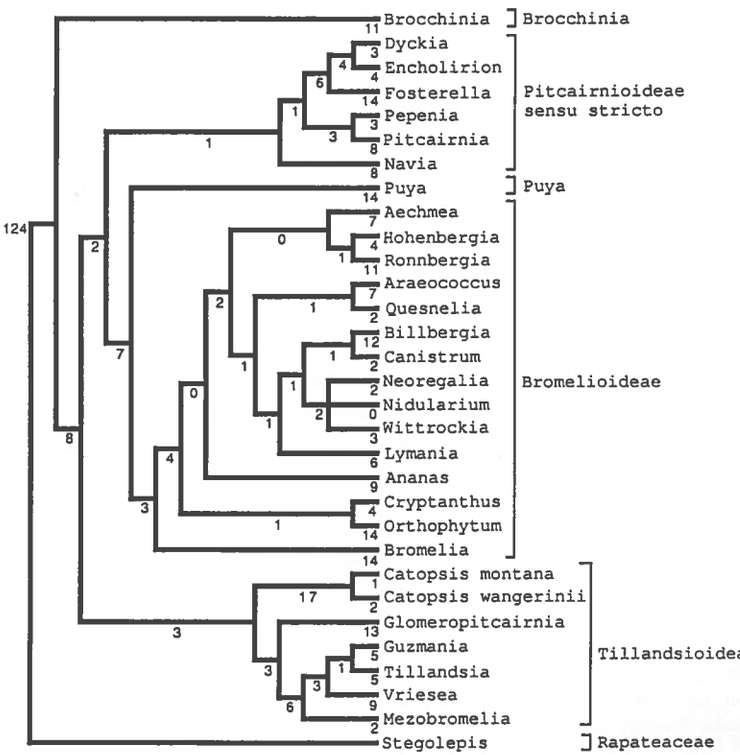

Figure 6.

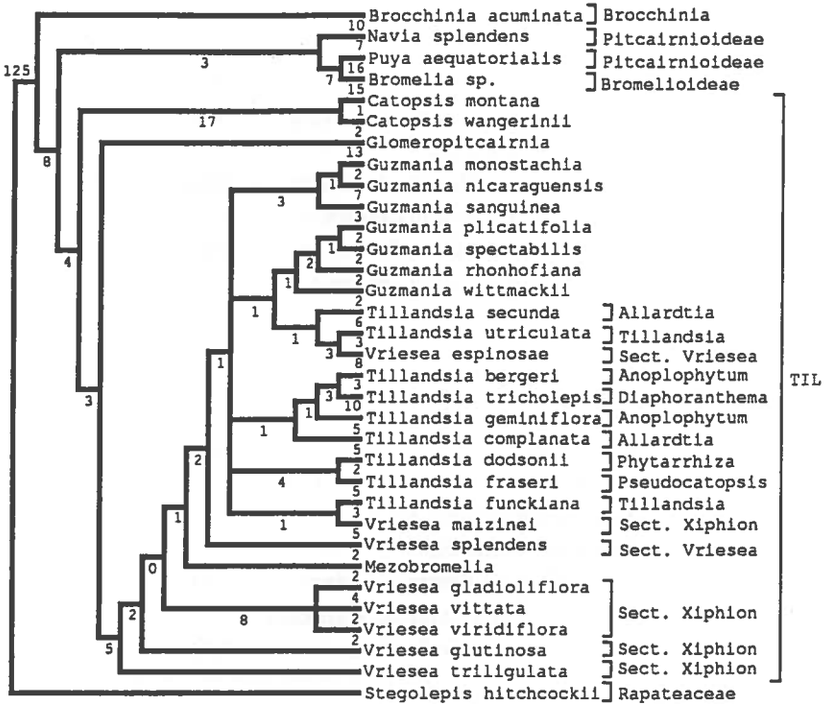

Figure 7.

ACKNOWLEDGMENTS:

We thank H. Luther and the Marie Selby Botanical Gardens for providing access to their collections, C. Palací, University of Wyoming, for supplying material of *Catopsis,* Dr. Richard Olmstead, University of Colorado, for expertise and guidance, and Dr. Thomas Givnish and Dr. Kenneth Sytsma, University of Wisconsin, for providing *Glomeropitcairnia* DNA and the *ndh*F sequence of *Stegolepis* (Rapateaceae). Support of the National Science Foundation (BSR–9108268 to GKB) and the Bromeliad Society International (to RGT) is gratefully acknowledged.

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[Continued on page 123]

Reestablishment of *Tillandsia eizii* in a Protected Habitat

Robert Guess and Virginia Guess

Photographs by Robert Guess

Tillandsia eizii L.B. Smith is one of the most spectacular epiphytic bromeliads that grows in highland Chiapas, Mexico. Because of its extraordinary beauty, the indigenous Maya Indians and local Ladinos use the long pendulous inflorescence of tiered, soft pink bracts and green spikes to decorate their shrines, churches and private homes. They cut thousands each year.

In a mature plant, the rosette of strap-like leaves often reaches a diameter of 1 meter with an inflorescence of up to 1.5 to 2 meters long. This monocarpic species reproduces exclusively by seed, and young plants require 8 to 10 years to mature. The fragile balance between present supply and demand for the prized inflorescence coupled with diminishing forests and increasing population in this southernmost state of Mexico potentially threaten the long-term survival of the species.

Positive results from a feasibility study suggest a method to preserve significant numbers of this bromeliad and to reintroduce the species into a local forest where it once thrived. Our project involves four stages: 1) collection of plants from their natural habitat prior to the emergence of inflorescences; 2) a safe place for the plants to mature and set seeds; 3) a suitable growing environment where liberated seeds can germinate and develop; and 4) a long-term plan to protect this environment from indiscriminate cutting and harvesting of the inflorescences.

Fortunately, we are associated with a Tzotzil-speaking Maya whose assistance is essential to the success of the project. As a participant in the religious cycle of his community where *T. eizii* is incorporated into the sacred rituals, his experience allows him to identify the plants before the distinctive inflorescences emerge.

