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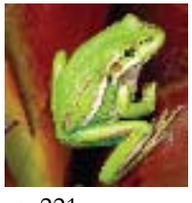

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Cover photographs

Front—Bromeliad display at Royal Flora 2006. Photograph by Chanin Thorut.

Rear—Aechmea triangularis L.B. Smith 1955. Original art by Penrith Goff.

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Editorial Advisory Board: David H. Benzing, Gregory K. Brown, Jason Grant, Thomas U. Lineham Jr., Harry E. Luther, Walter Till.

Editorial

In This Issue

The Editorial section is devoted to the recent BSI Membership survey. The Executive Summary presented to the BSI Board is reprinted, and in this and following Journal issues I will be discussing the points that arose from the survey, and how they are being addressed.

Scientific

Francisco Oliva-Esteve makes a taxonomic correction to his publication of *Vriesea splendens* var. *chlorostychya*. We delve into the one of the scorpions that make their home in Brazilian bromeliads, *Tityus neglectus,* in an article by Roberto Santos beginning page 201. Harry Luther and Karen Norton discuss the plants described by Augusto Ruschi as *Vriesea hasselbladi* in 1964, and conclude they are synonymous with *Vriesea fosteriana* var. *seideliana*. Beginning on page 219, Geoff Lawn makes a thorough review of the group of bromeliads called "monocarps" that are said to reproduce solely by seed and do not produce offsets in their natural habitat.

Cultivation

Tom Wolfe tells the story of one of his favourite garden plants, *Aechmea mariae-reginae* on page 219. This is one of the few bromeliads that has separate male and female plants. Brian Chudleigh brings us more of his photographs of frogs and relates the frog's activities in his New Zealand garden beginning on page 221. The cultivation section is a bit thin in this issue, and the next. But I promise to get it back up to its fair share of the content in 2007!

General Interest

There has been a spectacular exhibition of bromeliads at an Exposition in Thailand, running from September 2006 through to the end of January 2007. A huge bromeliad tree is shown on our front cover, and more on page 224. Our Webmaster Ken Marks continues the report on his travels thru Florida seeking out all its native bromeliads, and on page 227 we have the second installment. We introduce another new International Director of the BSI on page 233, Eric Gouda from the Netherlands. Most readers will be familiar with Herb Plever's work, and enjoyed his many great articles in the Journal . At the World Conference 2006 Herb was initiated (invested?) as the newist Honorary Trustee of the BSI, and we report on this on page 234. Sadly, Herb also writes the obituary, page 236, of his friend Henry Turner who died shortly after attending that World Conference.

Affiliated Shows Chair Carolyn Schoenau reports on the Greater New Orleans Bromeliad Society Show 2006, held May 6-7, shortly after Hurricane Katrina, and we wind up with the Events Calendar (slightly out of date due to publication delays by the Editor) on page 238.

Our Membership Survey

Earlier this year the final report was filed by the BSI membership Survey Committee. A large number of members took the time to respond, and their support was greatly appreciated by the current BSI Board. Not surprisingly there both positive and negative responses and we are working toward addressing all of these. Over the next few issues of the Journal we will work through the responses in detail.

Executive Summary

"In June 2005, surveys were mailed to 1723 people, both past and current members of the BSI. Of that total, 1300 surveys were sent to people in the United States; 423 were sent internationally. Joyce Brehm handled the mailing and estimated that aproximately 450 went to non-members. Surveys were returned throughout the summer and fall; the last survey was received on December 29. A total of 426 were returned (24.7%), an impressive rate of return, indicating strong interest by members of the BSI.

Generally there were no surprises in the survey results. Support for the Journal remains high, although dissatisfaction with its publication schedule being late was a prominent response. There was some dissatisfaction with the membership process — some non-members were not even aware their membership had lapsed; others reported specific problems. Furthermore, the World Conference remains an important event, although concerns were expressed about the continuing rising cost of attendance as well as the appearance of it becoming an "elitist," i.e., income-defined event.

The BSI needs to do a better job of defining its benefits to members

Of critical importance, however, is the aging of the membership and the lack of new, younger members to carry the organization forward. The BSI has shifted emphasis in recent years toward membership services on the BSI website; however there still is a significant number of members who have no Internet access and so are left out of the benefits of on-line services. Just as a small group of bromeliad enthusiasts looked for Internet services from the BSI ten Years ago, this non-computer-using group of BSI members now need to be served in less technical ways; the BSI is cautioned not to ignore a very loyal niche of non-computer using members.

Membership issues need to be addressed, most significantly, the lack of renewal notices. That was the one constant theme about this topic.

Members seem to have a sense of ownership with the BSI but also a sense of frustration at the lack of information about the organization, with internal politics being obvious to outsiders, and the lack of the Affiliates Chairman in keeping in contact with the affiliate societies that are, after all, a primary source for new members.

The BSI needs to do a better job of defining its benefits beyond the Journal and identifying new membership benefits that it can afford to offer.

The Journal needs to expand its content beyond the scientific. There obviously is little understanding by the members of the importance of the Journal publishing scientific-based articles. That would not matter if more articles on cultivation, genera, people and societies were included to balance the more technical content.

Overall, criticisms of the BSI were reasonable

Overall, criticisms of the BSI were reasonable and made with the intent to improve the society. The BSI can rest easy that its members want to be engaged and want the society to improve and become more approachable and interactive with its members. To ignore the input received by those dedicated members—and, more importantly— to fail to act on this input will damage the BSI. Of critical importance, the BSI must do more to cultivate and improve its relations with its overseas—and, domestically, isolated—members."

Michael Andreas, Chairman
Karen Andreas
Luiz Felipe Nevares de Carvalho
Larry Giroux
Jay Thurrot
Olive Trevor

What are we doing about it?

Over succeeding issues I will be devoting one editorial page to discussing individual issues raised in the membership survey. Please feel free to comment on anything that is said here.

Nearest to the Editor's heart (and President Brehm's!) is the publication date of the Journal. It has been a struggle to get up to date this year, but we are getting there. This issue should be printed in the first week of December 2006, and the final issue for the year will be sent to print by the middle of December 2006, so you will not receive it until early January 2007. From then on we will be able to work on a regular schedule

with issues going to print in January, March, May, July, September and November. In effect, you will be receiving your Journals during the second of the cover months (ie., January-February issue during February).

Some members felt the BSI directorate is "secretive" and "aloof." This type of feeling most commonly arises in groups where there is insufficient communication, when those not "in the know" get to think there is "something going on" that they are not being told about… usually there is no actual intent to be secretive, which is the case in the BSI; they are just a bunch of folk like the rest of us, trying to do their best! I will be making an effort to ensure members are kept up to date in the Journal with what is going on. This can be overdone, and indeed some members have pointed out they do not want the complete "boring" Board minutes printed in the Journal either. So what I will do is try and give readers a summary of what is going on at Board meetings and other discussions, such as this one. If any member wants a full copy of Board Meetings, financial statements or anything else please ask the Editor and we will mail you the relevant paper(s).

60 % of our members do not belong to a local bromeliad group

A lot of the discussion about Journal content comes down to how much cultural content should be devoted to "the novice grower" and "the hobbyist." There are opinions that there is not enough information for beginners and growers (domestic and commercial). How much information is available for commercial growers is very much dependant on how much information they are prepared to make available to us, such as the very useful article contributed by Corn Bak earlier in the March-April issue this year. For the domestic and novice growers, I had been inclined to the view that these members would be best served by local bromeliad societies—thinking that this would also best suit local growing condition—leaving the Journal to provide articles with a more universal content. But of the 426 responses to the member survey, only 171 belonged to any bromeliad society. So 60% of our members do not belong to a local bromeliad group! As a result, starting in 2007 I will be increasing the amount of cultivation articles. How well I succeed is in great part dependant on the contributions I receive from experienced growers. To date this has not been very much.

Increasing the content of basic care information does not, and will not, in any way diminish the importance of scientific articles, which we must continue to support and publish at our current level.

The members-only seed fund was popular with respondents. The seed list is kept up to date on the BSI website, and to make more widely available I have started printing it in the Journal (page 235 in this issue).

Erratum for a variety of *Vriesea splendens*

Francisco Oliva-Esteve[1] Photograph by the author.

In my article on a new variety of *Vriesea splendens* in the Journal of The Bromeliad Society (Oliva-Esteve 2001) published as Vriesea *splendens* var. *chlorostychya* Oliva-Esteve var. nova, the collector and herbarium number of the type specimen was not mentioned, as required by the St. Louis Code of Botanical Nomenclature [ICBN Art. 37.6, nom. inval. or no explicit specimen stated (Art. 37.3, Note 1)]. For that reason I am now correcting the omission, and an orthographical error, with this new note.

Vriesea splendens (Brongn.) Lem. var. ***chlorostachya*** Oliva-Esteve, var. nov.

A ceteris varietatibus bracteis floriferis viridibus differt.

Syn.: *Vriesea splendens* var. *chlorostychya* Oliva-Esteve, *J. Bromeliad Soc.* 51(4): 184, figs. 23, 24. 2001, nom. inval.

Type: Venezuela, Estado Yaracuy, Cerro La Chapa (Nirgua), 1200 m. s. n. m., leg. F. Oliva-Esteve 304 (VEN 303182, holotypus).

Figure 1. *Vriesea splendens* var. *chlorostychya*, inflorescence.

This variety is the fifth one:

1. *Vriesea splendens* var. *splendens* (leaf blades with dark cross-bands, red bracts and yellow petals).
2. *Vriesea splendens* var. *striatifolia* (leaf blades with longitudinal white bands, green bracts and yellow petals).

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3. *Vriesea splendens* var. *formosa* (leaf blades wholly green, red bracts and yellow petals).

4. *Vriesea splendens* var. *ionochroma* (leaf blades wholly reddish underneath, green above).

5. *Vriesea splendens* var. *chlorostachya* (leaf blades wholly green with green bracts and yellow petals).

Acknowledgements

I want to thank Prof. Dr. Walter Till, Curator of the Herbarium of the Botanical Institute of the University of Vienna, Austria, for making me aware of the previous invalidity of this taxon.

Literature Cited

Oliva-Esteve, F. (2001). "A new Variety of *Vriesea splendens*." *J. Bromeliad Soc.* **51**(4): 184-185.

Biogeography of the Bromeliad-dwelling Scorpion *Tityus neglectus* Mello-Leitão (*Buthidae*) in Rio Grande do Norte, Brazil.

