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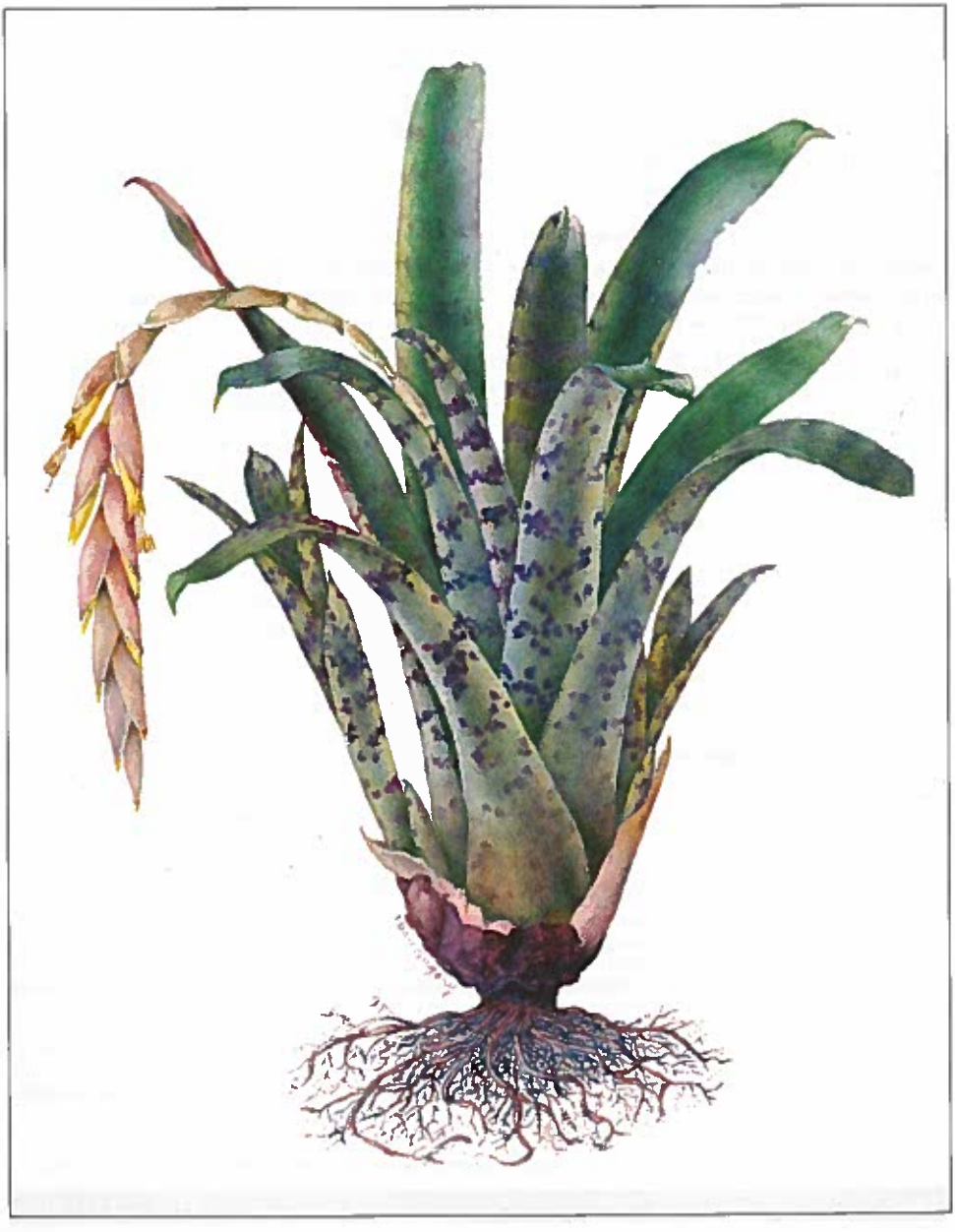

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Cover photographs. Front: *Vriesea guttata*, as painted by Mary Gregory. See the article in this issue for more paintings and the story on how Mary was drawn to painting bromeliads. Back: A beautiful molecular study, showing relationships of Bromelioideae taxa and actual plants! See article inside for full details.

FEATURE ARTICLES

BROMELIAD SOCIETY BUSINESS AND NEWS

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Insights on the Phylogenetic Relationships of *Aechmea* and Related Genera in Subfamily Bromelioideae

Ana Paula Gelli de Faria[1,2], Tânia Wendt[1] and Gregory K. Brown[2]

With ca. 239 species (Luther, 2004), *Aechmea* Ruiz & Pav. is the largest genus in subfamily Bromelioideae, possessing great vegetative and reproductive morphological variability. As such, *Aechmea* and the eight subgenera currently recognized (Smith & Downs, 1979: *Aechmea*, *Chevaliera* (Gaudich. ex Beer) Baker, *Lamprococcus* (Beer) Baker, *Macrochordion* (de Vriese) Baker, *Ortgiesia* (Regel) Mez, *Platyaechmea* (Baker) Baker, *Pothuava* (Baker) Baker and *Podaechmea* Mez) are central to major disagreements concerning generic/infrageneric delimitation within Bromelioideae. The taxonomic boundaries that separate *Aechmea* from other Bromelioideae genera are vague and in need of revision. This was noted by early taxonomists (Baker, 1879, 1889; Mez, 1892, 1896, 1935) and remains true in the last revision of Bromeliaceae (Smith & Downs, 1979) where, for example, some species of *Ronnbergia* E. Morren & André, *Quesnelia* Gaudich. and *Streptocalyx* Beer appear within identification keys for *Aechmea*. More recent actions, for example, the transfer of all *Streptocalyx* species into *Aechmea* (Smith & Spencer, 1992), and the transfer of species traditionally treated in *Aechmea* to other genera, e.g., *Lymania* Read (1984) and *Ursulaea* Read & Baensch (1994) also suggest that *Aechmea* (*sensu* Smith & Downs, 1979) is not a natural genus.

While recent advances in the systematics of Bromeliaceae have been realized using phylogenetic analyses of molecular and morphological data, and support Bromelioideae as monophyletic (Ranker et al., 1990; Terry et al., 1997; Horres et al., 2000), there is a general consensus that most genera and subgenera do not correspond to monophyletic groups. A stable well-supported taxonomy within Bromelioideae will likely depend on monophyletic status for the included taxa.

The main focus of our study is to identify natural groupings (monophyletic groups) within subfamily Bromelioideae using both morphological and molecular data. The first results from this project were published by Faria et al. (2004) with a phylogenetic analysis involving a total of 86 taxa (83 species and 3 varieties) representing 7 of the 8 *Aechmea* subgenera and related genera such as *Acanthostachys*, *Billbergia*, *Fernseea*, *Hohenbergia*, *Lymania*, *Portea*, *Quesnelia*, *Ronnbergia* and *Streptocalyx* as the ingroup. The genus *Cryptanthus* was chosen as the outgroup. A total of 60 morphological characters were employed, 13 vegetative, 46 reproductive and one pollen character (see Faria et. al., 2004, for a detailed list of the voucher material and morphological characters analyzed).

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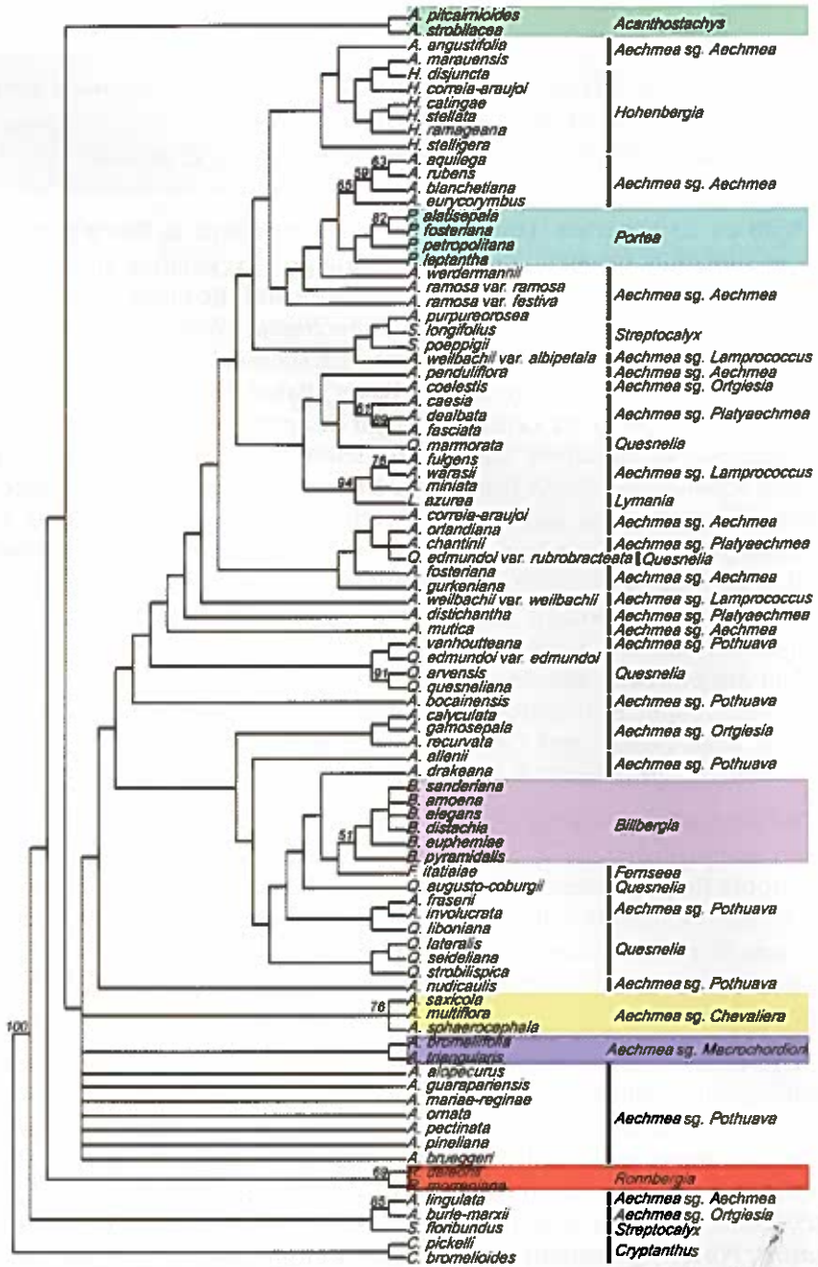
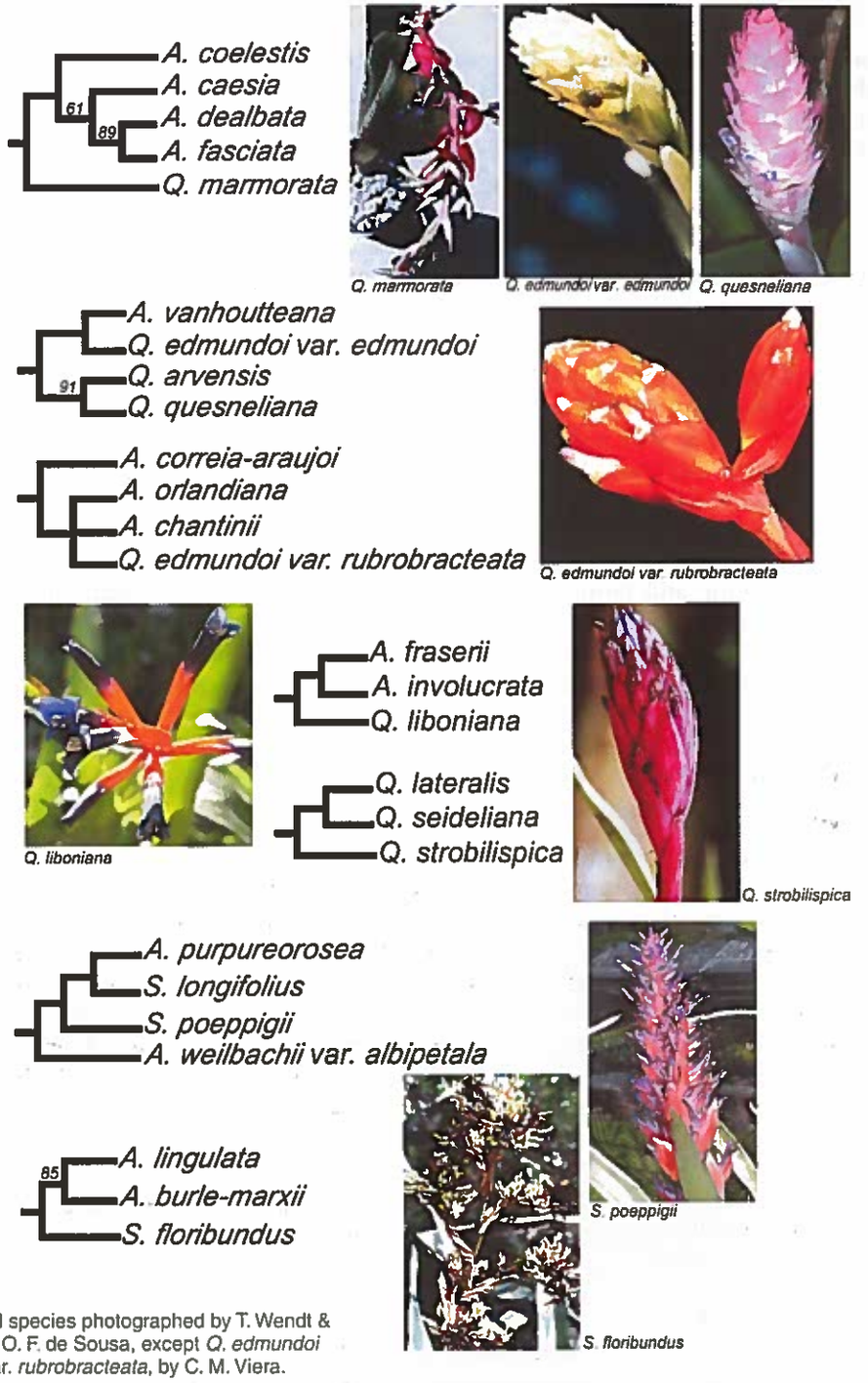


