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**Covers**

*Front*— ***Tillandsia streptophylla*** Scheidweiler ex C. Morren. La Belgique Horticole vol.28 plate 18-19 (1878). See article on page 234.

*Back*— habit of ***Nidularium rolfianum*** Leme, sp. nov. (described in this issue). Photo by Elton M.C. Leme.


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## Editorial

As we go to press, word has come through that Harry Luther has resigned from the Marie Selby Botanical Garden. Harry was Director of the Mulford B. Foster Bromeliad Identification Center, which he founded in 1978 at Selby Gardens, and Curator of Living Collections there since 1980. He has taken up the role of Assistant Director (Horticulture) of the National Parks Board in Singapore. We understand that Harry will be continuing his bromeliad research and his incomparable contributions to the BSI and our Journal, whilst being involved with the new "Gardens by the Bay" project in Singapore.

To date there has been no confirmation from either the BSI or Selby on the fate of the irreplaceable living collection of bromeliads at Selby. The extent of Selby's commitment to maintaining the living collection is questionable - in 2007 their water-treatment plant broke down and it took six months, and the contribution by the BSI of 50% of the repair cost, to get pure water flowing to the plants again. This resulted in the appalling loss of several hundred accessions in the collection for the sake of a $15,000 repair bill.

## In This Issue

**Conservation**

The first article in our scientific section includes a powerful call by Elton Leme for what he calls a "conservation-taxonomy" activism. The huge loss of species resulting from habitat destruction is becoming better recognised by human agencies, and efforts are being made to protect the environments of endangered species. Going along with this conservation-directed emphasis is an increase in taxonomic studies aimed at identifying and clarifying just which species are where. Unfortunately, these same taxonomic studies can result in a "nominal extinction" whereby two plant populations that used to have different names are merged under a single name. This results in one of the names being consigned to synonymy with the other, effectively removing it from our "list of species." If the person mistakenly decided that there is only one species whereas there really are two significantly different populations, then the habitat of the synonymised population may no longer be protected by human agencies and be left to become actually extinct as well. If you are interested in conservation, the article is well worth a read.

**Scientific**

In addition to the discussion of conservation taxonomy, our first article introduces a new species, *Nidularium rolfianum*, from the São Paulo state in Brazil. Author Elton Leme also includes on page 253 a revised key to the "subcomplex amazonicum" in Nidularium.

Harry Luther and Karen Norton bring us a new species, *Guzmania nangaritzae* from Ecuador, on page 256. The plant was originally collected by Mr. Jeffrey Kent.

## Editorial

Bromeliads in nature harbour large numbers of animal species, and on page 260 we have an extensive survey of invertebrates found in bromeliads in a Brazilian Conservation Unit. Roberto Santos and his co-authors identified 874 invertebrates in their study, concluding that monitoring these populations can be a useful tool for environmental risk assessment (page 260*ff*).

## Cultivation

We have our annual index on the centre pages, then we update progress made on our new online database for the bromeliad cultivar register. The old database was hosted on the fcbs.org website, and we hope to soon bring you a brand new version. The new online register has been developed for and will be hosted by the BSI website, but should be available to be linked to by fcbs.org and affiliated bromeliad societies if they want to.

## General Interest

The general interest section has a review by Eric Gouda of the long-awaited "Tillandsia II" by Paul Isley, then we conclude with the 5th installment of Leo Dijkgraaf's fascinating research into 19th century bromeliad illustration.





## Scientific

# A new *Nidularium* species from the Atlantic Forest of São Paulo State, Brazil, and issues against nominal extinction

**Elton M. C. Leme.** Illustrations by the Author.

### Introduction

The Brazilian Atlantic Forest today is one of the most endangered ecosystems in the world (Ranta et al., 1998), and the high number of species endemic to the remaining forest fragments suggests that many species have already become extinct before discovery (Morellato & Haddad, 2000; Morawetz & Raedig, 2007).

An average of 15 new bromeliad species from Brazil were described yearly between 1998—2002 (Leme, 2003), most apparently endemic and found in the remaining Atlantic Forest fragments. In the states of Pernambuco and Alagoas, Northeastern Brazil, where the Atlantic Forest is most depleted, and remaining fragments represent only 4.89% of the original forest area (Silva & Casteleti, 2005), 22 new endemic bromeliad taxa have been described in the past 10 years. This represents 23.65% of all known regional species (Leme & Siqueira-Filho, 2007). In contrast, Morawetz & Raedig (2007) estimate a loss of 100 narrowly endemic angiosperm species per year, facing the high rate of deforestation in the Neotropics. These examples highlight our rudimentary knowledge of Atlantic Forest biodiversity and underscore the importance of taxonomy as a basic tool for conservation and for assessing biodiversity patterns (Mayo et al., 2000). Thus, one goal of the modern taxonomists, documentation of species diversity, is trapped in a race against time ordained by habitat destruction and requires activism in "conservation-taxonomy".

### Nominal extinction

In the past few years, there have been numerous taxonomic studies of the Bromeliaceae. A growing number of scientists in Brazil and overseas are working to unravel the diversity of the family and more precisely define conceptual taxon limits and phylogeny. As with most revisionary studies, a need will arise for nomenclatural changes including new names, new combinations, revalidations, synonyms, etc., that are promptly dealt with so as to reflect the different taxonomic hypotheses that are proposed.