Roberto Lima Santos[1], Elinei Araújo De Almeida, Maria das Gracas Almeida, Marcel Serra Coelho

ABSTRACT

Along eastern Rio Grande do Norte State (northeastern Brazil), the distribution of the bromeliad-dwelling scorpion *Tityus neglectus* (Buthidae) is restricted to semi-arid coastal restinga and tabuleiro woodland. This scorpion was found in association with terrestrial phytotelm specimens of *Aechmea aquilega*, *A. lingulata* and *Hohenbergia ramageana* (Bromeliaceae). Occupation rate of bromeliad ramets by *T. neglectus* was highest in restinga habitats. *Tityus neglectus* is considered threatened by habitat loss mainly due to deforestation caused by urban sprawl and real estate speculation. The role of public health campaigns against arbovirus mosquito vectors as it relates to the preservation of phytotelm bromeliads in eastern Rio Grande do Norte State is discussed. The collection and exportation of wild bromeliad species for landscaping purposes, besides reducing habitat availability for restinga and tabuleiro populations of *T. neglectus,* may also lead to accidental introduction of this scorpion into new biogeographical areas.

Keywords: *Tityus*, *Buthidae*, Scorpiones, restinga, tabuleiro woodland, Brazilian Atlantic Rainforest, *Aechmea*, *Hohenbergia.*

INTRODUCTION

Bromeliads are known to host a diversified faunistic assemblage, among which the arachnid orders Aranae, Acarina, Opiliones, Scorpiones, Solifugae and Pseudoscorpiones have been reported (Laessle (1961), Fish, (1983); Cotgreave et al. (1993); Ochoa et al. (1993); Oliveira et al. (1994); Paoletti et al. (1991); Dejean and Olmstead (1997); Richardson (1999); Benzing (2000); Mestre et al. (2001); Santos et al. (2002), (2003), (2004); Tuthill and Brown (2003).

Interestingly however, despite the high specific diversity and generalistic, predatory habits of members of the order Scorpiones, Polis (1990); Lourenço (2002), few species of scorpions have been reported from bromeliad microhabitats, where prey and drinking water are concentrated. A survey of the literature found the following scorpion species occurring in bromeliads: *Centruroides margaritatus* (*Buthidae*) in Costa Rica, Picado (1910); Calvert (1911); *Chactas oxfordi* (Chactidae) in Colombia. Gonzales-Sponga (1978); *Chactas raymondhansorum* (Chactidae) and *Tityus tenuicauda* (Buthidae) in

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epiphytic *Glomeropitcairnia erectifolia* in Trinidad and Tobago, Francke and Boos (1986); Ward (1996); Prendini (2001); *Centruroides limpidus* (Buthidae) in *Bromelia hemisphaerica* in Mexico (Ochoa et al. (1993)), *Centruroides flavopictus* (Buthidae) in *Tillandsia vicentina* and *T. violacea* in cloud forests of Chiapas, Mexico (Lucas (1975)); *Tityus obtusus* (Buthidae) in epiphytic *Guzmania* spp. and *Vriesia* spp. in Puerto Rico (Richardson (1999)); *Bothriurus asper* (Bothriuridae) and *Tityus neglectus* (Buthidae) in terrestrial *Aechmea lingulata* and *Hohenbergia ramageana* in Rio Grande do Norte State, northeastern Brazil (Varela-Freire-(1997), Rocha-Neto (2001); Santos et al. (2003)) . In these cases, the scorpion may utilize the bromeliad simply as a convenient daytime shelter or it may be a true bromeliad specialist, implying behavior, or morphological adaptations to this particular niche such as dorso-ventral depression of the cephalothorax and abdomen as hypothesized for *T. neglectus* (Santos et al. (2003)).

Figure 1. *Tityus neglectus* Mello-Leitão.

In eastern Rio Grande do Norte State, *T. neglectus* has so far been found only in association with terrestrial phytotelm bromeliads supporting the hypothesis that this species is a bromeliad-mutualist (Varela-Freire 1997), Santos et al. 2003).

Considering that phytotelm bromeliads may play a significant role as a keystone resource for the native fauna in eastern Rio Grande do Norte State and possibly elsewhere in northeastern Brazil (Santos et al. 2002, 2003), the study reports on the distribution of this scorpion in terrestrial phytotelm bromeliads in different vegetation types occurring along the eastern coast of this State.

MATERIAL AND METHODS

A total of 119 terrestrial phytotelm bromeliads were sampled in five locations (figure 2) along the eastern coast of Rio Grande do Norte, representing the several vegetation types occurring in the area: Brazilian Atlantic Rainforest, tabuleiro woodland, open restinga and Brazilian Atlantic Rainforest mixed with restinga patches. The bromeliad species sampled were *Aechmea aquilega*, *A. lingulata* and *Hohenbergia ramageana*. All bromeliad specimens sampled showed water-impounding foliage architecture. The scorpions were collected and preserved in 70% ethanol solution, and identified according to Lourenço (2002). Voucher-specimens of *T. neglectus* are deposited in the Zoological Collection of the Departamento de Botânica, Ecologia e Zoologia in the Universidade Federal do Rio Grande do Norte, Natal, Brazil.

The climate in eastern Rio Grande do Norte State is tropical with mean yearly rainfall ranging from 1000 to 1200 mm, mean temperature is 26ºC and the rainy season extends from February to July (Felipe and Carvalho 2001). The tabuleiro woodland occurs in eastern Brazil in association with the Barreiras Formation and is similar to the savanna-like cerrado of Central Brazil, but with plant species characteristic of sandy coastal areas (Tavares, (1966); Rizzini (1997)). This vegetation type was surveyed in the Pitimbu and Rio do Fogo stations. The bromeliads sampled were associated with shrubs and thus were not fully exposed to sunlight.

The open restinga found in Pitangui comprises psammophilous grasses and herbaceous vegetation growing in sand fields, associated with scattered stands of trees and shrubs, where host bromeliads were found either exposed to direct sunlight or under the shade of the trees. In the Natal Dune State Park (NDSP), the authors sampled bromeliads in restinga patches found on the top of coastal sand dunes associated with Brazilian Atlantic Rainforest .

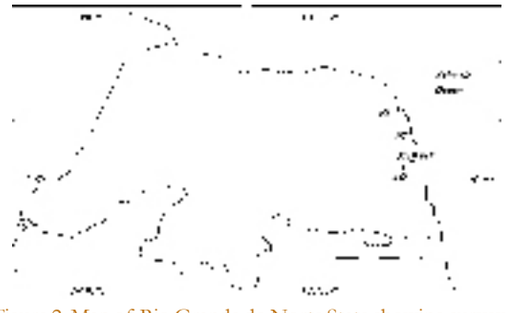

Figure 2. Map of Rio Grande do Norte State showing survey stations Rio do Fogo (RF), Pitangui (PT), NDSP-Natal (NT), Pitimbu (PU), and EAJ-Jundiaí (JD)

The Escola Agrícola de Jundiaí (EAJ), occupies an area of 1.209 hectares, and includes fragments of Brazilian Atlantic Rainforest or Mata Atlantica vegetation, where large stands of terrestrial *Hohenbergia* sp. are found in the understory.

RESULTS AND DISCUSSION

The genus *Tityus* Koch is widespread in Brazil with 29 species occurring in several morphoclimatic areas and vegetation types (Lourenço 2002a). The species *T. neglectus* was originally described from a female specimen captured in Rio Grande do Norte State, and belongs with the *T. bahiensis* (Perty) group (Lourenço & Eickestedt 1988; Lourenço 2002). Specimens of *T. neglectus* have been recorded in bromeliads in the Brazilian states of Bahia, Sergipe, Pernambuco and Rio Grande do Norte, in semi-arid caatinga and coastal restinga, tabuleiro and Brazilian Atlantic Rainforest habitats (Lourenço & Eickestedt 1988; Varela-Freire 1997; Lourenço 2002; Santos et al. 2003). The species *Tityus bromelicola* described by Matthiesen (1981)from specimens collected in bromeliads in northeastern Brazil is considered a junior synonym of *T. neglectus* (Lourenço & Von Eickestedt 1988).

Of the total of 119 bromeliad specimens collected 15 contained specimens of

T. neglectus. Usually just a single specimen of *T. neglectus* was found per bromeliad sampled.

Vegetaion type	Bromeliad species	Number of ramets sampled	Number of ramets with specimens of *T.neglectus*
Open restinga	*Aechmea aquilega*, *Hohenbergia ramagiana*	29	6
Restinga patches in association with Atlantic rainforest	*Aechmea lingulata*, *Hohenbergia ramagiana*	25	5
Atlantic rainforest	*Hohenbergia* sp.	28	0
Tabuleiro	*Aechmea lingulata*, *Hohenbergia ramagiana*	45	4

Table 1. Occupation rate of bromeliad ramets by specimens of *Tityus neglectus* in eastern Rio Grande do Norte State according to vegetation type.

Although studies carried out in North America showed that scorpions are generalistic regarding choice of vegetation types (Polis, 1990), the results indicate that the distribution of *T. neglectus* is restricted to xeric coastal *restinga* and *tabuleiro* woodland, with the highest occupation of bromeliad ramets recorded in open restinga (Table I). Both bromeliads growing in the shade of nearby trees and those exposed to direct sunlight harbored specimens of *T. neglectus*. No scorpions were found in the EAJ station, circa 26 km from the coastline, despite the high population density of terrestrial *Hohenbergia* sp. found in the area.

The distribution of *T. neglectus* in eastern Rio Grande do Norte parallels that of the theraphosid spider *Pachistopelma rufonigrum*, also considered a bromeliad specialist (Varela-Freire 1997; Santos et al. 2002, 2004; Dias and Brescovit 2003). On occasions when specimens of *T. neglectus* and *P. rufonigrum* were found together in the same host bromeliad, the spider occupied the leafblades near the center of the bromeliad rosette, while the scorpion was found hiding between the bases of the leafblades in the outer portion of the rosette.

The authors consider that local populations of *T. neglectus* are threatened as both restinga and coastal tabuleiro woodland are dwindling due to deforestation caused by urban sprawl and real estate speculation (Araujo and Lacerda 1987; Leme & Marigo 1993; Souza & Couto 2001; Rocha et al. 2003; 2004). The authors also fear that the demand for more seaside hotels and resort areas caused by the recent increase

in tourist activity in Rio Grande do Norte State may lead to further area reduction of restinga and tabuleiro vegetation types.

Another potential threat to water-impounding or phytotelm bromeliads and its associated fauna in Rio Grande do Norte comes from public health campaigns against *Aedes aegypti* (the local mosquito vector of the dengue fever virus) which may use bromeliad phytotelmata as breeding ground. The authors advise that Public Health authorities must consider the relevance of wild bromeliads as keystone resources for biodiversity conservation, and therefore should base such campaigns on sound research evidence that local wild bromeliads do serve as nurseries for *Aedes* species. Public health campaigns against *Aedes* mosquitos should also be carried out with care so as not to cause a hysterical reaction in the general public, which could lead to them eradicating wild bromeliad populations.