Figure 1. Strict consensus tree of 158 equally most parsimonious trees for *Aechmea* and related genera (modified from Faria et. al., 2004). *Cryptanthus* was used as outgroup. Numbers above branches are the bootstrap support percentages of over 50%. The classification to the right of species names follows Smith & Downs (1979), except for *Acanthostachys* (Rauh & Barthlott, 1982) and *Lymania* (Read, 1984). Putative monophyletic genera and subgenera are highlighted by colored bars. Vertical black bars indicate paraphyletic or polyphyletic genera and subgenera.



All species photographed by T. Wendt & L. O. F. de Sousa, except *Q. edmundoi* var. *rubrobracteata*, by C. M. Viera.

Figure 2. Selected branches of the tree presented in Fig. 1, showing the fragmentation of *Quesnelia* and *Streptocalyx* across different clades.

While provisional, this analysis offered the first explicit demonstration that, with few exceptions, most subgenera of *Aechmea* and genera in Bromelioideae do not correspond to monophyletic groups (FIGURE 1). Genera such as *Quesnelia* and *Streptocalyx* sensu Smith & Downs (1979) as well as most *Aechmea* subgenera were fragmented in different parts of the tree (FIGURES 1, 2), reflecting the polyphyletic status for these taxa. Other genera such as *Lymania* (FIGURES 1, 3) and *Hohenbergia* (FIGURES 1, 3) were nested along with *Aechmea* species, and further analysis with a larger sample will be necessary to reevaluate their phylogenetic position within Bromelioideae. Except for *Acanthostachys* (FIGURES 1, 3) an increased sampling of species also is necessary to reevaluate the putative monophyletic status indicated for *Portea*, *Billbergia* and *Ronnbergia* (FIGURES 1, 42-back cover) as well as *Aechmea* subgenera *Macrochordion* and *Chevaliera* (FIGURES 1, 42 back cover). We also noted that most of the morphological characters analyzed presented high homoplasy (repeated occurrence of similar features in distantly related taxa). Presumably the radiation of Bromelioideae into many diverse, even physically extreme environments, invoked a multitude of abiotic and biotic pressures that resulted in certain morphological attributes arising independently several times (Terry et al., 1997). The high homoplasy displayed by the characters traditionally employed in generic and infrageneric delimitations within Bromelioideae (e.g., inflorescence and pollen grains types, presence or absence of petal appendages), in concert with the various emphases placed on different characters by different authors, is likely to be the reason for the divergent and artificial previous classifications proposed within Bromelioideae.

The results shown here provide new insights into the relationships within a number of Bromelioideae genera, suggest directions for future studies, and indicate that traditional generic and subgeneric delimitations in this subfamily need serious reconsideration. However, these results best represent a first approximation, provisional in nature, and do not merit any reorganization or nomenclatural action. We are actively expanding both the taxon and character samples presented here, and augmenting these with DNA sequence data to develop a more robust phylogenetic analysis of *Aechmea* and related genera within Bromelioideae.

Acknowledgments

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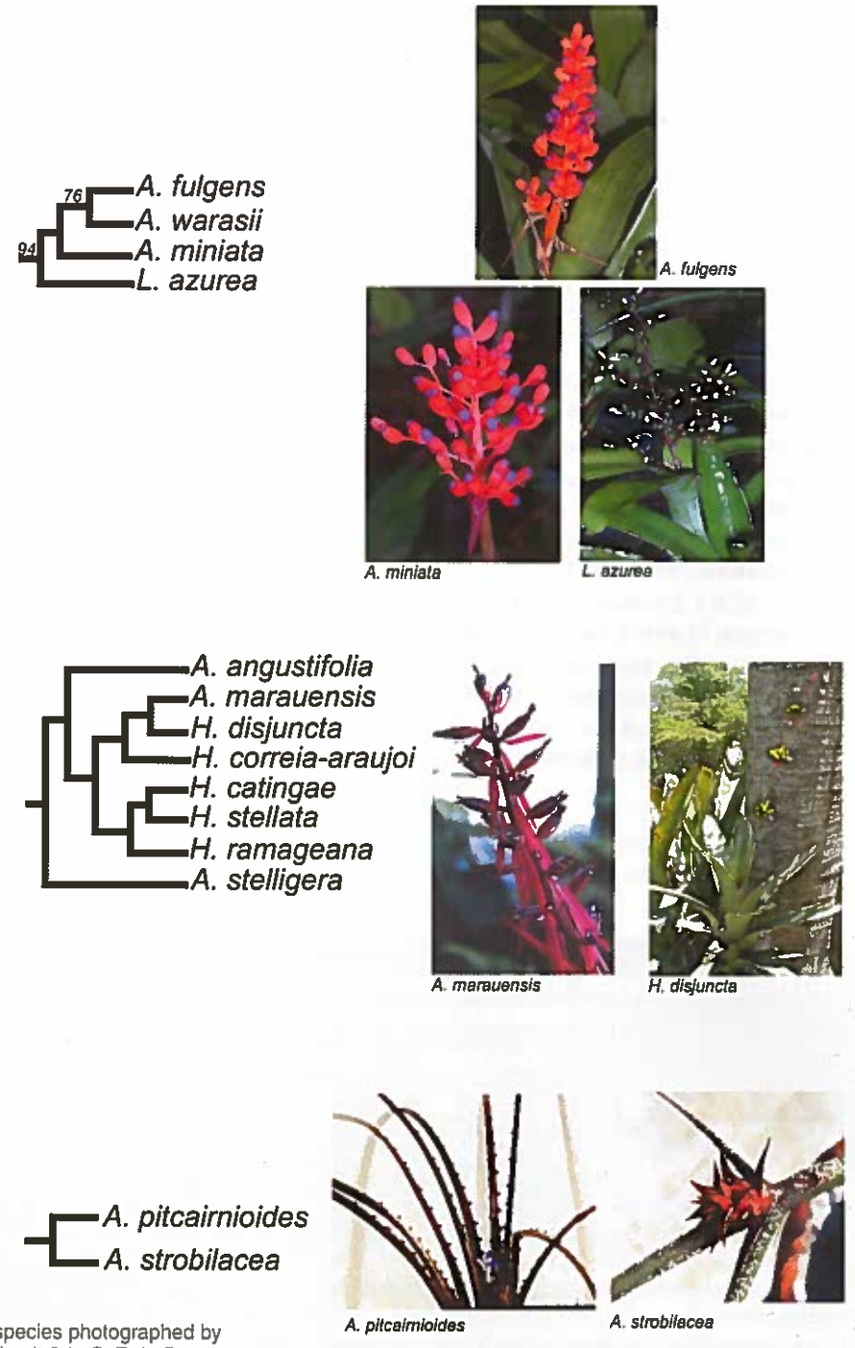

Figure 3. Selected branches of the tree presented in Fig. 1, showing the placement of *Lymania* and *Hohenbergia* nested with species of *Aechmea*. *Acanthostachys* appears as a monophyletic group.

Biogeography And Conservation Of The Bromeliad Tarantula *Pachistopelma rufonigrum* (Aranae, Theraphosidae) in Rio Grande do Norte, Brazil

Roberto Lima Santos, Maria das Graças Almeida, Leonardo David de Souza Tinoco, Luciano Barreto Martins & Marilia Gabriela Maia[1]

Abstract

In eastern Rio Grande do Norte State (NE-Brazil), *Pachistopelma rufonigrum* Pocock 1901 was found in association with terrestrial ramets of *Aechmea aquilega* (Salisbury) Grisebach, *A. lingulata* (L.) Baker and *Hohenbergia ramageana* Mez (Bromeliaceae). This species was observed in the Atlantic coastal rainforest, restinga, and tabuleiro scrub. Highest *P. rufonigrum* population densities were observed in restinga and tabuleiro areas, making this species vulnerable to extinction due to habitat loss and fragmentation.

Introduction

The genus *Pachistopelma* Pocock 1901 (Aranae, Theraphosidae) has two described species with disjunct biogeographic distributions. *P. rufonigrum* Pocock 1901 is found in restinga and caatinga areas from Bahia to Rio Grande do Norte, northeastern Brazil, whereas *P. concolor* Caporiaco 1947 is found in the Guianas (Dias and Brescovit 2003; Platnick 2004). Specimens of *P. rufonigrum* have been found only in association with water-holding or phytotelm bromeliads (Varela-Freire 1997, Dias et al. 2000, Dias and Brescovit 2003, Santos et al. 2002).