He gathers a supply of developing plants from remote forests and transports them to a large garden in San Cristobal de Las Casas. Here, for the next 18 months to 2 years, they continue their growth cycle and produce flowering inflorescences. After pollination by several species of hummingbirds, they eventually set seeds.

Following our first experience with seed dispersal in the garden, however, very few new plants developed. We attributed this to the lack of necessary substratum on the trees, and looked for a more appropriate habitat. In the natural forest setting, oak trees provide the favored medium.

The recent acquisition by a local Non-Government Organization **(PRONATURA CHIAPAS)** of 80 hectares of secondary-growth forest on the outer urban rim of San Cristobal de Las Casas offered a solution to our dilemma. Up to the early 1900s when it was completely cut over, this oak-forested area mixed with a few pine and madrone trees supported a variety of bromeliad species, including *T. eizii.*

Figure 8.
Spike of *T. eizii* with seed capsules.

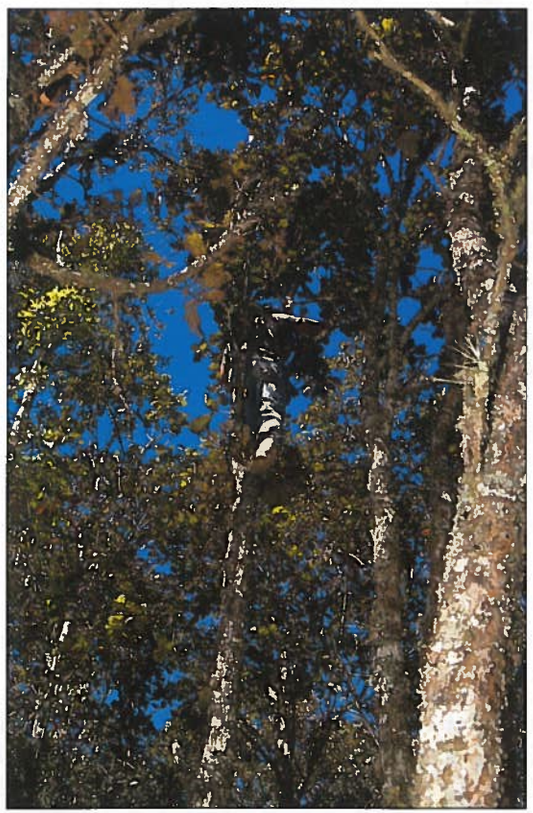

Figure 9.
Attaching seed filled *T. eizii* plants to lichen covered branches.

Figure 10.
Tillandsia eizii at various stages of development in a private garden.

The Maya Indians who live in adjacent hamlets have used the network of footpaths that traverse this forest for centuries. They also have cut the trees for firewood and harvested most of the large flowering bromeliads. Today only scattered remnants of 10 to 15 species of generally small Tillandsias grow in this regenerating forest.

In January of 1995, we removed four mature plants from the garden prior to dehiscence of their seed capsules and transported them to the **PRONATURA CHIAPAS** Reserve. Our associate then attached the plants high in separate oak trees in a less accessible area away from the well-traveled paths. One year later, hundreds of small plants of *T. eizii,* each measuring approximately 5 mm in height, covered the upper portions of these four trees. We intend to continue monitoring the growth of these new plants and to record their progress.

The administrators of **PRONATURA CHIAPAS** plan to maintain the forest as a biological reserve. This gives us the opportunity to expand the project and possibly reestablish significant numbers of *T. eizii* in the area. By using additional public and private gardens to care for developing plants where the townspeople can observe the life cycle, we hope to raise the level of awareness in the community about this threatened bromeliad.

Such a reintroduction of a species requires community education, long-term commitment, and patience. At least two decades may pass before *T. eizii* will again reestablish itself in the Reserve. If successful, this forest may be one of the few accessible areas where residents and visitors alike can appreciate the beauty of this bromeliad in a natural habitat.

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

Cultivar/Grex Registrations for June 1994 Thru October 1995

Ellen Baskerville

Genus Name		Cult/ Grex	Collector/ Hybridizer	Parentage
Aechmea				
Ae.	'Big John' 8–30–95	C	E. Baskerville*	
	[An exceptionally large cultivar of *Ae. nudicaulis* v. *nudicaulis,* 75–90 cm tall with broad green leaves and bright orange bracts. From the collection of John Anderson. May possibly be found in other collections under the name of *Ae. pseudonudicaulis.*]			
Ae.	Fascimoore 8–7–95	G	Samuel Smith	*moorei* × *fasciata* v. *purpurea*
Ae.	'Hazel Quilhot' 8–7–95	C	H. Quilhot	Cultivar of *Ae. chantinii*
Ae.	Jack 8–6–95	G	Samuel Smith	*moorei* × *brevicollis*
Ae.	'Peggy Joe' 8–7–95	C	Samuel Smith	*moorei* × *fasciata* v. *purpurea* cultivar of Fascimoore
Billbergia				
Bi.	'Arribella' 8–15–95	C	Don Beadle	'Arriba' × 'Estrella' (#1193)
Bi.	'Bob' 8–15–95	C	Don Beadle	*amoena* 'R.L. Frasier' × *vittata* 'Domingos Martins' (#1266)
Bi.	'Domingos Martins' 8–15–95	C	Don Beadle*	Cultivar of *vittata* collected by Georgia Waggoner & Bob Whitman near Domingos Martins, Espirito Santo, Brazil
Bi.	'Esther' 10–20–95	C	Wally Berg	Thelma Darling Hodge × *elegans*
Bi.	'Grande'	C	Mike Kashkin*	unknown parentage
	[Formerly known as Gerda, but is obviously not the M. Foster hybrid, Gerda. This plant has unknown parentage and was named 'Grande' by Mike Kashkin of Fuchsialand.]			
Bi.	'Hallelujah' 8–15–95	C	Don Beadle	*vittata* 'Domingos Martins' × *amoena* 'Ed McWilliams' (#1260)