The accidental introduction of species of *Tityus* has been recorded by Rodriguez-Acosta & Reyes-Lugo (2004) who reported the presence in Venezuela of the highly venomous *Tityus bahiensis*, endemic to northeastern Brazil. Besides reducing the territory available for recruiting *T. neglectus* juveniles, indiscriminate collecting of wild phytotelm bromeliads, mainly for home landscaping, brings forth the possibility of accidental introduction of this species into new biogeographical areas. In the present study, the authors observed that specimens of *T. neglectus* were insconspicuous while in the host bromeliad and probably go unnoticed by bromeliad collectors, who unknowingly could introduce this scorpion into new habitats within the Brazilian territory, with unknown consequences for the recipient ecosystem.

LITERATURE CITED

Araújo, D. S. and L. D. Lacerda (1987). "A Nautureza das Restingas." *Ciência Hoje* **6**(33): 42-48.

Benzing, D. H. (2000). *Bromeliaceae: Profile of an Adaptive Radiation*. Cambridge, UK, Cambridge University Press.

Calvert, P. P. (1911). "Studies on Costa Rican Odonata. II. - the habits of the plant-dwelling larva of *Mecistogaster modestus*." *Entomol. News* **12**: 402-411.

Cotgreave, P. and D. A. J. Middleton (1993). "The relationship between body size and population size in bromeliad tank faunas." *Biol. J. Linn. Soc.* **49**: 367-800.

Dejean, A. and I. Olmsted (1997). "Ecological studies on *Aechmea bracteata* (Swartz) (Bromeliaceae)." *J. Nat. Hist.* **31**: 1313-1334.

Dias, S. C. and A. D. Brescovit (2003). "Notes on the behavior of *Pachistopelma rufonigrum* Pocock (Aranae, Theraphosidae, Aviculariinae)." *Rev. Bras. Zoologia* **20**(1): 13-17.

Felipe, J. L. A. and C. E.A. (2001). *Atlas esolar do Rio Grande do Norte*. João Pessoa, Grafset.

Fish, D. (1983). Phytotelmata: Flora and Fauna. *Phytotelmata: terrestrial plants as hosts for aquatic and insect communities*. J. H. Frank and L. P. Lounibos. Plexus, Medford**:** 101-128.

Francke, O. F. and J. Boos (1986). "Chactidae (Scorpiones) from Trinidad and Tobago." *J. Arachnol.* **14**: 15-28.

González-Sponga, M. A. (1978). "*Chactas oxfordi*, nueva espécie de la Sierra Nevada de Santa Marta, Colómbia." *Monografias cientificas "Agusto pi Suner," Instituto Universitário Pedagógico (Caracas).* **9**: 1-20.

Laessle, A. (1961). "A micro-limnological study of Jamaican Bromeliads." *Ecology* **42**(3): 499-517.

Leme, E. M. C. and L. C. Marigo (1993). *Bromélias na Natureza*. Rio de Janiero, Marigo Comunicacões Visuais.

Lourenço, W. R. (2002). Scorpiones. *Amazonian Arachnida and Myriapoda*. J. Adis. Sofia, Pensoft Publishers**:** 399-438.

Lourenço, W. R. (2002). *Scorpions of Brazil*. Paris, L'Éditions de l'If.

Lourenço, W. R. and R. D. Von Eickestedt (1988). "Sinopse das espécies de *Tityus* do nordeste do Brasil com redescriçao de *Tityus neglectus* Mello-Leitão (Scorpiones, Buthidae)." *Rev. Bras. Zoologia* **5**(3): 399-408.

Lucas, K. E. (1975). *Tank bromeliads and their macrofauna from cloud forests of Chiapas, Mexico*. Arts, San Francisco State University, California, USA. **MA**.

Matthiesen, F. A. (1981). "Um novo *Tityus* do nordeste do Brasil (Scorpiones, Buthidae)." *Ciencia e Cultura* **33**(7): 768.

Mestre, L. A. M., J. M. R. Aranha, et al. (2001). "Macroinvertebrate fauna associated to the bromeliad *Vriesea inflata* of the Atlantic Forest (Parana State, southern Brazil)." *Braz. Arch. Biol. Techn.* **44**(1): 89-94.

Ochoa, M. G., M. G. Lavin, et al. (1993). "Arthropods associated with *Bromelia hemisphaerica* (Bromeliales, Bromeliaceae) in Morelos, Mexico." *Fla. Entomol.* **76**(4): 616-621.

Oliveira, M. G. N., C. F. D. Rocha, et al. (1994). "A comunidade animal associada à bromélia tanque *Neoregelia cruenta* (R. Graham) L.B. Smith." *Bromelia* **1**: 22-29.

Paoletti, M. G., B. R. Taylor, et al. (1991). "Diversity of soil fauna in the canopy and forest floor of a Venezuelan cloud forest." *J. Trop. Ecol.* **7**: 373-383.

Picado, C. (1910). "Les bromeliacées epiphytes considerées comme milieu biologique." *Bulletin Scientifique* **47**: 216-360.

Polis, G. A. (1990). Ecology. *The Biology of Scorpions*. G. A. Polis. Stanford, Stanford University Press**:** 247-293.

Prendini, L. (2001). "Further additions to the scorpion fauna of Trinidad and Tobago." *J. Arachnol.* **20**: 78-188.

Richardson, B. A. (1999). "The bromeliad microcosm and the assessment of faunal diversity in a neotropical rainforest." *Biotropica* **31**(2): 321-336.

Rizzini, C. T. (1997). *Tratado de Fitogeografia do Brasil. Aspectos Ecológicos, Sociológicos e Florísticos*. Rio de Janiero, 2ed Âmbito Cultural.

Rocha, C. F. D., H. G. Bergallo, et al. (2003). *A biodiversidade nos grandes remanescentes florestais do Estado do Rio de Janeiro e nas restingas da Mata Atlântica*. São Paulo, RiMa, São Carlos.

Rocha, C. F. D., L. Cogliatti-Carvalho, et al. (2004). "Conservando uma larga porção da diversiade biológica através da conservação de Bromeliaceae." *Vidália* **2**(1): 52-68.

Rocha Neto, M. (2001). *Guia Ilustrado: Fauna da Escola das Dunas de Pitangui, Ecossistemas Terrestres. 1 ed.* João Pessoa, Moura Ramos Gráfica e Editoria.

Santos, R. L., M. G. Almeida, et al. (2002). "Notes on the association of *Pachistopelma rufonigrum* Pocock, 1901 (Theraphosidae) with phytotelm bromeliads in eastern Rio Grande do Norte State, NE-Brazil." *J. Bromeliad Soc.* **53**(2): 122-124.

Santos, R. L., M. G. Almeida, et al. (2003). "Bromeliads as a keystone resource for the scorpion *Tityus neglectus* in eastern Rio Grande do Norte State." *J. Bromeliad Soc.* **53**(6): 256-258.

Santos, R. L., M. G. Almeida, et al. (2004). "Biogeography and conservation of the bromeliad tarantula *Pachistopelma rufonigrum* (Aranae, Theraphosidae) in Rio Grande do Norte, Brazil." *J. Bromeliad Soc.* **54**(4): 153-157.

Souza, M. F. L. and E. C. C. Couto (2001). "Threats to the natural populations of tank-bromeliads: Environmental degradation and non sustainable use in Sergipe." *Bromélia* **6**(104): 40-41.

Tavares, S. (1966). "Estudos geobotânicos no Rio Grande do Norte." *Arquivos do Instituto de Pesquisas Agronômicas* **5**: 39-51.

Tuthill, D. E. and G. K. Brown (2003). "Bromeliad dwellers: Summary and Insight from an Online Database." *J. Bromeliad Soc.* **53**(4): 178-185.

Varela-Freire, A. A. (1997). *Fauna Potiguar: A fauna das dunas costeiras da cidade do Natal e do litoral oriental do Rio Grande do Norte*. Natal, EDUFRN.

Ward, A. (1996). "Some bromeliad-dwelling scorpions in Trinidad." *British Arachnological Society Newsletter* **77**: 10-11.

Vriesea fosteriana Revisted Again.

Harry E. Luther & Karen F. Norton[1]

One of the most attractive and much cultivated of the Brazilian Vrieseas are the highly patterned sorts of *V. fosteriana.* The cultivars of this species were treated a few years ago by Chet Blackburn (Blackburn 1999), and Derek Butcher (Butcher 2003). In his article Derek mentions another entity, *Vriesea hasselbladi.*

Augusto Ruschi (Ruschi 1964) described *Vriesea hasselbladi* and compared it to both *Vriesea wawranea* and *Vriesea fosteriana.* Ruschi dedicates his new species to Dr. Victor and Erna Hasselblad, whom he had met at the Biology Museum the previous year. Ruschi probably should have used the specific epithet "Hasselbladiorum" as he meant to honor both visitors, but at any rate, the name appears to be a *nomen nudum* based on the ambiguity of the type numbers chosen, and the location of the type specimen. He mentions cultivated cotypes in both Brazil and the USA (at the Fosters in Florida), but there seems to be no surviving material either alive or preserved.

Figure 1.A group of *Vriesea fosteriana* var. *seideliana* at Orquidario Caterinensis in 1983. Photograph supplied by A. Seidel

All of this is mute, as *Vriesea hasselbladi* is clearly a more colorful version of *Vriesea fosteriana*, not a distinct and separate species. If a name for this taxon is needed at a subspecific level, Padré Rauleno Reitz (Reitz 1965) supplied one.

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Vriesea fosteriana var. *seideliana* Reitz was based on material collected from the same area (Santa Teresa in Espirito Santo State) as Ruschi's collections, and was distinguished from the typical variety of *Vriesea fosteriana* by similar foliage color characters, (green leaves with purple markings on var. *seideliana;* white-green with brown-red markings on *Vriesea hasselbladi*). That the color, intensity, and pattern of the foliage can vary, has been thoroughly demonstrated by Alvim Seidel (Seidel 1975); the collector of variety *seideliana;* on his observations of a seed grown nursery population. The color illustration (Fig. 1) of a small nursery grouping at the Seidel establishment in 1983 confirms the variation of foliage characters.

So it seems clear that *Vriesea hasselbladi* and *Vriesea fosteriana* var. *seideliana* represents the same entity. It also appears that *Vriesea hasselbladi* cannot be considered validly published. The best name for the high contrast, brilliantly colored sorts of *Vriesea fosteriana* originally from the Santa Teresa region of Espirito Santo State, Brazil is *Vriesea fosteriana* var. *seideliana;* the less colorful, green marked with thin purple-red leaf type from Vargem Alta, Espirito Santo, is variety *fosteriana.*

The above is relevant for natural populations only. Material in cultivation has been highly selected, in some cases, line bred from at least 40 years. What you get in the nurseries probably requires a cultivar name, and is not covered by botanical nomenclature.