In eastern Rio Grande do Norte State, *Pachistopelma rufonigrum* has been reported to inhabit terrestrial *Aechmea aquilega* (Salisbury) Grisebach, *A. lingulata* (L.) Baker, and *Hohenbergia ramageana* Mez (Varela-Freire-1997, Santos et al. 2002).

The aim of the present study is to investigate the geographic distribution of *Pachistopelma rufonigrum* in the vegetation types occurring in eastern Rio Grande do Norte State, northeastern Brazil.

Material and Methods

Terrestrial water-holding bromeliads were sampled in eight locations along the eastern coast of Rio Grande do Norte State (FIGURE 4). Data on the rate of occupation of bromeliad ramets by adult and juvenile specimens of *Pachistopelma rufonigrum* were recorded for the stations Pitangui (PI), Natal-PEDN (NT), Pitimbu (PT) and Colegio Agricola de Jundiai (CAJ-JD).

The climate in eastern Rio Grande do Norte State is tropical with a mean yearly temperature of 26°C and mean yearly rainfall ranging from 1000

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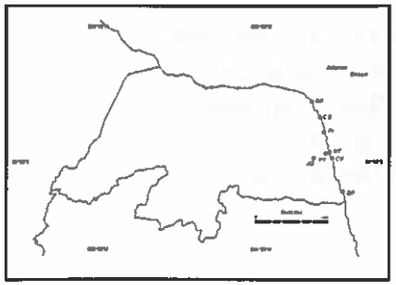

Figure 4. Map of Rio Grande do Norte State showing locations where specimens of *Pachistopelma rufonigrum* was found in association with bromeliads: Rio do Fogo (RF), Caraubas (CB), Pitangui (PI), NDSP-Natal (NT), Pitimbu (PT), Ponta do Cotovelo (CV), CAJ-Jundiaí (JD), and Baia Formosa (BF) (see text).

to 1200 mm, with the rainy season extending from February to July (Felipe & Carvalho 2001).

Open restinga vegetation was surveyed in the Pitangui and Caraubas stations and is comprised of psammophytes associated with scattered stands of small trees and shrubs of Malpighiaceae and Anarcadiaceae and the bromeliads *Aechmea aquilega* (Salisbury) Grisebach and *Hohenbergia ramageana* Mez (Santos et al. 2002, 2003) (FIGURE 5).

The coastal tabuleiro scrubland occurs in eastern Brazil in association with the Barreiras Formation (Rizzini 1997). In Ceará and Rio Grande do Norte States (northeastern Brazil) the tabuleiro vegetation is similar to the savanna-like cerrado, mixed with some plant species characteristic of sandy, coastal areas (Rizzini 1997).This vegetation type was surveyed in the Pitimbu and Rio do Fogo stations, where the bromeliads *Aechma aquilega*, *A. lingulata* and *Hohenbergia ramageana* were sampled.

The Natal Dune State Park (NDSP), Ponta do Cotovelo and Baia Formosa stations are characterized by the presence of species typical of the Brazilian Atlantic Rainforest, associated with coastal sand dunes where heliophilous and psammophillous restinga vegetation is also found (Freire 1990, Varela-Freire 1997). Both *Hohenbergia ramageana* and *Aechmea lingulata* were sampled at these stations.The Ponta do Cotovelo station (Parnamirim municipality) is located near a seaside cliff where large stands of *H. ramageana* were found under the tree canopy.

In the xeric conditions of coastal tabuleiro and restinga, phytotelm bromeliads represent a significant source of free water for drinking and breeding (Leme & Marigo 1993, Santos et al. 2003a, Rocha et al. 2003).

Typical Brazilian Atlantic Rainforest vegetation is the main feature of the Colegio Agricola de Jundiaì station (Macaiba municipality), where 5 to 10 m high trees form a dense canopy, and remarkably large stands of *Hohenbergia* sp. dominate the shaded understory (FIGURE 6). The specimens of *Pachistopelma rufonigrum* (FIGURE 7) observed at this locality were found on the edge of the forest, where more light reaches the bromeliads.

Voucher-specimens of *Pachistopelma rufonigrum* are deposited in the Zoological Collection of the Departamento de Botânica, Ecologia e Zoologia (UFRN).

Results and Discussion

Specimens of *Pachistopelma rufonigrum* were observed associated with bromeliads in all locations surveyed. However, the rate of bromeliad ramets occupied by *P. rufonigrum* was higher in tabuleiro and restinga areas (TABLE). Very few specimens of *P. rufonigrum* were observed in the Jundiai station, despite the high density of ramets of *Hohenbergia* species present in the area.

TABLE. Distribution of *Pachistopelma rufonigrum* in bromeliads according to vegetation type in eastern Rio Grande do Norte State.

Station	Number of ramets sampled	Occupation rate (%)	Vegetation Type
Pitimbu	32	81.25	Tabuleiro
Pitangui	210	54.28	Restinga
PEDN	25	52	Restinga associated with Atlantic rainforest
CAJ-JD	52	3.87	Atlantic rainforest
Total	392	43.37	

Based on these results, the authors hypothesize that in eastern Rio Grande do Norte the geographic distribution of *Pachistopelma rufonigrum* is restricted to open, coastal vegetation types such as restinga and tabuleiro scrub.

In Sergipe State, northeastern Brazil, *Pachistopelma rufonigrum* was recorded in *Aechmea aquilega* (Salisbury) Grisebach, *Hohenbergia ridleyi* (Baker) Mez and *H. stellata* Schult in coastal restingas (Dias et al. 2000). Populations were also found in bromeliads growing in the high altitude white sand region of the Serra de Itabaiana, located inland in Sergipe (Dias & Brescovit 2003). Dias and Brescovit (2003) also refer to Vicente et al. (1997) who report on the existence of similarities in vegetation and soil profile between the Serra de Itabaiana white sand region and the coastal restingas of Sergipe State.

Santos et al. (2002, 2003a,b) hypothesize that water-holding bromeliads in xeric coastal restinga and tabuleiro areas are important as a keystone resource for the local fauna. For *Pachistopelma rufonigrum*, phytotelm bromeliad ramets represent a refuge from dessication and predation, a hunting ground, and a nursery area (Santos et al. 2002, Dias & Brescovit 2003).The authors observed that the spiderlings remain with the female parent and hypothesize that they later disperse to unocuppied bromeliad ramets which may be a limiting resource to population growth of *P. rufonigrum*. Collecting wild bromeliad ramets for use in landscaping projects may thus lead to the reduction of habitat available to dispersing juvenile *P. rufonigrum*.

In Brazil, restinga and tabuleiro habitat loss and fragmentation due to urban sprawl and real estate speculation in seaside resort areas represent a major threat to native phytotelm bromeliad populations and their associated faunistic community (Araujo & Lacerda 1987, Leme & Marigo 1993, Souza &

Couto 2001, Rocha et al. 2003, Santos et al. 2003a,b). This is another important threat to the survival of viable populations of *Pachistopelma rufonigrum* in eastern Rio Grande do Norte State.

The authors also believe that efforts to raise public awareness of the ecological importance of bromeliads as a keystone resource as well as the biological uniqueness of restinga and tabuleiro habitats may foster, via political pressure, both the approval of legislation to protect these vegetation types and the design and creation of public and private wilderness conservation areas. Populations of restinga and tabuleiro bromeliads and their associated biota may thus be effectively protected (Jeffries 1997).

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Figure 5. General view of coastal restinga habitat in Caraubas, eastern Rio Grande do Norte State.

Photograph by Marilia G. Maia.

Figure 6. High density of ramets of *Hohenbergia* sp. growing in understory of a fragment of Atlantic Coastal Rainforest in the Colegio Agricola de Jundiai (Macaiba municipality, RN).

Photograph by Roberto L. Santos.

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Photograph by Marilia G. Maia.

Figure 7. Juvenile specimen of *Pachistopelma rufonigrum* on *Aechmea* sp. in restinga habitat in Caraubas restinga. Note the typical head down posture on the leafblade. When disturbed, the spider quickly retreats into the leaf axil, even submerging in the phytotelm water. The remains of the silk web retreat on the leafblade are visible below the spider.

Rapid Vegetative Propagation Of Alcantareas

Bob Reilly[1]

Alcantarea species are increasingly being used in sub-tropical and tropical areas as feature plants in landscaped gardens. Often, an even more impressive effect can be achieved if they are planted in groups or rows. However, it is not always easy to obtain large numbers of these plants.

These plants can be grown fairly easily from seed, though seed is not always available and can sometimes be incorrectly labelled. Further, it may be desireable to propagate from a particularly striking plant (clone). In these situations, vegetative propagation can be relied upon to produce the plants you desire.

Figure 8. *Alcantarea extensa* plant showing adventitious offsets.

A rapid vegetative propagation technique is available for Alcantareas. This technique, and a modification of it suitable for growers without elaborate growing aids, is described in the balance of this article.

Alcantareas produce small "adventitious" offsets when the plants are immature (FIGURE 8) and, with much reduced frequency, when they are approaching maturity. The propagation technique relies on harvesting, and rapidly multiplying these offsets.

The technique has a number of steps, namely:

• Detach the adventitious offset(s) from the parent plant. This can best be achieved by placing a small knife's blade behind the offset and near its base, and then "levering it out". Ensure that the offset has basal tissue, as the plant's roots originate from it. This step usually requires some practice to achieve consistent success. Inexperience may result in you severing the offset without any basal tissue. FIGURE 9 shows offsets which will produce roots.

• Adventitious offsets as small as one centimetre (cm) high can often be harvested successfully. However, the offsets of some species, for example, *Alcantarea imperalis*, need to be about 4 cm tall before they can be harvested with a high success rate.

• Pot the offsets into 50 mm pots/tubes, using a potting mixture comprised of 1 part Perlite to 1 part peatmoss.

• Water the plants at least four times a day.

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• Use a liquid fertiliser once a week. The use of a fertiliser in the potting mixture is not recommended, because of the risk of the fertiliser lodging in the offset's central leaves during watering. This event often results in the offset dying.

• When the plants are about 10 cm high, pot them into a 140 millimetre (mm) pot. The basal tissue of the plant needs to be exposed, so as to maximise the production of adventitious offsets. It may be advantageous to use small stakes to help support the plant.

• The potting mixture should include a balanced plant fertiliser such as Osmocote. Continue using liquid fertiliser on a weekly basis.

• When the first group of adventitious offsets are removed from each plant, remove its basal leaves. This action stimulates the production of more offsets.

• Offsets can be removed throughout the year, if "bottom heat" can be supplied to them while they are developing roots.

This technique can produce over 50 offsets from the initial offset in less than a year. If you do not have a the equipment to provide regular misting and bottom heat, then the technique outlined above requires modifying. The modifications are:

• Offsets are harvested when they are 4 to 7 cm high, rather than 1 cm. Such offsets usually only require watering once a day or every second day.

• Place several of the offsets in a 100 mm pot (known as a "community" pot), rather than separately into 50 mm containers. Better survival and growth rates are achieved this way.

• If the minimum night temperature falls below 10 degrees Celsius, cease removing offsets, as they will usually produce few, if any, roots below this temperature.

This modified technique usually results in around 10 offsets being produced from the initial offset, over a 12-month period.

The techniques outlined above have also been used successfully to rapidly propagate those *Vriesea* and *Werauhia* species, which produce adventitious offsets.