Genus Name		Cult/ Grex	Collector/ Hybridizer	Parentage
Bi.	'Naranja' 8–15–95	C	Don Beadle	F_2 of Fantasia (#1026)
Bi.	'Picale' 8–15–95	C	Don Beadle	'Birdsong' × 'Luna Blanca' (#1108)
Cryptanthus				
Cr.	'Alberta' 9–14–94	C	Jim Irvin	'Cloud Cover' × 'Silver Star' (#C20)
Cr.	'Aunt Beulah' 8–30–95	C	Jim Irvin	Goldie Langdon × Icecile (#C–72)
Cr.	'Circuit Breaker' 9–14–94	C	Jim Irvin	Kamehameha × Zonatus Silver (#C14)
Cr.	'Confection' 8–30–95	C	Jim Irvin	Fine Feathers × (Madame Ganna Walska × *zonatus)*
Cr.	'Durrell' 9–14–94	C	Jim Irvin	Diverse Pink × 'Cascade' (#C92)
Cr.	'Earth Angel' 8–95	C	C. Richtmyer	*sinuosus* × 'Lirico'
Cr.	'Jennifer' 8–95	C	C. Richtmyer	'High N' Mighty' × 'Hawaiian Beauty'
Cr.	'Miss Priss' 9–14–94	C	Jim Irvin	'Peaches' × Diverse Pink (#C43)
Cr.	'Paradox' 8–30–95	C	Jim Irvin	Diverse Pink × Diverse (#C–76)
Cr.	'Pink Floyd' 8–95	C	C. Richtmyer	*sinuosus* × 'Lirico'
Cr.	'Pixie' 9–14–94	C	Jim Irvin	'Peaches' × *colnagoi* (#C152)
Cr.	'Roman Candle' 8–30–95	C	Jim Irvin	Diverse Pink × 'Cascade' (#C–92)
Cr.	'Silly Sue' 8–19–95	C	Marty Baxley	Seafoam × 'Jimmy Antle'
Cr.	'Sweet Tooth' 9–14–94	C	Jim Irvin	Black Mystic × 'Kit Hilbers' (#C13)

Genus	Name	Cult/ Grex	Collector/ Hybridizer	Parentage
Cr.	'Tabasco' 9–14–94	C	Jim Irvin	*colnagoi* × Diverse Pink (#C61)
Cr.	'Whisper' 9–14–94	C	Jim Irvin	'Bon Ton' × 'Kit Hilbers'
× *Neomea* [*Neoregelia* × *Aechmea*]				
Nm.	'Caldera' 10–10–95	C	R.L. Frasier	*Ae. biflora**** × *Ne.* #27 [*carcharodon* × (*pauciflora* × *carolinae*)]
Nm.	'Mundillo' 10–10–95	C	R.L. Frasier	*Ae. biflora**** × *Ne. macwilliamsii*
× *Neophytum* [*Neoregelia* × *Orthophytum*]				
Np.	'Lisanne Kiehl' 8–20–95	C	M. Kiehl	*Or. navioides* × *Ne.* 'Blushing Bride'
Np.	'Burgundy Hill' 1992	C	H. Hill	*Ne.* 'Royal Burgundy' × *Or. navioides*
Neoregelia				
Ne.	'Castigado' 1–27–95	C	C. Skotak	(*carolinae* × *concentrica*) × (*concentrica* × Takamura Princeps) (#51–2)
Ne.	'Cereza' 10–10–95	C	R.L. Frasier	[(*carolinae* × *concentrica*) × Avalon] × (*carolinae* × *concentrica*)
Ne.	'Chanza' 10–10–95	C	R.L. Frasier	*olens* '696' × *aculeatosepala*
Ne.	'Chili Verde' 6–17–95	C	R.L. Frasier	(*carolinae* × *olens* 'Vulcan') × (*olens* 'Vulcan' × *carolinae* 'Shadowlawn') (#9–6)
Ne.	'Chiquita' 1–27–95	C	R.L. Frasier	(*carolinae* × *concentrica*) × (*carolinae* 'Perfecta' × *carolinae* 'Shadowlawn') (#5)
Ne.	'Chirripo' 1–27–95	C	C. Skotak	(*carolinae* × *concentrica*) × *concentrica* (#15–27)
Ne.	'Cranberry' 6–10–92	C	G. Groves/ Bert Foster	Meyendorfii (red-tipped) × 'Grace'

Genus	Name	Cult/ Grex	Collector/ Hybridizer	Parentage
Ne.	'Crayola' 1–27–95	C	C. Skotak	(*carolinae* × Painted Lady) × Painted Lady (#100–1)
Ne.	'Debbie' 6–10–92	C	G. Groves	'Grace' × (*coriacea* × Meyendorfii)
Ne.	'Derrumbe' 6–17–95	C	C. Skotak	(*carolinae* × *carcharodon*) × *cruenta* 'Fairchild' (#29)
Ne.	'Fence Post' 8–4–95	C	J. Anderson*	cultivar of *eleutheropetala* collected in Ecuador by R.L. Frasier
Ne.	'Gorrion' 6–17–95	C	C. Skotak	[(*carolinae* × 'Fireball') × 'Fireball'] × 'Fireball' (#56–13)
Ne.	'Hondillo Don' 10–20–95	C	C. Skotak	(*carolinae* × *concentrica*) × King of Kings
Ne.	'Imperfecta' 6–17–95	C	C. Skotak	*carolinae* × Painted Lady
Ne.	'Inkwell' 6–17–95	C	C. Skotak	[(*carolinae* × *concentrica*) × (*carolinae* × *concentrica*)] × *concentrica* 'Big Blue' (#109)
Ne.	'Johnathan' 1–27–95	C	C. Skotak	(*carolinae* × *concentrica*) × *concentrica* (#15–5)
Ne.	'Lena Regina' 6–17–95	C	C. Skotak	*carolinae* × *chlorosticta*
Ne.	'Little Debbie' 6–17–95	C	C. Skotak	*carolinae* × 'Fireball' (#63–2)
Ne.	'Lorena' 1–27–95	C	C. Skotak	(*carolinae* × *concentrica*) × (*concentrica* × Takumara Princeps) (#51–1)
Ne.	'Luna' 10–10–95	C	R.L. Frasier	[(*carolinae* × *concentrica*) × Avalon] × (*carolinae* × *concentrica*)
Ne.	'Mo' Peppa Please' 12–14–94	C	Jim Irvin	'Angel Face' × *ampullacea* v. *tigrina* 'Midget'
Ne.	'Morado' 6–17–95	C	C. Skotak	*carolinae* × Painted Lady (#22)