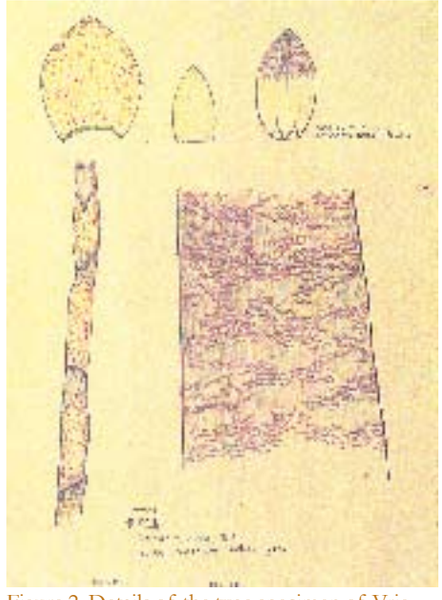

Figure 2. Details of the type specimen of Vriesea fosteriana as drawn by Mulford Foster in 1940.

Literature cited

Blackburn, C. (1999). "*Vriesea fosteriana.*" *J. Bromeliad Soc.* **49**(6): 261-3.

Butcher, D. (2003). "*Vriesea fosteriana*, Revisited." *J. Bromeliad Soc.* **53**(3): 133-7.

Reitz, R. (1965). "De Novitatibus in Bromeliads. *Vriesea fosteriana* L.B. Sm. var. *seideliana* Reitz, nov. var." *Sellowia* **17**: 41.

Ruschi, A. (1964). "*Vriesea hasselbladi* Ruschi." *Bol. do Museu de Biol.* **17**: 1-9.

Seidel, A. (1975). "Sementes de uma mesma inflorescencia de Bromeliaceae produzem muitos typos de plantas differentes." *Sellowia* **26**: 92-4.

One-time Bloomers — the Spectacular Monocarps

Geoff Lawn[1]

Survival and reproduction are primary goals of all living organisms. In the wild there are limited amounts of resources (chiefly sunlight, nutrients and moisture) bromeliads can invest into growth, maintenance and reproduction. Three general patterns of survivorship exist in Nature, both genetic and environment-based:

Category 1: low mortality (high survival) early in life, increasing later.
Category 2: even mortality rates throughout life.
Category 3: high mortality rates early in life, decreasing later.

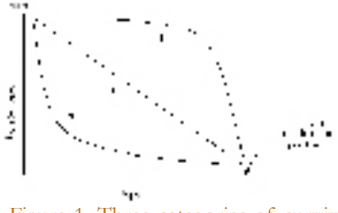

Figure 1. Three categories of survivorship. From (Colorado U.o., 2006)

As herbaceous flowering perennials most bromeliads are polycarpic: which means each rosette blooms once only from a central growing point, sets seed then slowly dies, replaced by either basal, axillary, viviparous or stoloniferous pups which eventually mature to form a clump. The process is periodically repeated, a life cycle known as iteroparity.

True monocarps (mono= one; carp= fruit) are category 3 survivors (figure 1) and display semelparity, a life history trait whereby each seedling becomes one mature rosette only, does not offset, and after a single massive flowering and fruiting dies completely, dependant entirely on seed production to perpetuate the species.

Monocarpic bromeliads known to date are confined to puyas, tillandsias and glomeropitcairnias. Monocarp's semelparity is characterised, with some exceptions, by being mostly self-fertile, high volume seed production, low juvenile survival (seedling up to early pre-reproductive growth phase), relatively large rosettes and multi-branching inflorescences, lengthy maturation period of both the rosette and fruiting/seed dispersal, then an abrupt senescence (genetically programmed death).

This "big bang" sexual reproductive method is incredibly slow for most species. Fertile seeds can take up to 2 years to ripen, then several months to germinate. Juvenile growth can take up to 15 years or more, followed by a lengthy maturation period of 5 years minimum. Full inflorescence formation from initiation can take up to 2 years, as was the case reported for *Tillandsia rauhii* by Werner Rauh (1982). The blooming period can extend over a year or more for some taxa and it is not uncommon to see seed pods and fresh flowers on the same inflorescence. Noted wild collector Pamela Koide (2003) reports twice visiting the same blooming specimen of *Tillandsia eizii* in habitat and its inflorescence still had fresh flowers opening on the second visit 18 months later.

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Figure 2. Sydney grower Nina Rehak with *Tillandsia rauhii* in cultivation. Photograph by Jarka Rehak.

Monocarpic and pseudo-monocarpic *Tillandsioideae*

Out of 665 tillandsia species, varieties and formas recognised to date, at least 40 are documented as monocarpic in terms of the whole plant. It is unlikely anyone can claim to have sighted all natural populations to verify they are strictly monocarpic unless a particular species has a very narrow geographical range, such as *T. juerg-rutschmannii* that is endemic to Rio Grijalva Gorge, Chiapas State, Mexico. "Rarely offsets" is a phrase field botanists and adventurous collectors often use, although grass pups are reported frequently.

Despite their relatively large size, most monocarpic tillandsias are epiphytic or saxi-

Figure 3. *Glomeropitcairnia penduliflora* in habitat. Photograph by Walter Till.

colous, seldom terrestrial. The following cool temperate highland species from southern Mexico through to Panama are reported as monocarpic in the wild at least: *Tillandsia australis, bourgeai, calothyrsus ,comitanensis, cretacea, dugesii, eizii, grandis ,huamenulaensis, kalmbacheri, lucida, macrochlamys, nuyooensis, oestediana, pamelae, prodigiosa, samaipatensis, sueae, supermexicana* var. *pendula, thyrsigera,* all of which have a 12-20 years life cycle.

In the region from Colombia through to north-west Argentina grow *Tillandsia australis, buseri, clavigera, krukoffiana, marnier-lapostollei, platyrhachis, rauhii, teres.* Native to the Caribbean, Florida and northern South America area are *T. adpressiflora, calcicola, fendleri, paniculata, utriculata.*

Many have long-lasting bipinnate or tripinnate inflorescences with large flamboyant scape bracts (especially Mexican species) emerging from grey green urns or green water-impounding tanks.

Normally in monocarps hormones biosynthesized in the apical meristem (growing point), mostly in the adjacent immature leaves, migrate downward and inhibit the activation of axillary buds. This is a phenomenon called apical dominance. However, monocarpic glomeropitcairnias and tillandsias in particular may sprout adventitious offsets (grass pups) from bud eyes on the young parent plant's basal stem. Benzing (1980) stated that those species whose seedlings generate offshoots as juveniles seem to experience an incomplete apical dominance throughout their life. This observation certainly applies to many *Tillandsioideae* monocarps.

Figure 4. *Puya clava-herculis* at Paramo Papallac, Ecuador. Photograph by Pierre Ibisch.

In habitat these grass pups remain inhibited and stagnant unless the parent's growing point or flower spike is destroyed or aborts, wherein one grass pup only, it is theorised, is triggered into growth to take over from the dying parent. It is thought any other non-activated grass pup siblings are held in reserve as back-up if needed, but that they die when the parent plant expires. If accidentally detached from the parent these tiny unrooted grass pups seem unlikely to survive *in situ.* However, this does not explain why some polycarpic species sprout both grass pups and basal pups simultaneously. Does the polycarpic parent rosette use grass pups as back-up also if

it's "normal" basal or axillary offsets fail to reach flowering? Many *Tillandsioideae* types, including monocarps, can and do regrow these loosely-attached grass pups to replace some removed, so grass pups' secondary back-up role appears vital.

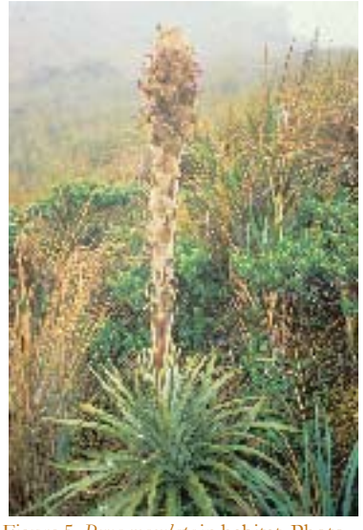

Figure 5. *Puya maculata* in habitat. Photograph by Betty Patterson.

Grass pups in cultivation behave differently whereby they can be separated, carefully nourished and grown on like seedlings through to maturity. The monocarpic parent loses this ability to vegetatively reproduce as it approaches flowering, just the reverse of polycarps. Most of the monocarp's energy is then channeled into the inflorescence and seed production. Exceptional are cases like serially-monocarpic *T. dasyliriifolia* where some Yucatan populations can not only regrow a damaged portion of the inflorescence, but also produce numerous viviparous pups. Some vrieseas, werauhias and alcantareas grow grass pups but generate axillary pups later too so are classified as polycarpic. Some obscure formerly-classified vrieseas or tillandsias, such as the rare, massive *Mezobromelia hospitalis* to 5 metres tall, may be monocarpic but they are poorly documented in this aspect.

Figure 6. *Tillandsia cretacea* in cultivation. Photograph by Jarka Rehak.

Glomeropitcairnias

Endangered *G. erectiflora*, from Trinidad and Isla Margarita, Venezuela is a wet montane forest epiphyte and sporadic terrestrial, 1-1/2 metres wide by 2 metres high in flower. Epiphyte and occasional terrestrial *G. penduliflora* of the Lesser Antilles islands is 2 metres wide by 3 metres tall in bloom. Foster (1956) and Padilla (1973) report seedling-like offshoots or plantlets on juvenile rosettes of these enormous species. Gilmartin & Brown (1986) report no pups found on *G. penduliflora* colonies of several hundred in habitat and cite a letter from Harry Luther advising they are difficult to propagate either from seed or field-collected plants. Maximum life expectancy of these solitary, cavernous rosettes is around 20 years.

Monocarpy / Polycarpy

The fine line between monocarpy and polycarpy is apparent in borderline *Tillandsioideae* species. The Florida form of *Tillandsia utriculata* ssp. *utriculata* is considered monocarpic whereas some of its Mexican populations are polycarpic, producing axilliary offsets. Similarly, the large monocarpic Guatemalan form of *T. guatemalensis* with its upright inflorescence contrasts with the smaller polycarpic Honduras form with its denser arching spike and axilliary offsets. There are a number of natural hybrids involving monocarpic species, such as *T.* x *lineatispica* (*fasciculata* x *utriculata*) from the U.S. Virgin Islands which is polycarpic. Native to highland pine-oak forest of Chiapas, Mexico *T.* x *cuchnichim* (*carlsoniae x eizii*) is polycarpic, another natural hybrid showing that the "fatal" monocarpic gene is not necessarily dominant in crossbred offspring.