Acknowledgements

The first technique described in this article is largely based on a lecture given by Bruce Dunstan at the March 2004 meeting of the Bromeliad Society of Queensland.

Figure 9. Adventitious offsets of *Alcantarea extensa*. Note their "hook like" bases from which roots will come.

Guzmania monostachia and its Varieties at the Alturas de Banao Ecological Reserve, Central Cuba

Lucia Hechavarria Schwesinger[1]

Photographs by Maikel Cañizares Morera

The neotropical genus *Guzmania* Ruiz & Pavon has more than 160 species (Smith & Till 1998). In Cuba it is represented by *Guzmania monostachia* (L.) Rusby ex Mez, *G. lingulata* Mez and *G. erythrolepis* Brong. ex Planch. *Guzmania monostachia* is the most abundant and widely distributed, occurring throughout the archipelago. Typical of humid forests, this species is found from sea level to 1600 m elevation (Villalón 1996) as an epiphyte in dense canopies or in limestone solution holes with accumulated organic matter where sunlight reaches the lowest layers of the forest (Hechavarria 2002). According to Smith & Downs (1977), *Guzmania monostachia* has three known varieties: the typical variety, *monostachia*, *G. monostachia* var. *alba* Ariza-Julia, and *G. monostachia* var. *variegata* M.B. Foster. Smith and Downs only reported the typical variety for Cuba.

On a recent expedition to the Alturas de Banao Ecological Reserve, located in the mountainous Guamuhaya region in central Cuba, the varieties alba and variegata were found. Variety *variegata* was previously known only for its type location in southern Florida in the United States (Smith & Downs 1977) as well as the Bocas del Toro Province in Panama (H. Luther, pers. com.)

There are six main vegetation zones at Alturas de Banao: broadleaf semideciduous forest, karstic vegetation complex (known as Mogotes, in the broad sense, not the typical Mogote geomorphology limited to Pinar del Río, Western Cuba), montane rain forest, gallery forest, broad leaf evergreen forest, and secondary vegetation. This area contains more than 900 plant species, of which nearly 25% are endemic (Bécquer, unpublished data). From the geomorphological point of view, the area that includes the upper river basin of the Banao and Higuanojo rivers is characterized by low mountains (200-843 m elevation), strongly dissected in some cases with karstic caps (Smith et al., unpublished data). The climatic conditions, according to Pérez (unpublished data), range as follows: annual average temperature: 22-26°C, annual average precipitation: 1700-2000 mm and annual average relative humidity 81-90%.

Between the Jarico Administrative Station and the Maria Antonia and Sabina Biological Stateions, is a gallery forest along the Banao river (FIGURE 10). The forest is composed mainly of the exotic species, *Syzygium jambos* (Myrtaceae), which is naturalized to the island and well-known locally by the name "pomarrosa". At approximately 400 m elevation, the pomarrosa is the main host to the three varieties of *Guzmania monostachia*, sometimes all occurring on the same tree. The more abundant varieties are *monostachia* and *alba*, whereas *variegata* appears with few individuals. Other epiphytes include the bromeliads *Tillandsia festucoides*, *T. setacea*, *T. variabilis*, and *T. bulbosa*, the ferns *Pleopeltis polypodioides*, *Phlebodium aureum* and *Campyloneurum phyllitidis*, the orchid *Epidendrum nocturnum*, the peperomias *Peperomia magnolifolia* and *P. obtusifolia*, and the hemiepiphytic climber *Marcgravia rectiflora*.

Varieties *monostachia* and alba bloom at the beginning of the rainy season in Cuba at the end of April, through most of May. The brilliant red and black striped floral bracts of var. *monostachia* (FIGURE 11) contrast with the green and immaculate white bracts of variety *alba* (FIGURE 12). Also growing in the pomarrosa trees are plants of *Guzmania monostachia* with pale rose floral bracts which suggest the probable occurrence of a new variety (W. Till, pers. com.). As in the typical variety, the rest of the floral bracts are pale green colored, but light and diffusely striped (FIGURE 13). Variety *variegata* (FIGURE 14), does not bloom in this season, which suggests the existence of a possible mechanism of reproductive isolation. This strip of Gallery Forest is a favorable site for studies of reproductive biology of *Guzmania monostachia* to further the knowledge of the natural history of the species in Cuba.

Although dried specimens of variety *monostachia* have some vestiges of dark stripes in the floral bracts, the differences between the other varieties of *G. monostachia* disappear almost completely once collected material is dried and pressed, which makes their identification to variety level in the herbarium difficult (Villalón 1996).

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Figure 10. *Guzmania monostachia* in habitat.

Figure 11. *Guzmania monostachia* var. *monostachia*.

Figure 12. *Guzmania monostachia* var. *alba*.

Figure 13. Possible new variety, *G. monostachia* with the floral bracts pale pink.

Figure 14. *Guzmania monostachia* var. *variegata*.

Mérida (Venezuela), The City of Bromeliads

Francisco Oliva-Esteve[1] **Photographs by the Author**

There are three Méridas. The oldest one is located in the Province of Badajóz in Extremadura, Spain, and has a population of 60,000. Founded by the Romans in 25 B.C., it was the westernmost province of the Roman Empire at the time and was called *Augustus Emerita*. The second Mérida, in the State of Yucatán, on theYucatan Peninsula, Mexico, is the state capital with a population of 200,000. It was founded by the Spaniard, Francisco Montijo in 1542.

The third Mérida, population 715,269, is the capital of the State of Mérida, Venezuela. It is located at 4920 feet (1640 m) in the Venezuelan Andes, at the foot of the Sierra Nevada (FIGURE 15). The Spaniard, Juan Rodriquez-Suarez and 300 men founded the city in 1558. The city was established on a mesa-like prairie, bordered by the Chama and Albarregas rivers. It has the highest and longest cable-car in the world, 7.5 miles (12.5 km) long, reaching a glacier at 15,284 feet (4765 km) above sea level (FIGURE 16).

Figure 15. The city of Mérida, Venezuela.

Figure 16. The famous cablecar.

Besides being a cool and nice city with an average temperature of 68 degrees fahrenheit (19°C), there is an abundance of bromeliads which makes the city unique and outstanding. There are thousands of individuals all over the place; in the streets, avenues, main and small plazas, private gardens, in vacant lots, gorges, talus, etc. Often, the wind blows them down and they can be gathered from the ground. A single tree usually is host to one or two species, sometimes as many as three or four, and they grow attached, covering the trunk and branches with hundreds of individuals (FIGURE 17). The city is like a garden, full of natural vegetation.

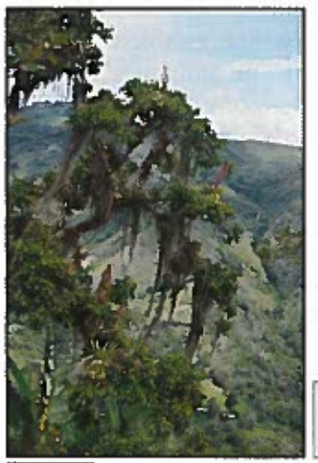

Figure 17. Abundant epiphytes on the outskirts of Mérida, Venezuela.

[1] Caracas, Venezuela

The following species can be found in the city and in the downtown area:

Guzmania mitis, G. monostachia, G. patula, G. squarrosa; Tillandsia balbisiana, T. fendleri, T. fasciculata, T. francisci, T. juncea, T. teunifolia, T. tenuispica, T. variabilis, T. usneioides, T. utriculata.

On the outskirts, about one-half hour from town, the following additional species occur:

Ananas comosus; Bromelia chrysantha; Catopsis nutans; Pitcairnia brevicalycina, P. heterophylla, P. maidifolia, P. meridensis, P. nubigena; Puya aristeguietae, P. floccosa; Racinea spiculosa, R. seemannii, R. tetrantha var. aurantiaca, R. tetrantha var. miniata, R. tetrantha var. scarlatina; Tillandsia biflora, T. compacta, T. compacta var. intermedia, T. complanata, T. flexuosa, T. funckiana, T. incarnata, T. longifolia, T. myriantha, T. schultzei, T. stipitata, T. tovarensis; Vriesea hasei, V. incurva, V. robusta, V. tequendamae.

Travels to the South of Bahia State, Brazil

Luiz Felipe Nevares de Carvalho, BSI Director, International Region

When Fernando Azevedo invited me to give a seminar on bromeliads at the Sixth Exhibition of Orchids and Bromeliads at the Sítio do Descobrimento, in Arraial D'Ajuda, Bahia, I foresaw the possibility of an outing in the environs where there are still hidden treasures in the remaining patches of the Atlantic Forest.

The Exhibition was organized by ORQUIDESC, the Society of Friends of Orchids and Bromeliads of the Sítio do Descobrimento, an organization that brings together conservationists and orchid and bromeliad lovers from the Porto Seguro area on the southern coast of Bahia. The exhibition this year was from November 13 to 16, at the Erva Doce Inn in the middle of Arraial D'Ajuda. It was absolutely lush with orchids and bromeliads, having coincided with the blooming season of *Cattleya warneri*, which enabled a sea of blossoms to cover the walls of the veranda of the inn. The ambiance, created with lovely examples of bromeliads, gave us a spectacle of rare beauty. Porto Seguro, of which Arraial D'Ajuda is a district, has a population of around 96,000, and, just to give an idea of the interest that the exhibition generated in the community, suffice it to say that more than 3000 people visited and followed the events.

In addition, there were workshops and courses, as well as activities of environmental education, mainly with children and youths from the local schools. One day, for example, art students from a charitable organization for needy children came to paint the plants at the exhibition (FIGURE 18), and several of them demonstrated great talent.

My seminar was on the Bromeliads of the southern part of the State of Rio de Janeiro and their problems of conservation. It gave rise to many questions and comments, and I think that it fulfilled its objective of increasing the awareness of conservation of the participants.

After the exhibition, we took our first excursion into the region in the south of Porto Seguro, going up to Curuípe and Espelho. Around the edges of the sea cliffs, seen from the beach, there are still populations of *Neoregelia pascoaliana*—very typical of the region. On the way back we came across some remnants of the Atlantic Forest, always on sea cliffs some 50 meters above sea level. The soil there is sandy, with small and medium-size trees, and we found *Portea grandiflora* and *P. alatisepala* and yet another, unidentified species. We found two species of *Hohenbergia*, terrestrial and epiphytic, and *Aechmea pabstii*, including a population of a much smaller clone (FIGURE 19), still with blossoms, and we were surprised to find a small population of *Aechmea amicorum* still with its inflorescence, albeit past its prime. *Tillandsia bulbosa, T. stricta,* and *Tillandsia gardneri* occupy the trees together with *Catopsis berteroniana*. It is a very interesting region that deserves more study.

On the following day we departed for the north along the coast. We had the objective of exploring the patches of forest between the cities of Belmonte and Barrolândia. Belmonte is around 80 km from Porto Seguro at the mouth of the Jequitinhonha River.