Genus Name		Cult/ Grex	Collector/ Hybridizer	Parentage
Ne.	'Morona' 1–27–95	C	R.L. Frasier	*pendula* × *rosea* (#58)
Ne.	'Mosquito' 6–17–95	C	C. Skotak	(*carolinae* × *olens* 'Vulcan') × (*olens* 'Vulcan' × *carolinae* 'Shadowlawn') (#9–2)
Ne.	'Nonis' 6–17–95	C	C. Skotak	*carolinae* × 'Fireball' (#63–1)
Ne.	'Peggy's Peach' 6–10–92	C	G. Groves	F_2 of 'Grace'
Ne.	'Pemiento' 6–17–95	C	C. Skotak	[(*carolinae* × *concentrica*) × Royal Burgundy] × Royal Burgundy (#99–1)
Ne.	'Pink Panther' 6–10–92	C	G. Groves	('Passion' × 'Grace') × Meyendorfii
Ne.	'Rosey Velez' 6–17–95	C	C. Skotak	[(*carolinae* × 'Fireball') × 'Fireball] × 'Fireball'
Ne.	'Rouge' 6–17–92	C	C. Skotak	[(*carolinae* × *carcharodon*) × *carcharodon*] × *carcharodon* (#7)
Ne.	'Royal Cordovan' 6–10–92	C	G. Groves/ Bert Foster	*coriacea* × Meyendorfii
Ne.	'Sassy' 10–10–95	C	C. Skotak	(*carolinae* × *macwilliamsii*) × *macwilliamsii*
Ne.	'Sybil Jane' 1–27–95	C	C. Skotak	(*carolinae* × *concentrica*) × *concentrica* (#15–31)
Ne.	'Verano' 10–10–95	C	C. Skotak	(*carolinae* × *concentrica*) × (*carolinae* 'Perfecta' × *carolinae* 'Foster's Pink')
Orthophytum				
Or.	Iron Ore 8–20–94	G	J. Irvin	*magalhaesii* × *saxicola* v. *aloifolium* (Green form)
Or.	'Stardust' 8–20–95	C	M. Kiehl	*gurkenii* × *lemei*

Genus Name		Cult/ Grex	Collector/ Hybridizer	Parentage
Tillandsia				
Ti.	'Aleta' 10–13–95	C	R.L. Frasier*	*ionantha* × *paucifolia*–cultivar of natural hybrid collected in Mexico by R.L. Frasier, 11–92.
Ti.	'Candela' 10–10–95	C	R.L. Frasier	*bartramii* × *schiediana*
Ti.	'Chanza' 10–13–95	C	C. Skotak*	*pruinosa* × *bulbosa*–cultivar of natural hybrid collected by C. Skotak in Costa Rica, 1989.
Ti.	Hines Poth 6–17–95	G	R.L. Frasier	*fasciculata* × *streptophylla*
Ti.	'Polly Ellen' 10–10–95	C	R.L. Frasier	*balbisiana* × *polystachia*

** indicates the namer/collector of the plant as opposed to the hybridizer.*
****Aechmea biflora was formerly known as Streptocalyx biflorus*

CORRECTION: Ti. Creation registered in June, 1994 was named by Corn. Bak, not P. Koide as previously indicated.

NOTES: The parentheses enclose the cross of one of the parents of the cultivar. In complex hybrids, brackets enclose the cross of one of the parents of the cultivar when there are more than two plants involved in that parental cross. That parental cross is indicated by a lower case "×". The upper case "×" indicates the major cross between the parents of the cultivar. Single quotes indicate a *cultivar* name. There are no quotes around the name for a *grex*. A number following the formula for a cross indicates the hybridizer's identifying number assigned to that cross.

This supplement contains all the cultivars and grexes registered from June 1994 through October 1995. An all inclusive listing from June 1991 (when *A Preliminary Listing of All Known Cultivar and Grex Names for the Bromeliaceae* was published) through October 1995, is now available from BSI Publications, c/o Sally Thompson, 29275 N.E. Putnam Road, Newburg, OR 97132. This supplement supersedes the August 1995 supplement. **Please destroy all previous lists to avoid confusion, and send any additions, corrections or changes to the Registrar at the following address:**

Ellen Baskerville, BSI Cultivar Registrar, c/o Research Department, Marie Selby Botanical Gardens, 811 S. Palm Avenue, Sarasota, FL 34236. Phone: 941-955-7553. The FAX number is 941-951-1474. Home Address: 5555 Shady Brook Trail, Sarasota, FL 34243, telephone 941-355-1277.

Marie Selby Botanical Gardens
Sarasota, Florida

Misnamed Bromeliads 16: *Aechmea capixabae*

Harry E. Luther

Aechmea capixabae L.B. Smith was first collected in July of 1939 by Mulford and Racine Foster near the city of Santa Teresa in Espirito Santo, Brazil. They re-collected it in the same locality a little over a year later. Apparently no living material was acquired, or more likely, none survived the rigors of the expeditions.

Aechmea capixabae was described and illustrated in 1941 in the Brazilian journal, *Arquivos de Botanico do Estado de São Paulo.* The drawing is rather unlifelike and does not accurately present the habit of the plant, although the various details of the inflorescence are clearly depicted.

At some point in the ensuing thirty-some years, the author of the species decided that *A. capixabae* was not a "good" species. In Flora Neotropica Monograph 14, part 3, 1979, *A. capixabae* is treated as a synonym of the quite distinct *A. victoriana* L.B. Smith. Adding to the confusion was the use of the drawing of the type of *A. capixabae* to illustrate *A. victoriana.* Fortunately, clonotypic material of *A. victoriana* has been well established in cultivation so the identity of this taxon has never been questioned. Because *A. capixabae* was not known in horticulture its validity has not been a matter of concern to horticulturists until very recently.