Figure 7. *Tillandsia pamelae* in cultivation at BirdRock Tropicals, California. Photograph by Andrew Flower.

Cross-breeding with monocarps presents challenges because of the inherent lengthy timespan before the progeny bloom. Lacking "normal" offsets or grass pups, the hybridist may have to resort to try recreating the cross, unless the clone can be retained by tissue-culturing. For example, Pamela Koide's magnificent *T. pamelae* x *eizii* and reverse cross fall into this category of monocarp x monocarp. Polycarps crossed with monocarps generally are more successful in their progeny offsetting, as per T. 'Aristocrat' (*ionantha* x *bourgeai*), although it took 18 years for hybridist John Arden to flower it (Arden 2000).

This is an area where experimenting with cytokinins, auxins, gibberellins and other growth and flower-inducing phytohormones may prove beneficial to breeders and propagators in speeding up the life cycle or inducing pups on monocarps, although such compounds can increase the risk of abnormalities. Many wild-growing monocarps are adapted to grow in nutrient-deficient habitats. Cultivated specimens generally are better nourished and hydrated but the upper limits of vigour (growth rate) are determined by factors inherent to the species and not by cultural or climatic conditions. Climate-controlled greenhouses and purified reverse-osmosis water are some other techniques used to ensure optimum healthy growth. Even well-fed seedlings if stressed or meristem-damaged will throw out a side shoot as a desperate last measure to survive.

One Australian importer of Guatemalan tillandsias experimented with adult monocarpic *T. utriculata* ssp. *utriculata*. From a stock batch of 50 maturing rosettes, 36

were allowed to flower, set seed and die normally. Of the remaining 14, emerging spikes on 6 specimens were cut off low down when the inflorescences were just 15cms. above the rosette. The spikes kept branching below the cut stumps so these branches were removed until the rosettes died. The importer then discovered that by letting the last 8 specimens develop spikes to the latter stage when scape bracts form, he could snip the inflorescence stems low down, then the plants went into pupping mode. This way, basal or axillary pups could be harvested as stock to sell, still letting the occasional mature specimen bloom normally, set seed and die off, to continue the traditional long-term method of seed-raising (Chris Larson, pers. comm.)

Monocarpic Puyas

Only 8 out of 217 puya species and varieties are noted as monocarpic to date: *Puya brackeana, clava-herculis, cuavae, hamata, maculata, pygmaea in* sub-genus *Puyopsis* and *P. raimondii* (subgenus *Puya*). These particular terrestrials with stiff, thorny-edged, sharply tipped leaves inhabit the high Andean páramos (sub-alpine shrubby, rocky slopes) and punas (grassy plateaus) regions of Colombia, Ecuador, Peru and Bolivia. Club-shaped and spear-like inflorescences are characteristic, with a woolly indument to insulate against the intense sustained cold at high altitudes of 2400-4200 metres.

Exceptional is the famous gargantuan *Puya raimondii* to 10 metres tall and producing on multiple branches 8-10,000 flowers followed by literally hundreds of thousands seeds. It is estimated to take at least 50-80 years from seed to blooming in the wild, although a cultivated Californian specimen reportedly flowered in "only" 28 years after planting out (juvenile age unrecorded). This amazing feat exhausts the rosette's energy reserves and yellowing limp leaves on flowering *P. raimondii* are observed.

Figure 8. *Tillandsia australis* collected in Mexico, now at BirdRock Tropicals, California. Photograph by Andrew Flower.

Many long-lived plants have an alternative vegetative method of replacement should the main stem or growing point be destroyed. However, stem re-growth by grass pups or standard offsets from activated bud eyes in the remaining live stump of any monocarpic puyas have not been recorded yet—is this just an oversight?

Summary

The ability of many monocarpic bromeliads to produce copious quantities of seeds indicates this is their inherent primary means of survival over generations. There is a disparity between a number of species reported as monocarpic in habitat and yet they can offset like polycarps in cultivation. Could more regular or better nutrition partly explain this situation? Nevertheless, for many growers certain species remain reluctant to pup despite presumably the best care, although it is often more difficult for hobbyists than commercial operations to maintain that regime over the many years required before maturity. Obviously some species are more tolerant or adaptive to localised climatic or cultural conditions than others.

For these reasons a consensus on a definitive first-time list of monocarpic species, natural hybrids and cultivars I researched was inconclusive among specialist tillandsia growers in particular. Besides, many species listed are either not in cultivation, scarcely grown and known or their monocarpy status is questionable. There are more fundamental questions than answers at this stage on the phenomenon of monocarpy specific to bromeliads so more scientific field studies, cultivation experiments and trials are required. Growers with time on their side need the long-term patience, commitment and space to see these sizeable beauties reach full term but the rewards are well worth the long wait. Increasingly with habitat disturbance and destruction plus potential climate changes, private collections and botanical gardens or institutions may be monocarp's only uncertain future for threatened and vulnerable rare species.

Acknowledgements

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Literature Cited

Arden, J. (2000). "*Tillandsia* 'Aristocrat'." *J. Bromeliad Soc.* **50**(2): 96.

Benzing, D. H. (1980). *The Biology of the Bromeliads*. Eureka, California, Mad River Press.

Colorado, U. o. "Life History and Allocation in Plants." 2006, from http://www.colorado.edu/eeb/courses/4140bowman/lectures/4140-12.html

Flower, R. A. (1999). *Water Pressure Deficit*. Bromeliads X: The Tenth Australian Bromeliad Conference, Cairns, Cairns Bromeliad Study Group Inc.

Flower, R. A. (2003). *Bromeliad Nutrition*. Bromeliads XII: The Twelveth Australian Bromeliad Conference Auckland, Bromeliad Society of New Zealand Inc.

Foster, M. B. (1956). "*Glomeropitcairnias penduliflora* (Griseb.) Mez." *The Bromeliad Society Bulletin* **VI**(2): 18, 32.

Gilmartin, A. J. and G. K. Brown (1986). "*Glomeropitcairnia*, an Enigmatic Tillandsioid Genus." *J. Bromeliad Soc.* **36**(3): 104-106.

Guess, V. and R. Guess (2000). "*Tillandsia juerg-rutschmannii* and *Tillandsia eizii* Revisited: Two Pendulous Bromeliads of Chiapas." *J. Bromeliad Soc.* **50**(3): 99-103.

Guess, V. and R. Guess (2005). "*Tillandsia* x *cuchnichim*: A Natural Hybrid." *J. Bromeliad Soc.* **55**(1): 23-27.

Isley, P. T. (1987). *Tillandsia*. Gardena, CA, Botanical Press.

Koide, P. (1999). *Exploring Tillandsias of Western Mexico*. Bromeliads X: The Tenth Australian Bromeliad Conference, Cairns, Cairns Bromeliad Study Group Inc.

Koide, P. (2003). *Discovering New Tillandsias in Mexico*. Bromeliads XII: The Twelveth Australian Bromeliad Conference, Auckland, Bromeliad Society of New Zealand Inc.

Koide, P. (2003). *Hybridising at Bird Rock Tropicals*. Bromeliads XII: The Twelveth Australian Bromeliad Conference, Auckland, Bromeliad Society of New Zealand Inc.

Luther, H. (2004). *An alphabetical list of bromeliads binomials*, Bromeliad Society International.

Manzares, J. M. (2005). *Jewels of the Jungle, Bromeliaceae of Ecuador, Part II. Pitcairnioideae*. Quito, Ecuador, Imprenta Mariscal. pp 241-544.

Padilla, V. (1973). *Bromeliads*. New York, Crown Publishers, Inc.

Ramirez-Morillo, I. M., G. C. Fernández-Concha, et al. (2004). "Portraits of Bromeliaceae from the Mexican Yucatan Peninsula-1V:*Tillandsia dasyliriifolia* Baker: Taxonomy and Reproductive Biology." *J. Bromeliad Soc.* **54**(3): 112--121.

Rauh, W. (1979). *Bromeliads for Home, Garden and Greenhouse*. Dorset, Blandford Press.

Rauh, W. (1982). *Bromeliads of Peru and Ecuador*. Bromeliaceae Ole, World Bromeliad Conference, Texas, Mission Press, Corpus Christi.

Smith, L. B. and R. J. Downs (1974). *Flora Neotropica Monograph No. 14 (Pitcairnioideae) (Bromeliaceae)*. New York, Hafner Press.

Smith, L. B. and R. J. Downs (1977). *Flora Neotropica Monograph No. 14, Part 2: Tillandsioideae (Bromeliaceae)*. New York, Hafner Press.

Till, W. H., H. Halbritter, et al. (1997). "Some Notes on the Remarkable Bromeliad Genus *Glomeropitcairnia*." *J. Bromeliad Soc.* **47**(2): 65-72.

Aechmea mariae-reginae

Tom Wolfe. Photographs by Carol Wolfe.

Scape bracts on the emerging inflorescence

The nice cool spring of 2006 in Florida was really beautiful and the greenhouses were animated with color. In March I began to notice the snuggly wrapped and very tight bright pink scape bracts of the *Aechmea mariae-reginae* in the greenhouse. We were scruitizing everything with blooms for entries into our annual Bromeliad Guild of Tampa Bay spring show but this Aechmea would take weeks before it opened, much too late to be a part of the show.

About ten years ago my wife, Carol, and I were going to Fairchild Gardens in Miami for the South Florida Bromeliad Society's annual Show. We had a huge *Aechmea mariae-reginae* that opened just in time for the show. It was beautiful and traveled well for the four-hour trip. Since I was judging the show, I entered it into the Judges' section. It received a top award just barely winning over one of Don Beadle's new Billbergia hybrids.

Female *Aechmea mariae-reginae* in flower.

A show visitor upon seeing the aechmea immediately fell in love with it and searched until he found me. He was really taken with the plant and insisted on purchasing it. I agreed that if he returned on Sunday afternoon when the show broke down, I would sell it to him for $75.00. We thought that he might forget but he showed up with his money ready to take what he considered "The Prize" home to put in his landscape.

This particular *Aechmea mariae-reginae* had been growing on the bench for at least three or four years and we couldn't remember whether it was male or female. We previously had both but in a few short weeks when the bright pink bracts opened the inflorescences would reveal its sex. Each day the spike was growing taller and taller and the bracts were glowing a deeper hot pink. By the time they opened there was only a minor touch of green on the tip of the bracts. The foliage continued to deepen from dark green into a deep reddish-orange

After many days of waiting, (what's a few more days after several years) the bracts began to open displaying a beautiful female inflorescences. This epiphytic species is endemic to Costa Rica and is one of two dioecious bromeliads meaning that there are male and female plants. The male flower parts are on one plant and the female parts are on another plant; therefore, you must have both plants for a pollinator to pollinate the flowers so they can produce seed. Otherwise, vegetative reproduction through offsets is the only way to multiply your collection.