The first stop was in Santo André, where vegetation on a spit with very sandy soil shelters populations of *Aechmea blanchetiana* of a rich salmon color. They are really marvelous, always terrestrial, whether they be in full sun or in shade showing off their vivid color (FIGURE 20). We also found *Vriesea procera* var. *rubra*, completely heliophytic, with a very red inflorescence and intensely yellow leaves. A little further on we made a second stop in a locale with large trees, when we came upon the epiphyte *Aechmea marauensis* about 10 meters from the ground. It was a beautiful, typical clone alongside another group with an inflorescence that, from a distance, looked dry or discolored to us. Drawing near, we saw that we had discovered a rarity, a growth of *A. marauensis* with absolutely white inflorescences! It was a magical moment in which we were stunned by the beauty of the scene. After the shock, we saw that the entire growth was a pure white clone with various white inflorescences. We photographed it and decided to baptize the clone *Dos Amigos*- "About Friends" (FIGURE 21). Recovered, we continued towards the north and now in the direction of Barrolândia, where we stopped several times to explore the surroundings. We found large terrestrial populations .and a few epiphytes of *Vriesea roberto-seidelii, Aechmea marauensis*—some terrestrial, some epiphytic, and even a very beautiful *Aechmea* with sheaths the color of pale wine. Unfortunately the inflorescence had dried, but it was branched like *A. blanchetiana*, though not quite so. Could it have been a natural hybrid of *A. blanchetiana* and *A. marauensis*? *Tillandsia globosa* was also seen in abundance among the shrubs of these very dry woods.

Figure 18. A boy painting a *Vriesea taritubensis* at the exhibition in Ajuda.

Figure 19. *Aechmea pabstii*, small form, blooming in Curuipe south of Porto Seguro.

Figure 20. *Aechmea blanchetiana*, regular form, with a vivid color in Santo André.

Upon going deeper into the woods, we came upon considerable populations of *Aechmea ampla* and *Cryptanthus* sp. Unfortunately there were clear signs of plunder, mainly of orchids. We saw the plantless roots stuck in the trees. The region is rich and still has good areas with considerable populations of bromeliads and orchids.

On the return near Belmonte, we found some strangely dwarf, but very interesting populations of *Aechmea blanchetiana*. They still had their inflorescences, which were smaller but exactly like those of normal size. (FIGURE 22).

Awareness of conservation is, without the slightest doubt, growing, and IBAMA, the Brazilian Institute for the Environment and Renewable Natural Resources, has been doing a good job with inspections that curtail plunder. The region includes the Pau Brasil National Park, Monte Pascal National Park, and also the recently established Environmental Preservation Area of Serra do Peri-Peri near Vitoria da Conquista.

Finally something has been done for the preservation of the remaining ecosystems that still shelter much natural wealth in the south of Bahia. The pressure from conservation organizations has certainly contributed a great deal.

Figure 21. *Aechmea marauensis*, completely white and growing as an epiphyte to 20 m high in trees, on the road to Belmonte.

Figure 22. *Aechmea blanchetiana*, dwarf form, in the way from Barrolandia to Belmonte.

Painting Bromeliads

Mary Gregory[1]

Paintings by the Author

As a botanical artist I was introduced to bromeliads rather late, having previously painted the exotics and native plants most commonly found in my local nurseries and gardens. I believe bromeliads are becoming more popular in southern Australia, my part of the world, although they have always been more appreciated in tropical Queensland, where people are accustomed to plants with the strong colours and bold forms of many bromeliads. However, having been commissioned to paint a tillandsia and deciding I should learn more about this genus, I found many were available in specialist nurseries, and I joined a very active and knowledgeable group of growers in the local Bromeliad Society.

On visiting my first Bromeliad Show, I felt somewhat overwhelmed on seeing the vigorous and colourful display of so many bromeliads together. As a consequence I cautiously chose another tillandsia to paint. Later, a kind grower provided me with plants as I needed them, and I spent an absorbing year painting more tillandsias, some aechmeas, vrieseas, guzmanias, and neoregelias, and I found a *Billbergia nutans* in my garden, ignored for years.

There are few plants that I don't come to love as I paint them and I had the same reaction to bromeliads. I appreciated their great variety of shape and size, the mixture of colours even on the one plant, the leaves which can be strong and thrusting with sharp edges and decorated with spots or stripes, or others more delicate, cascading gently from a central point. I enjoyed unearthing them from pot or garden to discover the form and colouring of the base, and was always delighted to find an offshoot or 'pup' starting to develop, as in *Tillandsia leiboldiana* (FIGURE 23). The roots with their mesh of finely formed and branching threads were a challenge to paint, but added to the full picture of the plant. For me the most fascinating part of the plants are the flowers, so various in their presentation. Stamens emerge from a long flute of petals as in *Vriesea malzinei* (FIGURE 25) or the flower nestles in the pool of water in the centre of neoregelias (FIGURE 24). Some flowers flaunt themselves against contrasting colours of the bracts, while others may be hidden and appear only briefly, so it was with an enjoyable sense of discovery that I located them. I endeavoured to paint each plant when its characteristic features were most in evidence, so that it could be easily identified.

The main principle of Botanical Art — to draw as precisely as possible what you see — applies to the depiction of all plants, but sometimes bromeliads, because of the variety of features often found in the one plant, presented a greater challenge than I had met when painting other genera. The leaves were particularly testing because of their striking shapes and markings. Courage was required to render very dark or vivid colours, and some of the patterned leaves, of a *Vriesea splendens* or a *Vriesea guttata* for instance, have to be observed very carefully if they are to be represented accurately. Furthermore, to paint the flower when it is at its often fleeting peak means there is only a short time to portray it. I have met all the above challenges before, but never in such an intense way as I faced when painting a number of bromeliads in succession. Above all I strove to make the paintings botanically accurate as well as aesthetically pleasing - a balance of the scientific and the artistic, which is the aim of good botanical art.

[1] Balwyn, Australia

Figure 23. *Tillandsia leiboldiana.*

Figure 24. *Neoregelia* 'Janet Gregory', named for Mary Gegory's eldest daughter.

Figure 25. *Vriesea malzinei.*

Cool Plants at the Atlanta Botanical Garden

Bruce Holst, Editor, JBS **Photographs by the Author**

A unique combination of technologies and generous funding from the Fuqua family has made it possible for the Atlanta Botanical Garden (ABG) to grow cool-loving plants from tropical montane regions around the world.

A problem in greenhouses in areas with hot seasons has always been how to achieve affordable cooling as well as how to maintain acceptable levels of moisture in the air. Standard air-conditioning technology severely dries the air, and as most people who live in the southwestern United States know, air-conditioning bills can seriously deplete one's cash reserves.

Figure 26. The Fuqua Conservatory, opened to the public in 1989, is a landmark on the Atlanta skyline. It houses plants of the lowland tropics, and connects directly to the Fuqua Orchid Center where the cool house is located.

Figure 27. One of the main greenhouse ranges of The Fuqua Orchid Center, as seen from the top of the Fuqua Conservatory. Mid-town, Atlanta, is in the background.

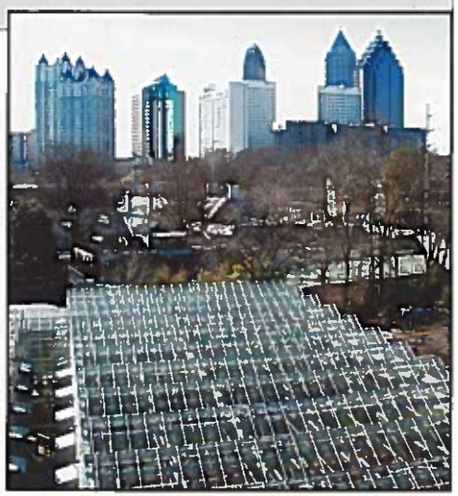

Figure 28. A wreath decorated with tillandsias is part of a seasonal display in the Fuqua Orchid Center display hall.

Figure 29. Bad hair day? Ron Determann, Conservatory and Conservation Director at ABG, and Mike McLaughlin, Director of Horticulture at the Marie Selby Botanical Gardens, experience the gale-force winds of the air exchange tunnels in the basement of the conservatory.

The Atlanta solution, where hot, sultry, summer nights are legend, was to seek a technology from another industry, in this case, the textile industry, to provide the cool, moist air needed to keep the montane plants happy. ABG was put in touch with a Swiss/North Carolina company, Luwa Bahnson, which specializes in something called an "Air Washer." The washer was developed for the textile industry to keep large high-tech cotton spinning plants from overheating and becoming too dry. Conventional air-conditioning causes yarn to become static and brittle, which then causes the spinning machines to jam. ABG challenged the company to modify their system for greenhouse use so that they could grow, for example, high altitude guzmanias, brocchinias, and tillandsias, as well as montane-loving genera from other plant families in the heart of Atlanta.

The technology works like this: a very large supply fan brings in filtered air and sprays it to saturation with water. Evaporative cooling takes place quickly, and then the air goes through a specially designed stainless steel wall that removes excess water and allows only the humidified air through. The supply fan then brings this humid air into the greenhouse through reinforced, perforated tubes placed overhead. After delivery, the air enters large duct returns and gets re-filtered and again sprayed to saturation with water. Evaporative cooling is maximized, and in a short period of time, the output air temperature becomes equal to the water temperature (or colder if the humidity in the greenhouse is low).

During periods of high temperatures coupled with high humidity, or for the additional cooling required to achieve the target 55 degree Fahrenheit night temperatures, the circulating air can also be air-washed with water cooled to 40 degree F. This brings the temperature down quickly. The Air Washer system is efficient because most of the cooling is done at night when there is no additional solar gain. Additionally, aluminum energy blankets are fully drawn beneath the greenhouse roof and keep the cool air in during the summer, or the warm air in during the winter.

In addition to the Air Washer system and energy blankets, the MX type greenhouses designed and built by the Van Wingerden Greenhouse Company of Asheville, North Carolina include many other computerized and energy-efficiency-promoting technologies.

This is all fine and well, but the proof of the technology is in the resulting plant display, and I'm happy to report that they have achieved what many seasonally hot gardens only dream about... to represent the diverse and interesting tropical montane flora. Three main biomes are represented in the cool-house, The Andes of South America, the tepui or "Lost World" area of South America, and the mountains of Southeast Asia. The cool house is but one of several elements in the Fuqua Orchid Center, which opened to the public in 2002. The Center also includes a tropical orchid display house, conservation house, support house, tissue lab, library, classrooms, and staff offices.

So, if you can't afford that trip to Borneo this year or would just rather not deal with all of the leaches, snakes, tarantulas, etc. that one may encounter in the montane tropics, consider a trip to the Atlanta Botanical Garden, any time of the year.

Acknowledgments

Many thanks to Ron Determann, ABG Conservatory and Conservation Director, and the conservatory staff for providing an up-close tour of the greenhouse ranges. Thanks also to Ron for allowing me to extract portions of his article in the Public Garden for use here (*Thinking Outside the Glass Box*; PG 18[2]: 16-18. 2003).

Figure 30. *Brocchinia acuminata* L.B. Sm. is one of the characteristic plants of the tepuis, or Lost World of northern South America on display in the cool house.

Figure 31. The rock wall of the Andean display area provides an amazing display of diversity. Pinks and reds seen here, from left to right: *Cavendishia* sp., Ericaceae; *Anthurium andreanum*, Araceae; *Phragmipedium besseae*, Orchidaceae; *Guzmania conifera*, Bromeliaceae.

Figure 32. The Air Washers at work. Huge fans push air through this wall of water, which then becomes saturated. The water can be cooled to 40 degrees Farenheit. You would get wet if you were standing on the other side of the "wall."

Figure 33. *Pitcairnia stevensonii* Luther & Whitten from Ecuador also likes it on the cool rock wall in the Andes display area.