At some time during the last few years, at least two introductions of *A. capixabae* have been made. The first apparently entered North American horticulture as *Aechmea* 'fulgens var. kautskyana", a fictitious name. At least this

Vern Sawyer

Figure 11.
Aechmea capixabae, the light-colored form flowering at the Marie Selby Botanical Gardens.

association appears to be more accurate than the unnecessary synonymy with *A. victoriana. A. capixabae* is closely related to *A. fulgens* but with smaller flowers and a differently shaped ovary. More recently the species, in a slightly darker color form, arrived with its true name.

Aechmea capixabae is easy to grow if given moist and somewhat shaded conditions. It appears to be a bit more cold-hardy than *A. fulgens* but certainly should be protected from frost and freezing. Its only drawback appears to be the fear associated with pronouncing its name.

Marie Selby Botanical Gardens
Sarasota, Florida

A Study of Evolutionary Relationships in Bromeliaceae

[continued from page 112]

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University of Wyoming,
Laramie, Wyoming

Distinguished Slate of Speakers Set for World Conference

B. C. McKinney

The organizers of Orlandiana '96 have assembled an outstanding group of speakers for a series of seminars to be conducted at the World Bromeliad Conference in Orlando from July 4 through July 7.

Luiz Felipe N. de Carvalho and two colleagues from the rapidly-growing Brazilian Bromeliad Society will present seminars on three topics:

- Organization of the "Centro de Pesquisa Botanico do Instituto Boavista", a botanical research institution in Brazil.
- The efforts at Conservation in Brazil through the Brazilian Bromeliad Society.
- The Recovering of the Herbarium Bradeanum by support from the Brazilian Bromeliad Society and the Instituto Boavista.

Liz Felter, of the Orange County Cooperative Extension Service of the University of Florida will present a seminar on the most recent research relating to integrated pest management, beneficial insects and the safe use of over-the-counter pesticides. Ms. Felter has many years of experience in research in this area and is one of the most sought-after speakers within the university system.

Herb Plever of the New York Bromeliad Society is well-known to bromeliad growers everywhere. He has held a variety of offices in both the BSI and the New York Affiliate, and has authored numerous articles for both the Bromeliad Journal and Bromeliana, the publication of the New York Bromeliad Society. His articles have been widely reprinted both within the United States and abroad. Herb grows his bromeliads exclusively indoors, often with surprising results, and he will impart some of the knowledge gained over the years that will not only benefit indoor growers but outdoor growers as well.

Don Beadle of Venice, Florida, has been growing bromeliads for more than twenty years, specializing in the genus *Billbergia.* Retired from the field of petroleum engineering, Don is best known for his hybridizing efforts and the production of beautiful plants at his "Los Milagros" nursery. He has also developed a reputation for providing entertaining programs on bromeliads.

Len Colgan comes to us from South Australia where he has been collecting and hybridizing bromeliads for many years. Affiliated with the university system there, Len devotes what free time he has to helping the many bromeliad societies in Australia. His special interest is in the genus *Tillandsia* and he will present a treatise on the hybridization of tillandsias in wild populations.

In response to interest expressed at previous world conferences, Orlandiana '96 will host a two-hour grower's forum with a panel comprised of three of this country's most successful commercial growers. They will be there to share their many years of personal and commercial experience and to answer questions from registrants. The distinguished panel includes:

Carol Johnson, owner of "Pineapple Place" in Longwood, Florida. Pineapple Place has one of the most extensive mail order and walk-in selections of bromeliads in the United States. She was chairman of the 1980 World Bromeliad Conference, and is a Bromeliad Society Master Judge.

Nat DeLeon has long been an eminent figure in the field of tropical ornamental horticulture. He was among the first to introduce bromeliads as landscape material in Florida and has earned a world-wide reputation as a hybridizer of tropical foliage plants, particularly bromeliads and aglaonemas. Nat is responsible for introducing many hybrids and several species into the trade. Indeed, it would be surprising to find a conference registrant who is not in possession of at least one of Nat's introductions.

Ervin Wurthman, owner of Velva Dean Tropicals, is not only a well-known nurseryman and hybridizer but is also a pioneer in the introduction of bromeliads as interiorscape plants. He is especially known for his interest in variegated bromeliads.

And finally, there is the esteemed **you!** The World-Wide Show and Tell seminar has become one of the most popular features of recent World Conferences. It is a special time when all registrants can participate by bringing in a few slides of their favorite plants. Everyone enjoys seeing slides of beautiful and/or beautifully grown plants and it is sometimes surprising that a plant that is commonly grown in one part of the country is not seen in another part. You can also bring in photographs or other bromeliad related items for tabletop displays.

To ensure your hotel reservations at the Clarion Plaza Hotel, make your arrangements prior to June 1. After that date, the room block will be released back to the hotel and requests will be honored only on a space available basis. Be sure to mention Orlandiana '96 when making reservations. See page 133 for information on how to visit our web site.

Remember that plants are needed for the rare plant auction. Please help make it a success. Proceeds go to the Bromeliad Identification Center.

Some "Pale" Bromeliads

Harry E. Luther

Growers of many types of ornamental plants prize unusual color forms, especially very dark and very pale kinds. "Alba" and "Semi Alba" cultivars are especially numerous in the Orchidaceae and often command prices many times that of more typically colored plants. Bromeliads with floral pigments suppressed or entirely lacking appear to be rather uncommon in cultivation, or at least seldom noted in literature. The following three pale-colored clones have flowered in the research collection of the Marie Selby Botanical Gardens and are presented for your enjoyment and edification.

B. Wands

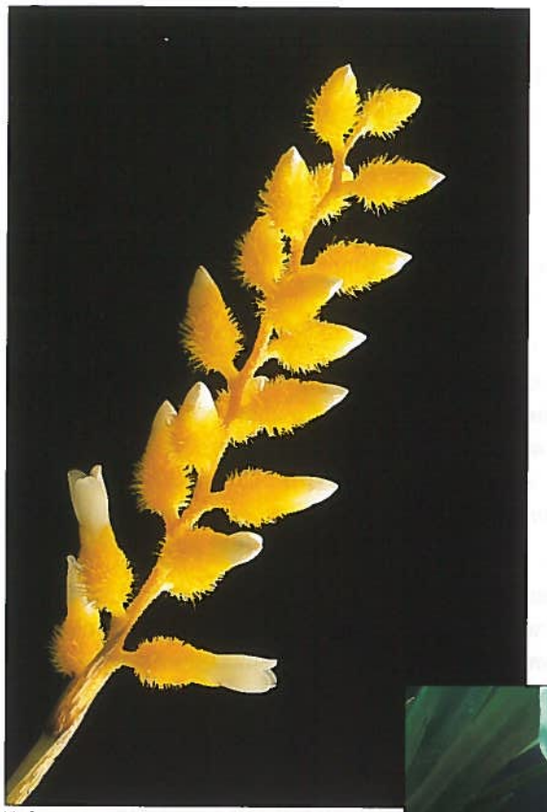
Figure 12.
The bracts and flowers of *Aechmea disticantha* forma *albiflora* are completely devoid of pigment.