In the book *Blooming Bromeliads* by Ulrich & Ursula Baensch there is an excellent photo on page 73 of the male and female. Like some human creatures, the male is tall and slender with the female being just a bit stocky and shorter but what a beauty! After it opened, it seemed to grow more brilliant and for the next two months commanded the attention of everyone going into the greenhouse.

Aechmea mariae-reginae is a great bromeliad to grow in your landscape, to observe, to photograph, to admire, and everyone should have the thrill of seeing it come into flower.

Baensch, U. and U. Baensch (1994). Blooming Bromeliads. Nassau, Bahamas, Tropic Beauty Publishers.

Litoria aurea bright green in *Aechmea vinicolor*.

Frogs and Bromeliads in a New Zealand Garden

Brian Chudleigh[1]. Photographs by the author.

My wife began our adventures into the world of bromeliads about the same time that my second childhood began, and at around 60 years of age I bought some tadpoles. Frogs had always fascinated from earliest childhood years in Sydney, Australia, where Litoria aurea, the Green and Golden Bell frog was common in suburban gardens. It was a surprise to find the same species quite common in our area when we arrived in New Zealand. The abundance of frogs was not to last. In Australia Litoria aurea was getting close to extinction when a small colony was found at the Sydney Olympic Games site when development began. Discovery of this colony was a hindrance for the Games site development and a huge help in saving the species. Frogs were taken in to captivity where large numbers were bred and then released in to various sites around Sydney where they rapidly became well established as self sustaining breeding colonies.

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Litoria aurea in *Hectia* sp.

Here in New Zealand, where the species was introduced in the late 1860s, and was once extremely abundant in the upper North Island, *Litoria aurea* was rapidly diminishing in numbers. The dreaded Chytrid fungus, indiscriminate use of herbicides around ponds and wetlands, and introduced predators have severely reduced frog numbers throughout the country. There was a time when people would find them by the dozen in their swimming pools when warm, spring weather initiated the frogs' breeding instincts in to action.

Unable to find tadpoles locally I resorted to buying a few from a pet shop, accommodated them in a couple of glass tanks and soon I had a nice little group of tiny frogs which kept me ever busy catching insect prey for food. Move forward to spring, 3 years later and our nights were filled with a pulsating drone of croaking frogs. The call of mating Green and Golden Bell Frogs is not an irritating sound, more a low, sleep inducing tone which we never found a bother, even when it continued non stop right through the night from directly below our bedroom window.

Before the summer was gone we had froglets by the dozen even after I gave tadpoles away by the hundred. Keeping them all contained was difficult and a few escaped in the garden. We have a large pond inhabited by a few goldfish and the ever expanding Bromeliad collection had encroached from the greenhouses on to the terrace off the

north side of the house and facing on to a desert garden of succulents, cacti and some of the heat tolerant bromeliads, Dyckias, small growing Neoregelias and an Alcantarea. Two large *Alcantarea imperialis* on the terrace and the one in the garden rapidly became part time home for wild frogs. Their huge, spineless leaves and vast reservoirs of water held in the growing centre and leaf axils are a logical attraction to frogs. I have read of bromeliads acting as full time home for tiny tropical frogs which even breed in their cups. What I did not expect was our 6-8cm frogs also taking shelter during the day in some of the most viciously armed plants in our garden. Day after day one small male frog could be found squeezed in to the tiny cup of a *Portea petropolitana* v. *extensa,* its leave edges armed with needle sharp spines. Frogs are such soft creatures I imagined they would be easily and horribly scratched by the spines.

One frog regularly spent its days on the leaves of another viciously armed plant, an *Agave macroacantha*. Later I photographed this frog sunning itself in another quite spiny plant, a *Neoregelia concentrica* where its activities were most obvious by the numerous fine scratch marks on its back. Most surprising of all though was the frog I found which had somehow managed to climb through the maze of spines on the leaves of a large clump of an unidentified hechtia. This plant is the nearest thing to botanical razor wire I have seen in a plant and somehow this frog had climbed right in to the centre of it. When I looked a few hours after photographing it, the frog had gone. I had half expected to find the dried remains of the frog still in the plant days later, unable to extricate itself from the tangled mass of spines.

It is hard to tell how many wild frogs we have in our quarter acre garden. Some, like a huge, all green female we know on sight. I have counted up to 6 of them at any one time, 3 were sunning on one of the *Alcantarea imperialis* plants one sunny morning. These wild frogs take to the pond in spring and I rescued lots of eggs from the goldfish this last spring. Some of the remaining eggs hatch and the odd resulting tadpole managed to go through metamorphism but the young froglets then have to elude the voracious mature frogs which are notorious for their cannibalistic appetites.

CHARCOAL: the forgotten ingredient. from *PotPourri*, January 2002.

Charcoal is the forgotten ingredient for potting mixes. It has no "food" value but has several important use to plants and potting mixes. It acts like a magnet and a sponge, collecting and conserving ammonia. It has been shown that if pieces of charcoal are in the soil, roots will cling to them to absorb the collected ammonia. Wjen organic fertilizer decomposes, one of the products given off by bacteria is ammonia gas... A grain of charcoal next to a grain of fertilizer will absorb 80 times its own bulk in ammonia and will hold it, for use by the plant. Sources of ammonia we add to potting media are bone meal, fish meal, natural manure, compost and organic fertilisers. Charcoal has other valuable plant properties. It helps open up the potting mix as well as helping with drainage. [it also raises the pH, so don't use too much - Ed] Do not use charcoal intended for grilling, but only from a nursery supply store.

Royal Flora 2006: a Unique Floral Display in Thailand

Andrew Flower, BSI Editor

A bottom section of the tree featured on our cover.

Running for five months through January 31, 2007, the Royal Flora Ratchaphruek 2006 is a massive horticultural display. It includes around 2,500,000 plants from over 2,200 species of tropical plants including thousands of bromeliads (see the huge bromeliad tree pictured on the front cover of this issue). The purpose of the Exposition is to honour His Majesty King Bhumibol Adulyadej's 80th birthday and the 60th anniversary of his accession to the Throne. King Bhumibol is the world's longest reigning Monarch. In Thailand, "Ratchaphruek" and "Golden Shower Tree" are names for *Cassia fistula* L., considered an "auspicious" tree.

The main bromeliad exhibition is in the "Ruen Rom Mai" (Shaded Paradise), said to be one of the largest exhibition domes in the world. The display was landscaped and supplied by the Nong Nooch Tropical Botanical Garden in Chonburi Province, Thailand.

Above, looking down from the sky walkway and below, photographer ChaninThorut admires a giant cryptanthus wall.

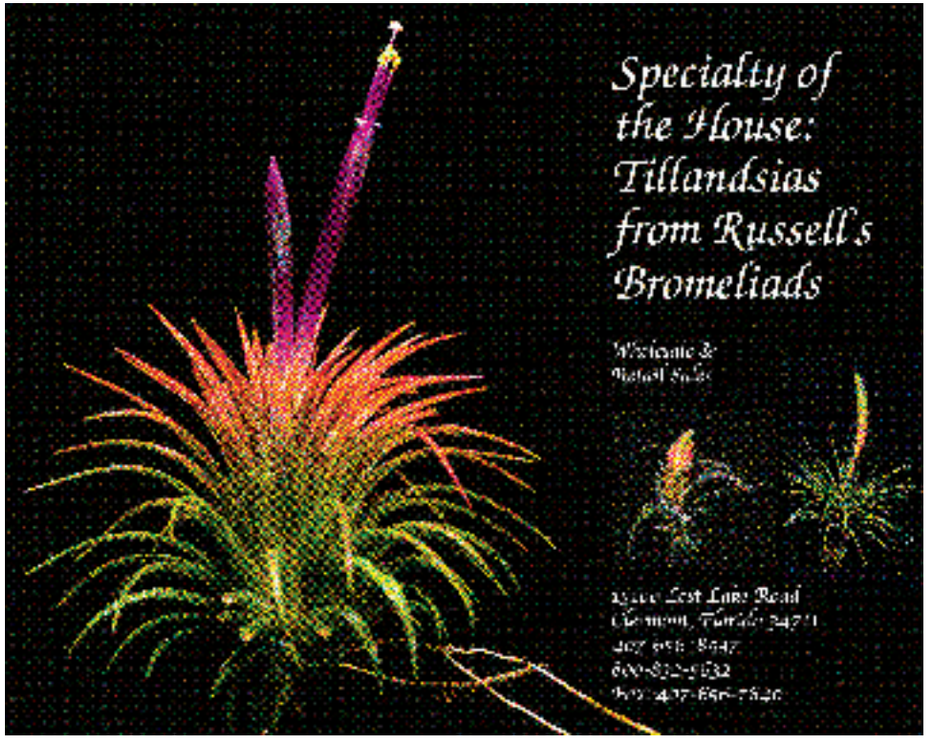
Cryptanthus are planted in coconut husk fixed to hard-wire constructed tree trunks and branches.

Overall control of the Exposition is by the Thai Ministry of Agriculture, supported bt the International Cociety for Horticultural Science, the World Flower Council, and the Horticultural Science Society of Thailand.

For those connected to the internet, the exposition has a comprehensive website at www.royalfloraexpo.com/index.asp. The website includes information on travel packages out of Bankok, and connecting international flights can be organized through the Thai Airways International Call Centre tel. +66 (0) 2356 1111 or (0) 2628 2456-7. There is a comprehensive visitor information page accessed from the main menu, this includes travel procedures for international visitors. Those without internet access can phone the GoodMan American travel Service Office +66 2 233 5900.

Acknowledgements

Thanks to Chanin Thorut for agreeing to let us use his photographs, and to Penrith Goff for bringing Royal Flora to my attention.



Florida Bromeliads: A Modest Quest. Part 2

Ken Marks, BSI Webmaster

North to the Highlands

Figure 8. Harrisella porrecta, the "Jingle Bell Orchid" in Highlands Hammock State Park.

The next weekend we decided to extend the streak but this time we headed north to Highlands Hammock State Park. We had been there several times and we knew it had a good population of bromeliads. On a previous trip to the park we had found the Florida's smallest epiphytic orchid — *Harrisella porrecta*. This tiny orchid, one of three leafless orchids in Florida, consists of little more than a cluster of thin gray-green roots a few centimeters long growing from a short central stem. In autumn the plant's minisscule yellow flowers make it slightly more visible but it is even easier to spot when the round seed capsules are present. These capsules are the source of one of the species' common names, Jingle Bell Orchid.