Vriesea 'Brentwood'

Derek Butcher, BSI Cultivar Registrar

Figure 34. *Vriesea* 'Brentwood'.

Following is just one example why details of hybrids should be reported to the Registrar as they happen and not left to posterity. According to the 1988 Bromeliad Cultivar Register, *Vriesea* 'Brentwood' is of European origin but the description by Cole and Bromeliad Treasury differ considerably and suggest they are referring to two different plants. In my search for an authentic photograph to represent this cultivar I received several different ones. This set me asking questions.

The 'European origin' had me confused until I found out that David Barry who imported several plants from Europe in the 1960's lived at a place called Brentwood in California. Bill Paylen of California, one of the first members of the BSI, remembers a branched spiked plant with reddish bracts coming from California Jungle Garden Nursery in Brentwood and this could well be our plant. In the early 1980's John Arden took a slide of what he considered to be *Vriesea* 'Brentwood' and I am using this as an example of this cultivar. Cole describes this cultivar as having 'maroon' bracts and this colour is described as a dark brownish red in my Encyclopaedia but is not a colour used in Stearn's 'Botanical Latin'. The colour from John Arden's slide (FIGURE 34) is closer to #20 brick red on Isley's colour chart. The leaves are very dark. It is amply branched with up to 7 side spikes.

Now for the crunch. There is also a plant being grown in Australia since about the mid 1980's which is thought to have come via Kent's nursery to June Bennett of Cairns, Queensland. This has yellow floral bracts and darkish green leaves. The inflorescence is only few branched and sometimes reduced to a single spike. If we refer to Brian Smith's 1984 Manuscript of Bromeliad Hybrids we will see that 'Brentwood' x *fenestralis* (Kent) and 'Brentwood'F2 were on offer in nurserymen's catalogues. Neither have since been registered so we do not know what they look like either! This could well be the reason why we have this yellow bracted form in circulation also being called 'Brentwood'. A similar yellow bracted plant (FIGURE 35) is also on offer at Tropiflora, Florida, under the same name. I intend to call this *Vriesea* 'Brentwood Lemon' not only because of the colour but because of my sense of humour!

Photograph by John Arden.

Figure 35. *Vriesea* 'Brentwood Lemon'. Photograph by Michael Pascall.

Endangered Bromeliads Available in Horticulture

Jeffrey Kent[1]

Many species of bromeliads grown in horticulture are rare or endangered in the wild. After carefully comparing those Bromeliads available in the nursery trade against the biodiversity hotspots as defined by Conservation International, I came up with the following listing of Bromeliad species of concern. While not all of these are the most decorative bromeliads available, my hope is to encourage growers to pay special attention to them, keep them alive in their private collections, and distribute them to fellow growers.

Caribbean

Aechmea dichlamydea var. dichlamydea
Aechmea aripensis
Aechmea serrata
Tillandsia baliophylla
Tillandsia moscosoi
Vriesea tuerckheimii

Mesoamerica

Aechmea allenii
Aechmea haltonii
Aechmea mariae-reginae
Aechmea pittierii
Aechmea strobilina
Araeococcus pectinatus
Guzmania blassii
Guzmania donnell-smithii
Guzmania sprucei
Tillandsia carlsoniae
Tillandsia eizii
Tillandsia hondurensis
Tillandsia matudae
Tillandsia mexicana
Tillandsia oerstediana
Tillandsia ponderosa
Ursulea macvaughii

Choco-Darien-Western Ecuador

Guzmania alborosea
Guzmania eduardii
Guzmania harlingii
Guzmania inexpectata
Guzmania longipetala
Guzmania raubiana
Guzmania testudinsis
Guzmania xanthobractea
Guzmania wittmackii
Pitcairnia nigra
Tillandsia cyanea
Tillandsia dyeriana
Tillandsia pretiosa

Tropical Andes

Aechmea abbreviata
Aechmea kentii
Aechmea servitensis var. servitensis
Chevaliera tayoensis
Guzmania andreettae
Guzmania condorensis
Guzmania rubrolutea
Tillandsia bongarana
Tillandsia confertiflora
Tillandsia lindenii var. lindenii
Tillandsia platyrhachis
Tillandsia raacki
Tillandsia reuterii
Tillandsia rhodosticta
Tillandsia wagneriana
Vriesea penduliscapa
Tillandsia pyramidata var. vivipara
Vriesea dubia
Vriesea zamorensis

Atlantic Rainforest of Brazil, Paraguay, & Argentina

Aechmea orlandiana var. orlandiana
Aechmea ramosa
Aechmea roberto-seidelii
Aechmea seidelii
Aechmea warasii
Alcantarea imperialis
Billbergia horrida
Billbergia leptopoda
Billbergia minarum
Billbergia sanderiana
Canistropsis billbergioides
Canistropsis elata
Canistrum camacaense
Canistrum montanum
Canistrum fosterianum
Canistrum seidelianum
Cryptanthus bivittatus
Cryptanthus lacaerdae
Nidularium apiculatum
Nidularium fradense
Nidularium fulgens
Nidularium insularis
Nidularium kautskyanum
Quesnelia seideliana
Tillandsia kautskyii
Vriesea angostiniana
Vriesea barilletii
Vriesea delicatula
Vriesea ensiformis
Vriesea fenestralis
Vriesea flammea
Vriesea fosteriana
Vriesea guttata
Vriesea hieroglyphica
Vriesea racinae
Vriesea simplex
Vriesea sucrei
Vriesea triangularis
Vriesea warmingii
Wittrockia campos-portoi
Wittrockia cyathiformis

[1] Vista, California

Plant Patents, Plant Breeding Rights, Whatever...

Derek Butcher, BSI Cultivar Registrar

Plant patents evolved to protect breeders from exploitation by others in an open market and act in a different way to what we call 'Registration'. In no way can it be construed that reliance can be made on this plant patent reference. Therefore, this section will be removed from the Cultivar data base maintained under http://BSI.org under Cultivar Corner. Any reference to plant patents in any printed version of the Register (see 1998, for example) is to be ignored.

However, plant names under plant patents will still be recorded in the Register when we know about them because the name will still apply in the future when the plant patent is obsolete. Secondly, it may help in reducing the use of duplicate names and the subsequent confusion in identification.

Plant patenting is a separate plant naming and identification system where there is NO direct contact with the ICRA and certain care should be taken if you are growing a plant, which has a Plant Patent. Information received to date suggests you can safely grow on and take offsets from any named plant whether it has plant patents or not. The official wording seems to be you can grow patented plants for experimental purposes, privately and non-commercially. If you sell then you need to check with the Plant Patents authorities for the country (or area such as the European Union) in which you are going to sell. If you are going to sell in quantity we suggest you contact the hybridist by way of courtesy, in any case. Remember that asexual sports, like variegation, are also covered under the plant patent even though they would need a new name under the International Code of Nomenclature of Cultivated Plant rules. If it is your own hybrid then you have no worries even if one of the parents may be a patented plant. If you grow from self-set seed from a patented plant you may also have to be wary depending on the country concerned.

Commercial growers of plants are well aware of these restrictions in selling plants, but how does it affect the back-yard grower and plant societies who organise plant sales? From what I can see, the onus is on the grower and not the Society unless the Society buys the plants for resale. Therefore, the grower is the one who should be checking for plant patents and you only need to check in the country where you are selling. Most have web sites where checking is easy although the one maintained in the USA is not user friendly. It is of interest that only a few bromeliads have current patents (or have applied for patents) on the various countries' websites I have checked. If in doubt you can always give away or swap any spare plants you may have. However, you have been warned of these dangers especially if you sell in bulk. Contact a Solicitor or Lawyer versed in plant patents if you want advice.

Remember too, that a plant label that purports to be under plant patent for your country and is not, would in all probability be in breach of the various Trade Practices Acts. Certainly in Australia a label giving a false impression about a plant patent is a punishable offence.

Registration of plants through an ICRA such as myself is based on trust. Keep those registrations rolling in. You can still use the information on the register as evidence to institute court action if someone were using your hybrid as his or her own. Plant Patents are based more on mistrust and you are advised to check before acting.

Events Calendar

April 9-10, 2005. *NSW BROMELIAD SOCIETY AUTUMN SHOW.* New South Wales, Australia

Oct. 14-17, 2005. *BROMELIADS XIII - AUSTRALIAN CONFERENCE.* The Bromeliad Society of Queensland, Inc., Brisbane, Australia. The conference will include lectures, tours, sales, displays, and an auction and show. For more information, contact Bromeliads XIII Conference Committee, c/o Bromeliad Society of Queensland Inc., PO Box 565, Fortitude Valley, Queensland, 4006 Australia. E-mail: secretary@bsq.org.au. Web site: http://www.bsq.org.au/conference.html.

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

WANTED

Writers & Photographers

The editors of the Journal of the Bromeliad Society seek writers and photographers of diverse bromeliad interests worldwide to contribute to the Journal. Please send your contributions to the editors. (address on inside front cover).

A New Variety of *Tillandsia incarnata* from Ecuador

Albert Roguenant[1] & Aline Raynal-Roques[2]

A new variety of *Tillandsia incarnata* Kunth., var. *margaritacea* A. Roguenant & Raynal-Roques is described. This variety is only known from the type locality in Ecuador.

Tillandsia incarnata* var. *margaritacea A. Roguenant & Raynal-Roques, var. nov. TYPE: Ecuador. Tungurahua: Ambato, 2300-2800 m alt, epiphyte on *Schinus molle* and Caesalpiniaceae, 12 May 2001, *Albert & Claudie Roguenant & Aline Raynal-Roques* 0177 (Holotype: SEL). Figures 36, 37.

A varietate typica sed bracteis scapigeris griseo-viridibus, inflorescentia simplici, spicis brevioribus, subviridi-griseis, 5-8 flora, bracteis florigeris subviridibus, et petalis margaritaceus differt.

Plants in dense tangled masses; ***stem*** branching, its branches to 10-35 cm long, *roots* present on young plants. ***Leaves*** densely polystichous, spreading, 6-15 cm long, gray, covered with appressed or slightly spreading scales; ***sheaths*** ovate, indistinct, sometimes tinged with brown; ***blades*** suberect to spreading, narrowly triangular, filiform-attenuate, usually involute toward the apex. ***Scape*** terminal, straight or slightly curved, about 2.0-2.5 mm in diameter, 10-30 cm long, lepidote or glabrous; ***scape bracts*** densely imbricate, elliptic, chartaceous, the lower gray green, with long filiform blades, the upper acute or apiculate, pale green to cinereous, apex cinereous, sometimes slightly rosy. ***Inflorescence*** simple; spike lanceolate or linear, flat, 5.0-7.5 cm long, often arched, pale greenish gray loosely 5-8 flowered, internodes 7 mm long, rachis nearly straight, subquadrangular, lepidote to glabrescent. ***Floral bracts*** and ***scape bracts*** alike, imbricate or the lowest slightly divergent, elliptic, apiculate, 1.5-2.2 cm long, exceeding the sepals, ecarinate, chartaceous, with a longitudinal nerve, densely lepidote, pale green, apex generally more beige; ***flowers*** subsessile. ***Sepals*** lance-elliptic, acute, about 1.4 cm long, with a longitudinal nerve, lepidote, carinate and connate for 1 mm; ***petals*** narrowly elliptic, erect or nearly so, tortuous, pearl-white, 2.0-2.5 cm long, claw 3 mm wide, ended with a lanceolate blade 5-6 mm long, obtuse; ***stamens*** included, 18 mm long, ***filament*** pure white, 0.4 mm in diameter, bearing a straight yellow anther, 3 x 0.2-0.3 mm. ***Pistil*** 16 mm long; ***ovary*** egg-shaped, clear green, glistening, 4 mm long, 2 mm wide; *style* white, spindly, 10 mm long, 0.4 mm thick; ***stigma*** 2 mm long, white, papillose inside.