Aechmea disticantha forma *albiflora* (Figure 12) was collected by Mulford and Racine Foster in Paraná State in southern Brazil in 1939. The bracts and flowers are totally white. The plants present no problems in cultivation but seem to have remained quite rare in horticulture.

Aechmea pedicellata 'Nelwyn' (Figure 13) was purchased as an unflowered seedling at the 1988 World Bromeliad Conference in Miami, Florida. The inflorescence of the typical color phase of *A. pedicellata* is red or orange-red with blue petals. Both the normal and this "Semi Alba" type are beautiful and delicate in appearance and deserve wide cultivation.

The pale-flowered unnamed cultivar of *Aechmea racinae* var. *tubiformis* (Figure 14) was submitted to the BIC for identification several years ago. The

[Continued on page 132]



V. Sawyer

Figure 13.
Aechmea pedicellata 'Nelwyn' is lacking in normal red and blue floral pigments.

Figure 14.
This cultivar of *Aechmea racinae* var. *tubiformis* has its normal red and blue floral pigments suppressed but not entirely absent.

V. Sawyer

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

VI

SANTA THEREZA

After leaving Cachoeira, the Fosters continued by train northward through the state of Espírito Santo toward the seaport of Vitória searching for bromeliads and collecting wherever the train stopped. At Vitória the secretary of the State of Board of Agriculture gave them the use of his chauffeur-driven car to help them explore (to the extent the roads allowed). Having heard that the mountainous district of Santa Teresa (Thereza), some 30 kilometers to the northwest was "one of the most fertile spots for air plants" they arranged to see for themselves.

Once out of town [*with car and chauffeur*] we were in different territory altogether than any of the other trips to the south or west. It was a great temptation to make many stops for collecting, but we did have to limit ourselves and the stops so that we could get to Santa Thereza before dark. The few stops yielded several new plants and we thoroughly enjoyed the orchid-covered hills which we were approaching.

This section of one of Brazil's smallest states was settled many years ago by colonies of principally Italians and Germans. Here these early immigrants soon became very much at home, melting into the life of Brazil

We were not many miles from Santa Thereza when a tire went down. Bad for the tire and chauffeur but a welcome opportunity for collecting, so we took advantage of every moment, being rewarded with several species we had not found before.

We reached quiet, serious little Santa Thereza at dusk. The meager *pensão* was not difficult to find on the one main street. We inquired for Augusto Ruschi who came upon the scene even before the question could be answered. We had become acquainted with him and his work in orchids when he came to see us in Victoria; now he was welcoming us to Santa Thereza. An inquisitive crowd collected immediately for they seldom saw *estrangeiros* and especially ones from America do Norte. Mulford said it reminded him of meeting the 4:30 train when he was a boy. It was the event of the day in his native Jersey town.

With Augusto Ruschi's extensive knowledge of the area they soon arranged to visit one of his observation stations that he kept from general knowledge.

A long tedious walk through dense jungle brought us to what proved to be a paradise for the air-minded bromeliads and orchids which were thriving here in tremendous quantity in glorious air gardens. Almost a dozen genera of epiphytic bromeliads were represented here in *Billbergia, Vriesia, Aechmea, Tillandsia,*

Portea, Gravisia, Quesnelia, Neoregelia, Nidularium, Acanthostachys, and *Canistrum.* Although there were many bromels in the high trees there were also so many on the low trees and on the fallen branches that we seldom had to cast a wishful eye to the heights. It was the first time in Brazil that collecting was fairly easy!

It was here that Racine found her first new species, a most interesting little curly leaf, spotted *Vriesia,* a dwarf type. Although the one she found was on the ground, they normally grew high in the tree tops. After several difficult climbs for more, Mulford came down with but a few of the little blue-green gems, to find that only a few feet away, a fallen branch held several within easy reach. Later this lovely bromeliad was named by Dr. Smith, *Vriesia racinae.*

That day was a memorable one in bromeliad collecting for we found more new species there than we had hoped to find on our entire Brazilian trip! *Vriesia hamata, Vriesia delicatula* and *Vriesia Ruschii* were among those new ones and before we left that part of the country we added several others. Dr. Smith reported to us after our return to the U.S. that only nine new species had been described from all of Brazil in the previous ten years!

Ruschi was soon under the influence of our enthusiasm for bromeliads. While he had seen the bromeliads everywhere along with his orchids he had not given them much attention. Now for the first time he was really conscious of bromeliads.

At noon he led us to a shaded spot by a cool stream where we might eat our picnic lunch. It was really a delightful nook with rushing water and lush, verdant growth all about. We sat on moss-covered stones and used a large flat stone for a table. Almost every tree was literally dripping with bromeliads and orchids. Great vines festooned from tree to tree were also covered with the epiphytic plants. The cool, liquid green shadows gave a fairy-land effect and we were completely enchanted with it all. It was an air-plant paradise if there ever was one.

Discussion arose concerning the general characteristics of bromels in certain areas, and we expressed the conclusion that in this state, so far, the outstanding leaf characteristic of the bromeliads seemed to be that they had much more vivid markings than similar species we had found in other areas. Also, we had found more of the strikingly marked plants here than elsewhere and there was a predominance of Aechmeas, Billbergias, and Neoregelias with the crushed effect on the leaves.