Looking at some of the distribution maps, it seemed that the two northern species of Florida bromeliads, *Tillandsia bartramii* and *simulata*, might be found here as Highlands County was at the southern limit of where these species had been recorded. With any luck the northern hybrid between *Tillandsia fasciculata* and *bartramii* (×*floridana*) might also be in the area as well.

The first thing that we noticed when we got to the park was that the bromeliad density had been greatly reduced since our last visit a few years ago. Apparently the "Evil Weevil" (*Metamasius callizona*) had been through this area, decimating the larger species (*utriculata* and *fasciculata*), for there were far fewer of these than I remembered seeing in the past. There was still quite a bit of *Tillandsia setacea* present and this was a bit problematic for us as we had only seen a few images of *Tillandsia bartramii* and had not developed a strong search image yet to allow us to easily distinguish it from the pervasive *setacea*. After much searching we finally spotted, with the aid of a pair of binoculars, a small clump of *bartramii* far up the trunk of an oak tree. The thick and bright pink stem of the flower spike was quite distinctive. Additionally, the leaves were more silvery-gray than the greenish or reddish needle-leaves of the *setacea*. They also appeared to be more upright and tightly bundled together at the base than *setacea* which seemed to form a more open cluster of leaves. We did not find a second *bartramii* that day and I was beginning to believe that we were too far south and that setacea was replacing it here.

I suggested that we head over to the boardwalk that runs through the cypress swamp to see if there was anything different in that particular habitat. In no time this gambit paid off as we were staring at the second northern species, *Tillandsia simulata*. This species does not occur down where we live in south Florida. In fact, it is endemic to just a few counties in the central part of the state. As it has never been found growing naturally anyplace else in the world, it has earned its common name of "Florida Air Plant". *Tillandsia simulata* resembles *Tillandsia balbisiana* with a narrow, simple or few-branched inflorescence. The flower bracts on the *simulata* were pinker than the red found on *balbisiana*; they were slightly scurfy as well. The *simulata* leaves were long, narrow and twisty but unlike *balbisiana* did not reflex back or form a pseudobulb near their base. My search image for *simulata* thus became a search for a pseudobulb-less *balbisiana*.

Figure 9. *Tillandsia simulata* in Highlands Hammock State Park.

The next day we hunted for additional *bartramii* since we had already had good luck with *simulata*. At one point on the loop road that winds its way through the park, we saw a huge oak branch extending out across the road. Growing on this branch were some clumps of the now much-diminished *fasciculata*. One of the single plants on this branch seemed a little odd and was justification enough for stopping for a closer look. This plant resembled a *fasciculata* with very narrow and elongated leaves. The plant was more upright as well and did not form a very wide rosette. Was this plant just etiolated (stretched) due to the shady conditions that it was growing in or could this be an example of ×*floridana*?

There were several "normal looking" *fasciculata* growing on this same branch. In my mind the chance of the mystery plant being the northern hybrid would be strengthened if we could find the other parent, *bartramii*, in the area. Tammy said that I should try wishing to find some *bartramii* since that method was so successful the week before. Within minutes more and more clumps of *bartramii* seemed to appear out of nowhere. As we spotted more, our search image strengthened; all of the clumps we had seen were in flower. We then started looking for the pink flower spikes instead of the needle-like foliage that all too often turned out to be *setacea*. Dare I push my luck again? Of course, it's in my nature. I wished that I could find some nice clumps

Figure 10. *Tillandsia bartramii* in Highlands Hammock State Park.

of *bartramii* at eye-level and in bloom and soon there they were. A fallen tree branch had transported several blooming clusters of *bartramii* from high in the canopy to a location where they were child's play to photograph in detail. No poison ivy — no poisonwood — I was getting good at this. Tammy suggested I buy a lottery ticket but I figured I'd reserve my luck for important things like locating plants.

Oh Withlacoochee, Where Art Thou?

My streak of hunting bromeliads on the weekends was broken by a series of unrelated back-to-back trips across the US and abroad (including the World Conference) which kept me away from home for two months. After this hiatus I was anxious to restart my quest. So the day after returning from my final trip, Tammy and I headed out one morning for west-central Florida (about an hour west of Orlando) to go look for more of Florida's native bromeliads in habitat. We headed north on this trip since where I wanted to go to the south was under a dense band of thunderstorms at the time.

A little research using Google a few months previous had turned up a website for the Herbarium of Louisiana State University. They had a *Tillandsia bartramii* in their herbarium and their database included the latitude/longitude and a description of where the specimen was collected. I plugged this information into Google maps and found that the location was in a large forested area. Some additional searches turned up the name of the area as the Withlacoochee State Forest. Description of the collected specimen mentioned the Richloam tract so that was our destination. Louis Pasteur once said, "Chance favors the prepared mind," and I was using the power of the Web to prepare my mind as best as I could.

When we arrived and started to explore the forest we were disappointed as the woodlands were mostly covered with pine with a mixture of oak, maple, and a few other broadleaf trees. The pines had virtually no bromeliads or other epiphytes on them. Many of the larger oaks (and they get big in that part of Florida) were dripping with *Tillandsia usneoides* but no other bromeliads were to be seen. We had one last area

nearby to check out before classifying this trip a bust and heading home.

Using the map I had found on the Web, we headed over to the Richloam Tract and stopped at the large fire lookout tower. This appeared to be one of the few parking areas off the small, semi-paved roads that criss-crossed the area. When we pulled into the parking area we could see an enormous oak tree literally dripping with bromeliads. Upon closer inspection it turned out to be one of the species we were looking for, *Tillandsia bartramii*. There were literally tens of thousands of plants of this species covering all but the very bottom surfaces of the stout branches of this great oak. A few months back the blooms on these plants would have all been bright pink with bluish tubular flowers — what a sight that must have been! I'll have to remember that for next year...

Figure 11. *Tillandsia simulata* inflorescence.

A small cypress tree nearby held another surprise, we found a few plants of *Tillandsia simulata*. Encouraged by the find, we decided to do some quick reconnaissance on one of the marked trails that lead away from the fire tower and parking area. The first 10 minutes on this trail were completely devoid of any bromeliads save for a few wispy strands of *usneoides* and even that was not quite uncommon. We checked the time and decided to give ourselves 5 more minutes following this trail before turning around and heading back to the air-conditioned comfort of the car.

Before long we came across an area dominated by cypress trees instead of the pine and oak which we had been walking through. Instantly we saw in the distance the clumps of thin strappy foliage attached to the trees which we knew meant we were finally "in the zone". In addition to small clumps of *Tillandsia bartramii*, this area contained a lot more *Tillandsia simulata* growing as singles or with a few pups attached as it seems not to tend to form large clusters.

I had just minutes before been telling Tammy that it appeared that *simulata* seemed to prefer cypress trees. The few plants of it that we had just found in the parking area were restricted to a single cypress. Our only other sightings of *simulata* were along the cypress boardwalk at Highlands Hammock State Park a few months earlier. A little knowledge is a dangerous thing and generalizations based on too little sampling are

Figure 12. *Tillandsia bartramii* inflorescence.

bound to be misleading but it seems that *simulata* like *variabilis* prefers more humid areas like cypress swamps.

This cypress swamp was, however, anything but wet at the moment. Though the dry season was technically over and we were a month into the wet (read that as hurricane) season, this area had apparently been missed by any early-season rains as it was bone dry. We could see the line about a meter up the bases of the cypress buttresses where the tannic waters of last season had left high water marks. For now the dry conditions meant that navigating the area could be accomplished by walking rather than wading. The good fortune of missing the thick swarms of mosquitoes that accompany the rains was only slightly tempered by the bites of several large yellow flies (also known as "doctor flies" for their hypodermic acuity).

Harry Luther, Bromeliad Identification Centre Director, advises how to distinguish these species. *Tillandsia bartramii* has small, flat, triangular leaf sheaths, usually a simple or 2-branched inflorescence; *T. simulata* has elliptic inflated leaf sheaths, usually 3-6 branches. Often *T. bartramii* is in large hemispherical clusters, *T. simulata* in single or small erect clusters. *T. bratramii* is in Florida, Georgia and NE Mexico; *T. simulata* has been found only in Florida.

What was most surprising was not the small Gray Fox (*Urocyon cinereoargenteus floridanus*) that we came across snoozing in the brush among the cypress knees, resting up between its nocturnal hunts. In fact, the most surprising find was a tillandsia that I had hoped, but did not expect, to find here. Scattered among the cypress were several *Tillandsia* ×*floridana*, the northernmost of the two natural hybrids to be found in Florida. Some of these were still in bloom providing excellent photographic fodder. This hybrid was once described as *Tillandsia fasciculata* var. *floridana* which was seemed to be endemic to Florida (hence the name). The hybrid nature of this plant was sorted out by Harry Luther in the same 1985 issue of *Phytologia* that described the ×*smalliana* hybrid.

While this was the primary target of this trip, I was not holding out much hope for seeing one. The parent species of this hybrid are *Tillandsia fasciculata* and *bartramii*. It

was obvious that *bartramii* was in the area (the oak tree near the fire tower had enough plants to provide pollen and nectar for a legion of pollinators). However, I never spotted the other parent needed to make this hybrid. In fact, I later learned that *Tillandsia fasciculata* reaches its northern limit in Florida just shy of where we were. The more cold-tolerant *bartramii*, however, extends from just above Lake Okeechobee northward into the panhandle (and even the southern portion of Georgia).

I had expected that my best chance of seeing this hybrid would be to look in an area inhabited by both of its parents. It seemed logical — but what do plants know of logic anyway? I'm guessing that due to the actions of far ranging pollinators and the fact that tillandsioid seeds are distributed by the wind on their little "parachutes" of fuzzy, cottony hairs, the ×*floridana* hybrid can be found in areas far removed from one of its parents.

Regardless of how the northern hybrid came to be located where I happened to be looking for it, I'll accept dumb luck as a substitute for calculated planning anytime. Alternatively, I could rely on the Pasteur defense and claim that chance was rewarding my preparedness. Though it initially looked like it was going to be a wasted trip in search of the northern Florida bromeliads, we managed to snatch victory from the jaws of defeat by locating (and photographing) all three of our target plants including the main objective *Tillandsia* ×*floridana*. *to be continued...*

Eric Gouda: New International Director

We welcome Dr. Eric Gouda, elected an International Director of the BSI for the period 2006-2008.

Eric started to grow tillandsias at an age of 10 years old, inspired by his father C.S.Gouda (Kees), who at that time had a fancy open jungle terrarium in the living room, containing orchids and bromeliads among other plants as well as lizards and poison-arrow frogs. Not many tillandsias were available in the Netherlands at that time and most of them came from a good friend of his father, Dr. Richard Oeser from Germany. Inspired by the way Dr. Oeser was propagating Tillandsias by seed, Eric began sowing tillandsias himself and now, nearly 40 years later, he still loves seeing the seedlings growing from seed to flowering plant, which takes often more than 15 years.