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[2] Aline Raynal-Roques, 5 ch. de la Ceinture-la-Reine, 91290 Arpajon, France

The new variety was observed growing mixed among populations of the typical variety, but also in large populations by itself. Individuals of the new variety tend to be smaller in stature and always have pearly-white petals. They are found as epiphytes on *Schinus molle* (Anacardiaceae) and on vertical cliffs. The species name refers to the pearl-white petals.

Acknowledgment

We thank Jason R. Grant for discussions on the manuscript and Ecuadorian Bromeliaceae.

Photographs by the authors.

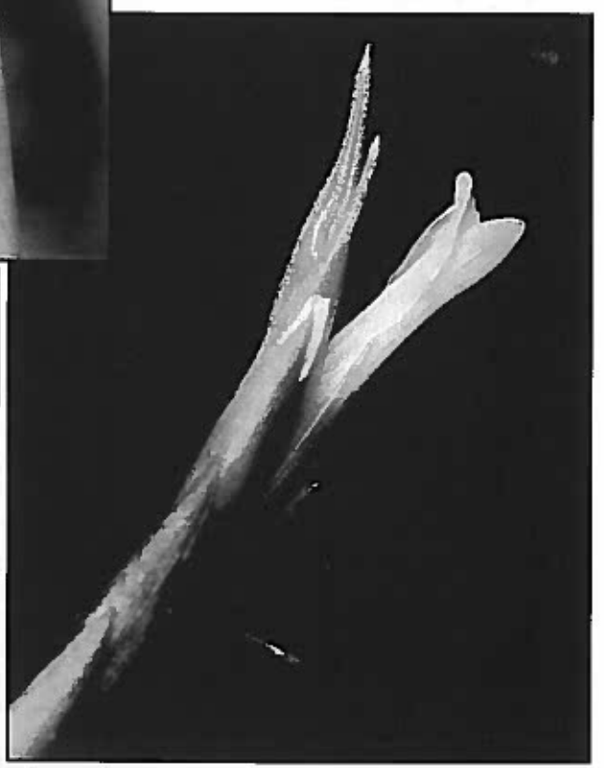

Figure 36, 37 (right). *Tillandsia incarnata* var. *margaraticea*.

Pitcairnia norteſluminensis, a New Species from Rio de Janeiro, Brazil

Elton M. C. Leme[1] **Photographs by the Author**

According to Luther (2002), the genus *Pitcairnia* L'Héritier is comprised of 342 taxa (including species, varieties and forms, and not including members of the genus *Pepinia* Brongn. ex André, *sensu* Varadarajan & Gilmartin 1988); or it contains 396 taxa in the concept of Smith & Downs (1974), including all species of *Pepinia* (*sensu* Taylor & Robinson 1999). Despite being the largest genus in the subfamily Pitcairnioideae, *Pitcairnia* is sparsely represented in eastern Brazil, with only 11 species reported on the Brazilian Atlantic coast, (Wendt & Chamas 1997).

In a study conducted by Wendt (1994), six species of *Pitcairnia* were recognized from the Atlantic coast state of Rio de Janeiro. However, recent investigations conducted by Wendt et al. (2000) and Tatagiba (2003) suggest that detailed taxonomic studies in the field and the use of neglected morphological characters as seen in living specimens may provide a new basis for consistent taxonomic segregation, mainly those related to *P. flammea* Lind. complex. (e.g., the reestablishment of ***P. corcovadensis*** Wawra to species status). This new taxonomic approach has contributed tremendously to a more precise assessment of biodiversity patterns in eastern Brazil, and has also made possible the recognition of undescribed species, like the one presented below.

Pitcairnia norteſluminensis Leme, sp. nov. TYPE: Brazil. Rio de Janeiro: field collected in Campos, Morro do Coco, Morro do Baú, 19 June 1999, and flowered in cultivation June 2003, *E. Leme & J. Gastin 4646* (Holotype: HB). FIGURES 38, 39.

> A *P. corcovadensis* Wawra, cui affinis, squamis longe fimbriatis patentibus, foliis laxe vel subdense albo-lepidotis sublanatis, bracteis scapalibus internodia superantibus, albo-lepidotis, scapo albo-lepidoto, bracteis floriferis albo-lepidotis, floribus per anthesin unilateralibus et petalis brevioribus differt.

Plant rupicolous, propagating by short basal shoots, flowering ca. 35 cm tall. ***Leaves*** fasciculate, all alike, suberect-arcuate, thin in texture, entire, persistent. ***Sheaths*** subtriangular, ca. 2 x 1.5 cm, glabrescent, abaxially brown toward base and lustrous, coarsely nerved abaxially, adaxially greenish. ***Blades*** very narrowly linear-attenuate, slightly narrowed toward base but not petiolate, apex filiform-caudate, 37-45 x 0.8-1.1 cm, inconspicuously nerved, distinctly canaliculate but not carinate, green except for the inconspicuously red margins, laxly to subdensely white-sublanate abaxially with long fimbriate spreading trichomes, laxly lepidote adaxially with long fimbriate spreading trichomes, blade color not obscured by the trichomes; ***scape*** suberect, ca. 18 cm long, 0.3-0.4 cm in diameter, subdensely white-sublanate with long fimbriate spreading trichomes to glabrescent, red. ***Scape bracts*** the basal ones foliaceous and exceeding the scape, the upper ones lanceolate-attenuate, filiform-caudate, erect, distinctly longer than the internodes but not concealing the scape, subdensely white-sublanate with long fimbriate spreading trichomes, entire, green. ***Inflorescence*** laxly racemose, simple, suberect, distinctly exceeded by the leaves, 4-7 cm long, rachis straight, 1.5-2 mm in diameter, terete to slightly angulose toward apex, red, subdensely white-sublanate with long fimbriate spreading trichomes to glabrescent. ***Floral bracts*** lanceolate, acuminate, 8-20 x 2-3 mm, entire, membranaceous, greenish to reddish, soon stramineous, suberect to erect, laxly lepidote with long fimbriate spreading trichomes to glabrescent, the basal ones equaling the pedicels, 18-20 x 2.5-3 mm, the upper ones shorter than the pedicels, 6-13 x 1.5-2 mm. ***Flowers*** 4-7 in number, 60-70 mm long (including the pedicels), laxly arranged, suberect and downwardly secund at anthesis, odorless, pedicel 15-20 mm long, ca. 1 mm in diameter at base, ca. 2 mm in diameter at apex, terete, red, sparsely white-lanate to glabrous. ***Sepals*** lanceolate, apex acuminate, erect, ecarinate, 18-20 x 3 mm, red, glabrous; ***petals*** sublinear-lanceolate, apex acute, 48 x 5-6 mm, red, erect or slightly recurved at apex at anthesis, convergent over the stamens forming a zygomorphic corolla, unappendaged; ***stamens*** about equaling the petals; ***anthers*** linear, ca. 7 mm long, fixed near the base, base sagittate, apex obtuse. ***Stigma*** conduplicate-spiral, red, margins entire; ***ovary*** subpyramidate, ca. 2/3 superior; ***ovules*** many, caudate; ***seeds*** bicaudate.

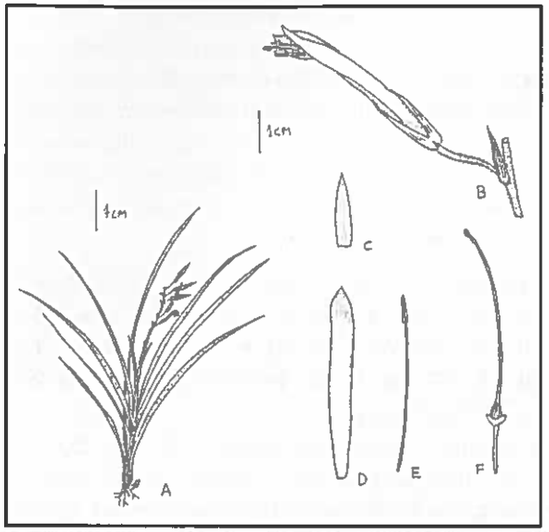

Figure 38. *Pitcairnia norteſluminensis*. A. Habit. B. Flower. C. Sepal. D. Petal. E. Stamen. F. Pistil. (Drawing by E. Leme).

This new species is very closely related to *Pitcairnia corcovadensis*. On the basis of the morphological characteristics highlighted by Wendt et al. (2000), it differs from *P. corcovadensis* by the presence of long fimbriate spreading trichomes (vs. plant glabrous), leaves laxly to subdensely white-sublanate (vs. glabrous), scape bracts distinctly longer than the internodes and white-lepidote (vs. the upper ones shorter than the internodes and glabrous), scape white-lepidote (vs. glabrous), floral bracts white-lepidote (vs. glabrous), flowers downwardly secund at anthesis (vs. not distinctly secund), and by the shorter petals (48 mm vs. 55-65 mm long).

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The structure and shape of the trichomes were emphasized by Tatagiba (2003) as a consistent character in the segregation of seven taxa related to the *Pitcairnia flammea* complex to which *P. nortefluminensis* belongs. The trichomes that cover the abaxial leaf surface of *P. nortefluminensis* are long fimbriate, spreading or irregularly curved, single to laxly multiple filamentous shields, giving the plants a sublanate aspect. These trichomes are closely related to those reported by Tatagiba (2003) in *P. flammea* var. *flammea* and mainly in *P. flammea* var. *spinulosa* E. Pereira.

On the basis of the identification key offered by Tatagiba (2003), this new species is morphologically related to a *Pitcairnia flammea* var. *flammea*, but it can be distinguished by its distinctly smaller size (ca. 35 cm tall vs. 45-100 cm tall), shorter leaves (37-47 cm vs. 60-180 cm), narrower leaf blades (0.8-1.1 cm vs. 2.5-4.8 cm), shorter scape (ca. 18 cm vs. 45-100 cm), inflorescence bearing a distinctly smaller number of flowers (4-7 vs. 20-83), shorter sepals (18-20 mm vs. 22-33 mm), and shorter petals (ca. 48 mm vs. 60-68 mm). In relation to *P. flammea* var. *spinulosa*, the new species differs by leaves completely entire (vs. spinulose near the base), leaf blades narrower (0.8-1.1 cm vs. 1.5-2.6 cm), inflorescence bearing a smaller number of flowers (4-7 vs. 10-66), floral bracts lanceolate (vs. triangular) and shorter (8-20 mm long vs. 23-38 mm long), besides the downwardly secund flowers at anthesis (vs. flowers not secund to upwardly secund at anthesis). In addition, *P. flammea* var. *spinulosa* shows a distribution restricted to the "Campos Rupestres" domain in the state of Minas Gerais, while *P. nortefluminensis* is only known from the Atlantic Forest domain in Rio de Janeiro state

Pitcairnia nortefluminensis was found on isolated inselbergs surrounded by Atlantic Forest in the north region of Rio de Janeiro State (FIGURE 40), from which came the specific epithet "*nortefluminensis*." It was growing on vertical bare rock surfaces on the foothill partially shaded by the proximity of the Atlantic Forest, at about 100 m altitude. In this population, some clumps with reddish leaves at the base were living side by side with the completely green-leafed regular clumps, but the reddish-leaved specimens brought into cultivation have not flowered, so identification is not yet possible.