As we sat there a lively hummingbird fluttered up to get nectar from a brilliant *Billbergia* flower. Again we were reminded how well the epiphytic bromels with their tubular flowers have worked hand in hand with these busy little creatures for their developments. It has been, undoubtedly, a simple cooperative arrangement that has produced coordinated results. These tiny birds so busy fluttering from flower to flower never in any of their life's cycle do injury to these or other plants, while the insects which generally do most of the pollinating are often destructive to that or some other plant as their larvae may live by devouring the leaves or boring into the heart of the plant devouring its very vitals.

So far as pollinating the plants is concerned, these flying dynamos carry out the mission as well as the insects but are satisfied with the reward of only nectar and small insects for their entire diet.

A pleasant odor is usually expected of a beautiful flower but there is at least one beautiful bromeliad whose odor is not so pleasant, as we discovered in a peculiar way. This experience we tried to explain to Ruschi.

Humming bird at *Billbergia.*

Back in Rio, Mulford had taken the flower stalk of a certain *Vriesia* which he was saving out to carry back to the room in order to make a detailed botanical study of the flower. His work of the day with the plants was finished and he was washing his hands at the faucet in the botanical garden. For want of a better place to put it while washing, he held the flower stalk between his teeth. Soon his nostrils were greeted with something very unpleasant. Maybe there was a dead animal under the bushes. He looked but saw nothing, yet the pungent odor continued. It became stronger and he decided that there must be a caged animal in the path of the wind. To be sure it was just like what we smelled at the fox pen at the zoo. Mulford hastened to finish washing his hands as the odor increased and became more unpleasant, but he could find no cause for it.

That evening when he prepared to make a complete botanical record of the flower, he pulled out one of the flowers and proceeded to pore over its intricate parts under the small microscope. One whiff from this close proximity to the flower explained the mysterious odor while washing his hands. He had held the flower right under his nose, and its odor was that of an unclean fox pen! This was a startling discovery because many of the bromeliads have no very definite odor. Later when Dr. Smith read the descriptive account of this specimen and determined that it was a new species, he decided that *Vriesia vulpinoides* would be the most appropriate name for it, "the foxy Vriesia."

From time to time our attention to birds and bromels was diverted by the great effort we had to exert upon the very hard and tasteless sandwiches which the little *pensão* had prepared for us. In the midst of one great chewing and gustatory effort we were stunned to see the one bromeliad we had hoped to find. We had known *Vriesea hieroglyphica* from illustrations and a very few from cultivation in the States but of course we had never seen it growing wild. Yet, there, just across the stream, in shadows from the drooping trees and leaf tapestry above, reflected in the luminosity of the stream below, sitting on a graceful branch in all its zigzag glory, was the most spectacular of all Vriesias, the *V. hieroglyphica!* (so named because the design on the leaves resembles Indian or Egyptian sign writing, hieroglyphics). Here it was with its singularly dramatic blotches and bands and wavy lines. Unfortunately this bizarre leaf design has made it a much-hunted plant and it is now fast disappearing from the jungles of Brazil. Our lunch no longer satisfied our hunger. The complete satisfaction now was to take this plant from its native and original habitat with our own hands, after photographing it in all its glory. While this is a large *Vriesia* and it is the most strikingly marked plant it is also the least conspicuous and one of the most difficult of all the bromels to find. It has been unusually successful in its own natural color photography, recording the ever-changing lights and shadows on its leaves, giving it extraordinarily perfect protective coloration.

More hunting and collecting and climbing around in this section was only an anti-climax so we finished and carried our many bags of plants and herbarium specimens to where the car was awaiting us.

Subsequently, while Mulford was working hard at collecting, trying to cover a lot of territory in short time, Racine was toiling over specimens back at the hotel. She was almost beside herself with the amount of difficult work piled all around her. And the specimens were molding. So using her womanly talents she took to pressing the difficult bromeliads with an electric iron, *ferro electrica,* which she purchased for less than a dollar down one of the little streets in town.

During many days the lack of sun added to the difficulty of having little space for spreading blotters when the sun was out. Heaters had proved to be very ineffective for fast drying of the big succulent leaves and flower heads. The ironing of them proved so effective that we were surprised botanists had not used it more often. But then, most botanists, especially out on trips, are men, and they leave it

for a woman to apply this household implement to botany. It is not wise to put the hot iron on the bare leaf but between blotters and with only a warm iron, the resistance of the stiffest and the most stubborn leaf is knocked down and while we did not press them completely dry, it speeded up the drying process by many, many days. Within the next two days they could be ironed again and behold, they were dry. With thin-leaved plants one pressing by the iron was sufficient, we discovered.

It was the first of August and we suddenly realized that we had only one more month in Brazil (at least that is what we thought). We had hoped to be able to collect in Santa Catharina and Parana, states to the south of São Paulo where a cooler climate naturally would produce many different bromeliads. But we had to check the dreams of new territory until the difficulties of the moment were solved. Many difficulties arise in Brazil about getting crates. But at last we found some and it took hours to carefully pack them. Seven good-sized boxes of plants and three double boxes of herbarium material was the botanical evidence of this locality.

We felt most grateful to Dr. Rubem Landeiro and Dr. Fontenelli who aided us in behalf of the state so very much in every way in getting these boxes of plants dispatched, which is an eternally long process of red tape in Brazil.

The three days of intense work of packing was over and we were settled on a train which for the first time in Brazil we did not have to rise early to catch. It left at 10:00 A.M.

It was hard to leave this state and over every mile we cast wishful eyes in the direction of the trees. We did manage to stop a few hours between trains at one more high altitude station for a small amount of collecting where we found one of the most delightful of all our finds. An *Aechmea* whose delicate flower hangs pendulant twelve to eighteen inches, ending in a cluster of red berry-like flowers with bright yellow and black petals. This was such a distinctive and unique form of flower head that we were certain it must be a new genus. That good fortune was not ours; but it was a new species and was named for Racine, now called *Aechmea Racinae.*

[To be continued]

Some "Pale" Bromeliads

[continued from page 126]

variety *tubiformis* was distinguished from the typical variety by its very erect and narrowly tubular rosette. The pictured cultivar differs further by its pale orange not red axis and ovaries, light green not black-purple calyx, and yellow not yellow and black-purple corolla. A cluster of these plants make a very attractive hanging display.