In 1980 he started to study biology in Wageningen, then at the Utrecht University. His speciality was tropical plant biology and taxonomy, focussing on Tillandsioideae of the Guianas and (Computer) Informatics. He completed his doctorate in 1987 with the publication of the Tillandsioideae in the series of the *Flora of the Guianas* as part of the dissertation. He is now curator of the Utrecht University Botanic Gardens where he has started to develop a special collection of Bromeliaceae. In his spare time he continues his research on Bromelioideae and Pitcairnioideae for the *Flora of the Guianas* as well as Tillandsioideae research in other regions (mainly Andean).

He has been a member of the BSI for 30 years, and since 1998 has been Chairman of "Bromelia Contact Groep" (Dutch & Belgium Bromeliad Society, founded in 1996) hosting it at the Utrecht Botanic Gardens and registering it as an official society in 2000 and seeking affiliation to the BSI the same year.

Eric "in the field" with a giant *Tillandsia secunda*. Photograph by José Manzanares.

Herb Pleaver Appointed an Honorary Trustee

Herb was presented with his outstanding achievement award at the World Bromeliad Conference in San Diego last June. Below is from his nomination proposal written by David McReynolds.

- Herb Plever is an excellent bromeliad photographer, supplying many photos to broadcast through fcbs.org/

Herb receiving his award from President Joyce Brehm at the World Bromeliad Conference

- Seminar speaker for at least 4 World Bromeliad Conferences--New Orleans (1977), during which he co-presented with Bob Read a local television presentation using bromeliad photos; Corpus Christi (1982); Orlando (1996); San Francisco (2000). Herb also compiled a written biography of keynote and honoree speaker Roberto Burle Marx's lifetime achievements for the WBC Tampa (1992) banquet.

- BSI Journal articles printed since1969: 28 solo, 3 co-authored, on many cultural topics and WBC Reports.

- Co-Editor, co-author and photographer of BSI Cultural Manual (revised) 2003 edition.

- Herb has given wide-spread presentations on various aspects of bromeliad horticulture and identification to many BSI Affiliates, namely Corpus Christi, Greater New Orleans, Atlanta B.S. (defunct), Houston, New England, Chicago, San Diego, North County (Southern California), Central Florida, Tampa Bay and the Hawaii Bromeliad Societies.

- Herb has made substantial contributions toward color separations for the BSI Journal, the Bromeliad Identification Centre at Selby Gardens and a private donation towards the cost of the scientific Seminars at WBC St. Petersburg 2002.

- Herb is the long-time (since 1970) Editor of "Bromeliana", the New York

Bromeliad Society's Journal, to which he supplies many articles (many of which are reprinted elsewhere). Has served 2 terms as NYBS President and as a member of its Board of Directors for 42 years (since it's inception in 1963). He also gives regular presentations to NYBS and supports shows with display plants. Herb organizes the NYBS's major twice-annually bulk purchase of bromeliads for members. In 1988 Herb was presented an Award of Appreciation by the NYBS Board of Directors. A plaque from the NYBS was presented to Herb in 2000 which reads: "In Appreciation of Four Decades of Outstanding Dedication and Service".

- Herb has served 2 terms as North-Eastern Region BSI Director, in 1982-84, 1985-87. He co-wrote the adopted BSI By-Laws, democratizing the BSI which gave Affiliates a voice in Administration.

- Herb has fostered, by good example, the cultural understanding of successful indoor growing everywhere and for northern U.S.A. growers especially. Many of his cultural tips are applicable to outdoor culture also. By experimental trials and observation, Herb found the best techniques and compiled articles on indoor fertilizing, watering, light control, ventilation, variety choice for confined spaces, potting and mounting mediums, humidifying, temperature control, propagation.

- Herb has grown and consistently promoted bromeliads for over 40 years. He is a knowledgeable friend and esteemed, helpful adviser to many amateurs and professionals in U.S.A. bromeliad circles on both plants and administration matters, a regular WBC Registrant and a very active BSI participant.

MEMBERS ONLY SEEDBANK

Acanthostachys *strobilacea* .
Aechmea *aquilega* (*hellae*) ● *bracteata* ● *chantinii* (ebony) ● *egleriana* (pink bracts) *e*● *luddemanniana* ● *mertensii* ● *mexicana* ● *victoriana* var. *leodiensis*. ***Alcantarea*** *imperialis* (aka *Vriesea imperialis*) ● *vinicolor* ***Billbergia*** *pyramidalis* ● horrida. ***Guzmania*** *fuerstenbergiaia* ● *scherzeriana* ● var. minor (orange) ***Catopsis sessiliflora***. ***Hohenbergia*** *stellata*. ***Neoregelia*** *bahiana* ● *bahiana* 'Viridis' ● *carolinae* 'Marechallii' ● *concentrica* ● *concentrica* 'Plutonis' ● *fluminensis johannis* ● *magdalenar* ● *morrisoniana* ● 'Rastroeusus'? ● *uleana* ***Nidularium*** *marechallii* (probably *Neoregelia carolinae*). ***Pitcairnia*** *altensteinii* ● *archeri* ● *spicata*. ***Portea*** *leptantha*. ***Puya*** *mirabilis*. ● ***Tillandsia*** *capillaris* 'Hieronymi' ● *gardneri* ● *geminiflora* var. *incana*. *juncea* ● *loliacea*. ***Vriesea*** *ensiformis* ● *fluminensis* ● *fosteriana* var. *seideliana* ● *glutinosa* ● *gradata* ● *itatiaiae* ● *pauperrima* ● *platynema* ● *platynema* var. *variegata* ● *saundersii* ● *sceptrum* ● *sparsiflora* 'Flavo breactum' ● *pulchella*.

Packets, at least 20 seeds, US $1 each. Seed supplied only to BSI members, and limit 2 packets per species.

Send orders & make checks payable to:
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In Memorium. Henry Turner

The Bromeliad World has just lost a great grower, supporter, member and friend. The New York Bromeliad Society regrets to report the death of our revered member, Henry Duncan Turner, who at the age of 94 died on July 3, 2006 following a massive coronary. Henry attended the founding meeting of our Society in 1962, and since that time he has always been active in bromeliad affairs as an officer, director, and panelist and with the beautiful flowering plants he brought to our exhibits. He attended most of the World Bromeliad Conferences since their inception. In recent years he has been host to our members at his home on 171st Street in Jamaica, NY with annual socials during the summer in his large garden where his bromeliads, orchids, and large collection of dahlias could be viewed outside and in his two, hand-built greenhouses.

Henry "Hank" Turner jamming at the World Bromeliad Conference, June 2006

He was a man of many talents and interests. As a young man he was an outstanding athlete, a track star who won many events in the 1930s. . Early on he became interested in jazz and learned to play the trumpet. After his graduation he played with several bands and then "Hank" Turner organized his own group in 1935 and became the house band at Ryans Rendevous in Kew Gardens, Queens until he was drafted in the U.S. Navy during World War II. Henry and his wife Vivian attended the World Bromeliad Conference in San Diego in June, 2006. He brought his horn with him and the festivities at the Saturday banquet were memorably livened by the swinging trio of Rusty Luthe, David Shiigi and Henry Turner.

Following his discharge from the Navy, Henry moved back to the family home in Jamaica and undertook to restore his father's flower garden. He moved from garden plants to intensive study of dahlias, then orchids and finally bromeliads and continued to grow these plants without losing interest in any of them. He created three fine orchid hybrids and even built a small lab to experiment with tissue culture. He became active in the societies representing these plant families and in addition to his work in the N.Y. Bromeliad Society he served as president of the Long Island Dahlia Society, the Eastern Orchid Congress and the Long Island Orchid Society.

Herb Plever

Greater New Orleans Bromeliad Society Show 2006

Carolyn Schoenau, Affiliated Shows Chair. Photos by Eloise Beach

This is the first show, May 6 and 7 2006 in Metairie, Louisiana, that New Orleans has had since Hurricane Katrina hit them. It was admirable that they were able to have a show this year and I respect that very much.

View of the awards table

Aechmea orlandiana 'Glowing Embers' (unreg) entered by Terry Coulthard.

Mulford B. Foster Best of Show, *Aechmea* 'Aztec' from Mal Mele.

The Show attracted 107 horticultural entries and 2 artistic, from 12 exhibitors. Sweepstakes winner (most points in show) was won by Terry Coulthard. Ribbons awarded: 40 Award of Merit, 55 blue, 10 red.

EVENTS CALENDAR

Australia

October 28-29, 2006. Bromeliad Society of New South Wales Spring Show. Wellbank Street, Concord.

November 11-12, 2006 Bromeliad Society of Queensland 2006 Bromeliad Bonanza--combined show and sale of bromeliads. Venue: Mt Coot-tha (Brisbane) Botanic Gardens Auditorium. Saturday (11th) 8am-4pm Sunday (12th) 9am-3pm. Entry $3 adults, children under 14 free. Enquiries Bob Reilly (phone 07 3870 8029).

November 18-19, 2006 Hunter District Bromeliad Society Annual Show. Venue: WEsley Church, Beaumont Street, Hamilton.

April 28-29, Bromeliad Society of NSW Autumn Show. 9-11 Wellbank Street, Concord. Enquiries phone 9971-6183.

September 21-23, 2007 14th Australian Bromeliad Conference. Rydges resort Hotel, Port Macquarie. Enquiries to 47 Boden Street, Edge Hill QLD 4870 or lynnie@ledanet.com.au

June 2008, BSI World Conference in Cairns (Australia.) Enquiries to Lynn Hudson, 47 Boden Street, Edge Hill QLD 4870 or lynnie@ledanet.com.au

New Zealand

February 24-25, Bromeliad Fiesta 2007. Mt. Eden War memorial Hall.

Thailand

September 2006 - January 31 2007. see article beginning page 224 of this issue.

United States of America

November 18-19, 2006. Caloosahatchee Bromeliad Society Annual Sale. Terry Park, 3410 Palm Beach Blvd., Fort Myers, FL. Contact : Larry Giroux, DrLarry@comcast.net

April 14-15, 2007. Seminole Bromeliad and Tropical plant Society Spring Plant Sale. Sanford Garden Club Building, 200 Fairmont Drive, Sanford FL. 9am-4pm both days.

April 21-22, 2007. Bromeliad Society of South Florida Annual Show.

The Bromeliad Society International

The purpose of this nonprofit corporation is to promote and maintain public and scientific interest in the research, development, preservation, and distribution of bromeliads, both natural and hybrid, throughout the world. You are invited to join.

Members-Only web site access: *Username*: Pseudaechmea, *Password*: ambigua