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Figure 39. *Pitcairnia nortefluminensis*, in cultivation.

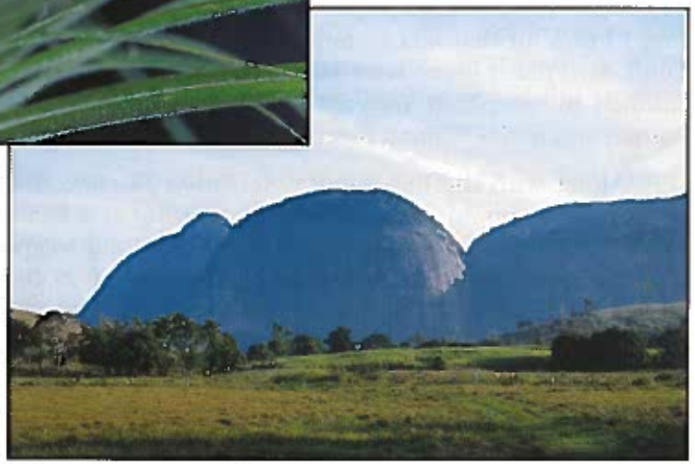

Figure 40. Inselberg where *Pitcairnia nortefluminensis* was found, growing in the foothill partially shaded by nearby Atlantic Forest.

Moving?

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

If you are moving, or have recently moved, please send your name, the old and new addresses, and the effective date to: John Atlee, BSI Membership Secretary, 1608 Cardenas Dr. NE, Albuquerque, NM 87110 or by e-mail to membership@bsi.org.

A Long Journey for *Tillandsia cyanea*

Ken Marks, BSI Webmaster

I've spent a good deal of my fleeting spare time lately working towards a long term goal of converting all of the old BSI Journals to HTML and adding them to the Members-Only section of the BSI website. Occasionally while reading through these old articles, I come across a real gem of a story. Many times they are humorous in their own right-other times it is the half century of time that has past since their writing that brings a new perspective to the article. This article recounts the long journey that *Tillandsia cyanea* has made from a time when it actually took a "long journey" to obtain one, to today when it is readily available from a number of nurseries, garden shops, and even mega-retailers.

I think some of the commercial success of *Tillandsia cyanea* (FIGURE 41) might be attributed to the fact that it is one of the very few bromeliads that I know of that has a common name which is very fitting indeed: Pink Quill. Any plant lover who has seen this species with its fuchsia paddle rimmed by oversized, fragrant blue flowers sequentially opening along its margin surely has found a place for it in their collection.

Along with the old standby *Aechmea fasciata* and an ever increasing number of stunning "user friendly" *Guzmania* and *Vriesea* hybrids that turn up in various garden centers, it doesn't take long to spot the hot pink paddles that draw shoppers to these plants as surely as they have drawn plant collectors in the past (and pollinators before that).

While this species may now be snapped up at your local mega-mart in brightly colored 4" pots for the not-so-princely sum of $2.98, there are even more choices today for the avid collector of this species. A number of interesting botanical forms of this species are now floating around in cultivation. There is one botanical variety called *Tillandsia cyanea* var. *tricolor* which has white streaks in the centers of the blue petals. There are also cultivars with pink and even white petals. There is also a very nice variegated form that makes this plant a stunning beauty even when not in bloom. One of the more unusual forms to show up recently has gone by the name "3D" in the trade. The normally flat oval paddle of pink bracts have gone three dimensional in this interesting mutant. This mutation (or sport) has resulted in a three-faced paddle with three rows of the same fragrant blue flowers running up each edge.

With all these varieties so easily available today it is interesting to read of the trials and tribulations that were required to obtain this species in the 1950s. Here is an excerpt from an article entitled "Hunting *Tillandsia cyanea*" by Clarence Kl. Horich which appeared in the BSI Journal (then called the Bulletin) in the Jan-Feb issue from 1956 [V6(1)]:

Unlike all other bromeliads, *Tillandsia cyanea*, cannot just be "picked" it requires a real back-country expedition to be located and carried back into what South Americans call civilization. A certain "highway" runs close to the place and this is why I asked my friend to call his driver and use his Packard for transportation. The tire burst three times on the way north to the boundary of the province of Guayas [Ecuador]. Actually there is no road, but a spider web of desert tracks with potholes of three feet depth which made us lose our direction several times as each singular driver to tackle this region crosses the country on pure instinct. There are no bridges, but several rivers in the center of one of which we got thoroughly stuck with the motor completely drowned at four A.M. By six A.M. we had pushed the car out while standing in the muddy water to the height of our hips. A day passed and we were ready to leave again. An hour later we rolled over into a cactus studded ditch. The driver was getting nervous by now–but it did not save him from running the car into a sand dune next!

By the time we hit Manabi the lower middle section of the car was thoroughly ground off, as the tire tracks of the inter-provincial trucks to pass through this country are way too deep for a passenger car. Then there was a genuine "blowout" and before we knew what had happened the steering wheel spun around like mad. It had broken from its connection.

This did it! There was no other car or truck for twenty-four hours which we spent eating green bananas, wild papayas and killing mosquitoes. Neither houses nor villages are near, instead the forests are full of huge Bushmaster snakes, three-inch spiders, hoards of ants, butterflies and humming birds. Night fell and with it came the spine curdling noise of the howler monkeys. The morning showed fresh Jaguar tracks only thirty feet distant from the car.

There was nothing we could do but grab machete, pistol and walk several hours into the jungle which is rather dense here and there with open, park-like stretches in between. Housing the trees here are *Catasetum*, *Cattleya maxima* orchids and the stunning *Tillandsia cyanea* which grows locally by the hundreds. We returned with a good thousand plants, although the car still lies broken down on some odd track in northern Guayas.

This story gives you some idea of the difficulties in obtaining bromeliads and it may justify a good price. Take my word that it is not exaggerated.

While I certainly do not encourage the harvesting of thousands of bromeliads from the wild, it is true early plant hunters risked life and limb at every turn. An interesting thought to keep in mind next time you see a pretty pot of *Tillandsia cyanea* on your bromeliad society's raffle table or sitting along side of the assorted foliage plants in your local garden center.

Photograph by Ken Marks.

Figure 41. *Tillandsia cyanea.*

A Word from the Editors

Bruce Holst & Susan Murphy

If you haven't already noticed, please take a look at the redesigned logo on the cover page which now includes the word "international" in the design. We thank Steve Littlefield for this new design.

Please check your March-April issues carefully to be sure all of the pages are present and that none are duplicated. An assembly error resulted in some copies with pages 57–60, 85–88 missing, and pages 61–64, 81–84 duplicated. If your copy was improperly assembled, please let us know (see contact information on inside front cover) and we will send you another one.

We continue to work towards getting the Journal on schedule and appreciate your patience, as well as your articles and photographs.

[1] BSI Secretary

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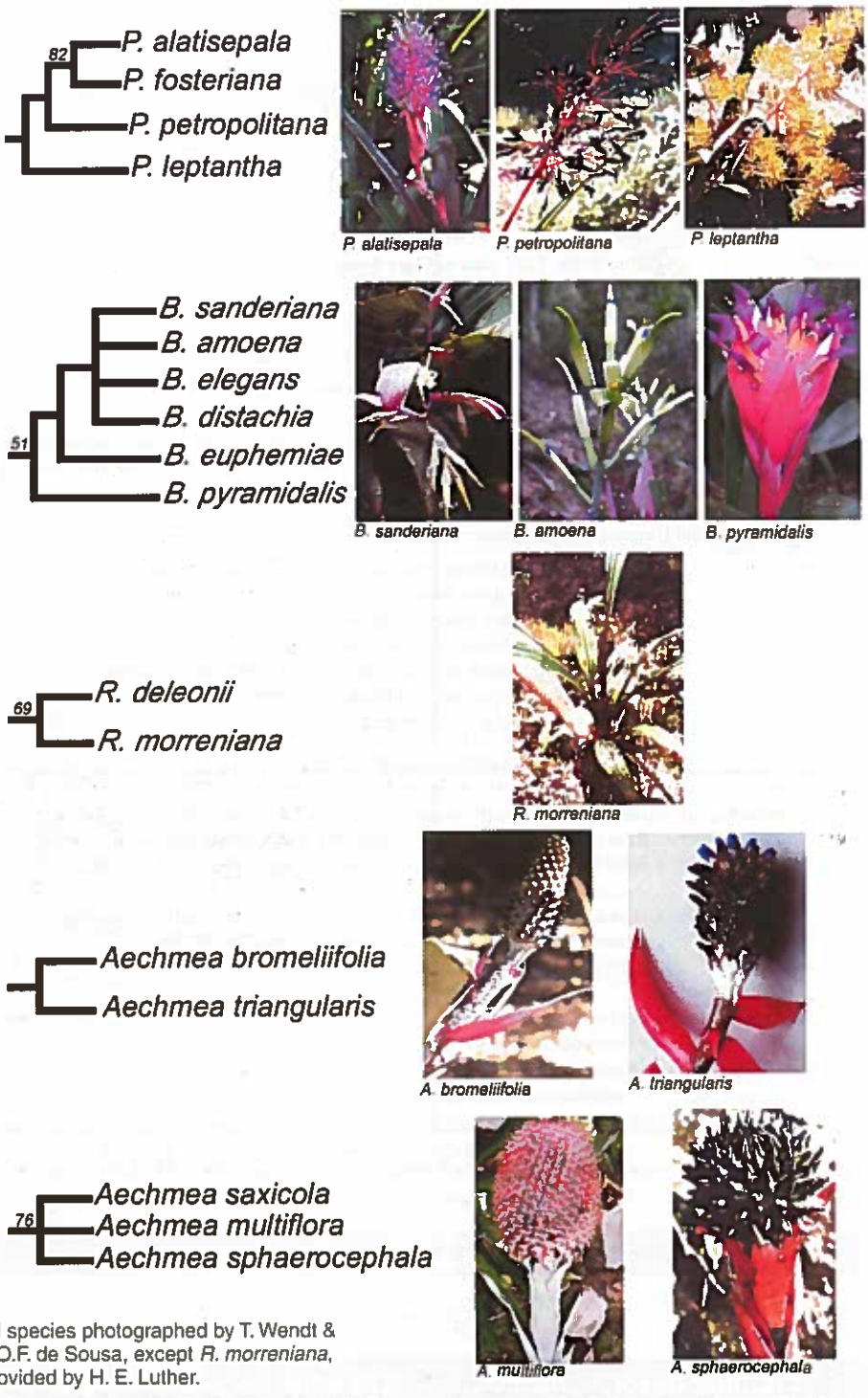

All species photographed by T. Wendt & L.O.F. de Sousa, except *R. morreniana*, provided by H. E. Luther.

Figure 42. All in the family tree. Selected branches of the tree presented in Fig. 1, showing the tentative monophyletic status for *Portea*, *Billbergia* and *Ronnbergia*, and *Aechmea* subgenera *Macrochordion* and *Chevaliera*.