Bromeliad Identification Center
Marie Selby Botanical Gardens
Sarasota, Florida

Bromeliads in Cyberspace

Peniel Romanelli

The BSSF is now working with the SEFLIN (South East Florida Library Information Network) freenet to provide an online bromeliad information center. This site will include, among other things; cultural information, frequently asked questions, upcoming events related to bromeliads, material about the BSSF and other bromeliad societies, a discussion group and links to Internet sites relating to bromeliads. Uploading of text files began January 30.

To access SEFLIN you need a computer and a modem. Set your comm program for VT100 or higher terminal emulation, up to 28.8 KBPS, 8N1. The Dade County number is 372-6375, and the Broward County number is 765-4332.

If you're not a registered SEFLIN user, sign in as "visitor" (no quote marks) at the login: prompt. After the introductory screens you'll find yourself at the main menu. From there type "bssf" to reach our section.

Other Internet sites of interest include:

Selby Gardens
http://www.sarasota-online.com/selby/welcome.html

Orlandiana 96
http://members.aol.com/mikefrommi/ORLANDIANA/

FAIRS Bromeliad info
http://hammock.ifas.ufl.edu/txt/fairs/mg/10222.html

Virtual Bromeliad Society
http://www.connix.com/comm/~reingg

Fairchild Tropical Garden
http://192.104.39.4/AABGA/Member.pages/fairchild.tropical.html

Good Green Fun, Inc.
http://www.tropicalmarketplace.com/

BROM-L The bromeliad taxonomists and growers list.

For more information contact Peniel Romanellii at 305-642-5597, or better still, by E-mail at d021785c@dcfreenet.seflin.lib.fl.us

Reprinted from the Bromeliad Advisory, *the bulletin of the Bromeliad Society of South Florida. 39(3). March, 1996.*

NOTE: *The article above provides information on additional Internet sites relating to bromeliads as a follow-up to the article "Surfin" by Dan Kinnard in the January/February 1996 issue of the* JOURNAL. *Manny Lorenzo, of Good Green Fun, Inc. states that a listing of the names and addresses of BSI affiliates are available at his site as well as an application form for membership to the BSI.*

Odds and Ends

Wally Berg and Luiz Felipe Nevares de Carvalho both wrote in regards to an error in the brief discussion of the genus *Catopsis* on the back cover of Volume 46:1 (January/February 1996). The discussion on the back included the comment that the genus *Catopsis* ranges from Florida to Ecuador. Both men pointed out that *Catopsis berteroniana* occurs as far south as the southern state of Bahia in Brazil. We thank them for setting the record straight.

Stephen Jay Gould in his article, "The Sexual Politics of Classification" in Natural History Magazine (November 1993), relates that when Linnaeus proposed his system for botanical classification and based it upon male and female flower parts, it was not accepted with universal enthusiasm. There were some who disliked the concept of utilizing the sexual organs of plants as the basis of classification and cited it as another example of declining public morals. (So that's where it started!) Professor Johann Siegesbeck of Saint Petersburg decreed that the system was unnatural because God would never have based his natural arrangements on such shameful whoredom. Linnaeus responded by naming an insignificant, ugly little weed *Siegesbeckia* in his honor.

A growing tip was provided by Peniel Romanelli at the February 1996 meeting of the Bromeliad Society of South Florida. Peniel suggested putting a coffee filter in a pot before adding the potting mix. It prevents the mix from running out from the bottom and it doesn't interfere with the drainage.

A ballot for election of directors would normally be inserted in the May–June issue of the JOURNAL. None is included however, because only one nomination was received for each of the vacancies. The names of the new directors will be announced in the Sept–Oct issue of the JOURNAL.

Individuals attending Orlandiana '96 who are interested in post-conference collecting or photography trips to bromeliad country should contact Lee Moore at 305-274-3980. Lee is planning July trips to Ecuador and Peru. You may also contact John or Carolyn Carr at the Banana Bank Lodge in Belmopan, Belize if interested in Belize. Their phone and fax is 501-81-2020.

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Photograph by Patricia Hernandez

Tillandsia grandis growing on sheer cliffs at Barranca de Texolo near the municipality of Xico in the state of Veracruz, Mexico.

Calendar

10–12 May	The Bromeliad Society of Central Florida's annual standard bromeliad show and sale will be held at the Florida Mall in Orlando. Hours coincide with the Mall hours: Friday and Saturday 10 AM to 9 PM and Sunday from noon to 6 PM. Contact: Geoffrey Johnson 407-333-0445
18–19 May	The Bromeliad Society of South Florida will hold its 18th annual bromeliad show and sale at the Fairchild Tropical Garden, 10901 Old Cutler Road, Miami, FL 331-516-4296. Hours are 9:30 to 4:30 both days. Contact: Peniel Romanelli 305-642-5597 or by E-mail at d021785c@dcfreenet.seflin.lib.fl.us
18–19 May	The Houston Bromeliad Society will hold its 27th annual standard bromeliad show and sale at the Garden Center, 1500 Hermann Drive, Houston, Texas. Show hours are from 2 PM to 5 PM Saturday and 11 AM to 4 PM Sunday. Plant sale hours are from 9 AM to 5 PM Saturday and 11 AM to 4 PM Sunday. Contact: Allyn Pearlman 713-772-7831
8 June	The Saddleback Valley Bromeliad Club will hold a BSI judged show and plant sale at Irvine Arboratum located at the corner of Jamboree and Campus Dr. on the University of California at Irvine Campus. Show hours are noon to 5 PM and sale hours from 10 AM to 5 PM. There is a $1.00 admission charge.
8–9 June	The San Francisco Bromeliad Society will hold a show and sale in the Hall of Flowers at Strybing Arboretum in Golden Gate Park, 9th and Lincoln, San Francisco. Contact: Marilyn Moyer 415-365-5560
15–16 June	The Sacramento Bromeliad Society's annual show and sale will be held at the Shepard Garden and Arts Center, 3330 McKinley Blvd. in Sacramento. Hours are 10 AM to 5 PM on both days. Contact: Keith Smith 916-823-0203
1–7 July	ORLANDIANA '96, The World Bromeliad Conference will take place at the Clarion Hotel in Orlando, FL. See the ad on page 139 for details

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