When new taxonomic hypotheses lead to misguided nomenclatural changes, especially when names of taxa are invalidated, species may become nominally extinct. Nominal species extinction, in contrast to bona fide extinction, is abstract and hypothetical, involving the designation of incorrect synonyms at the specific or infraspecific level (Leme, 2003). For example, in a new taxonomic treatment, two or more species

are reduced to heterotypic synonyms of one taxon. Due to an error, the newly synonymized taxa no longer exist for all practical purposes.

Overall, the hypotheses and understanding that we have concerning a given phenomenon do not alter the phenomenon itself. Using the same line of reasoning, the incorrect grouping of one or more taxa under a single epithet does not make these taxa disappear as biological entities. However, due to nominal extinction, taxa may become really extinct if they are no longer the focus of conservation and political decisions and actions. In other words, erroneous nominal extinction may enhance the likelihood of bona fide extinction, and in the case of the Bromeliaceae in the Brazilian Atlantic Forest, it may lead to the loss of associated flora and fauna, magnifying biodiversity loss.

## Nominal extinction in "Flora de São Paulo" treatment

In this day and age, we cannot improve taxonomic studies of the Bromeliaceae if we do not make an effort to do field research and adopt a new philosophy of collecting botanical samples. As recommended by Brown et al. (1993), bromeliad taxonomists should concentrate on the reassessment and correlation of taxonomic traits, identifying new or under-utilized characters that provide new data and contribute to constructing a more natural system. However, as highlighted by Brown et al. (2008) some of the taxonomic concepts adopted by the recently published taxonomical treatment of Bromeliaceae in the "Flora Fanerogâmica do Estado de São Paulo" (Wanderley & Martins, 2007) are contrary to the mainstream views of the Bromeliaceae research community, since it neither provided new data, nor a data based justification, to explain the maintenance of older arguably artificial generic concepts for the family, over more recent revisionary changes that are based on focused, systematic monographic study.

In addition, the treatment of Bromeliaceae in the "Flora de São Paulo" provides some typical examples of bromeliad taxa that were made nominally extinct. One example involves *N. krisgreeniae* Leme, in the chapter on *Nidularium* (Moreira et al., 2007), where taxonomic information available in the literature was neglected and, more importantly, where the taxonomic decisions provided were not based on new, tangibly produced data. Here the authors designated *N. krisgreeniae* as a new synonym of *N. amazonicum* (Baker) Linden & E. Morren ex Lindm. based solely on the argument that the first lies within the range of morphological variation of the latter. They also considered *N. amazonicum* var. *paulistanum* Wand. & B. A. Moreira to be a "new synonym" of the typical *N. amazonicum*, despite the fact that this variety had previously been considered a synonym of *N. krisgreeniae* by Luther (2001) and Leme (2002).

The multiple features that justify the segregation of *N. krisgreeniae* from *N. amazonicum* are explicitly provided and illustrated by Leme (2000). Both species, each with distinct geographical range, can be easily differentiated even when sterile by comparing rosette conformation, leaf texture and venation. Other sources of data (e. g., pollen





and stigma microstructure, cladistic analysis of morphological data) that distinguish these species from each other are also provided by Halbritter & Till (1998), Gortan & Till (1998) and Brown & Leme (2000). Thus, *N. krisgreeniae* was made nominally extinguished by Moreira et al. (2007). Concerning *N. amazonicum* var. *paulistanum*, the long explanation justifying its inclusion in the synonymy of *N. krisgreeniae* can be accessed in Leme (2002).

Synonymizing of taxa should not be based only on vague arguments like "there is insufficient material available to confirm the trait attributed to the species" or "species X lies within the range of morphological variation of species Y". We must remember that the inability to perceive certain differences and phenomena is sometimes typical of the observer and occasionally stems from an ideological source. But based on the precautionary principle, if there are no new data and uncertainty still reigns, we must abstain from making changes that can lead to a negative result (i.e., nominal extinction) and indisputable consequences in the real world.

## New *Nidularium* species

Moreira et al. (2007) missed the opportunity to contribute to our understanding of *Nidularium* biodiversity in the Flora de São Paulo treatment by not providing any new collection of these species for São Paulo state, and this is exemplified by the following new species, which was recently collected in the region of Tapiraí and also belongs to the complex of species of *N. amazonicum* and *N. krisgreeniae*.

***Nidularium rolfianum*** Leme, sp. nov. ***Type:*** São Paulo, Tapiraí, between Piedade and Tapiraí, road to Cachoeira do Chá, ca. 400 m elev., 7 Jul. 2004, *E. Leme 6405* & *R. Zorning*, fl. cult. Febr. 2008. Holotype: HB. Isotypes: RB, SEL.

Species nova a *N. krisgreeniae* Leme, cui proxima, laminis foliorum angustioribus, basin versus distincte angustatis, transversin perinconspicue nervatis, marginibus basin versus sparse spinulosis, inflorescentia bipinnata vel interdum inconspicue tripinnata, prope apicem substellata, fasciculis primariis basalibus floribus minus numerosis et sepalis longioribus differt.

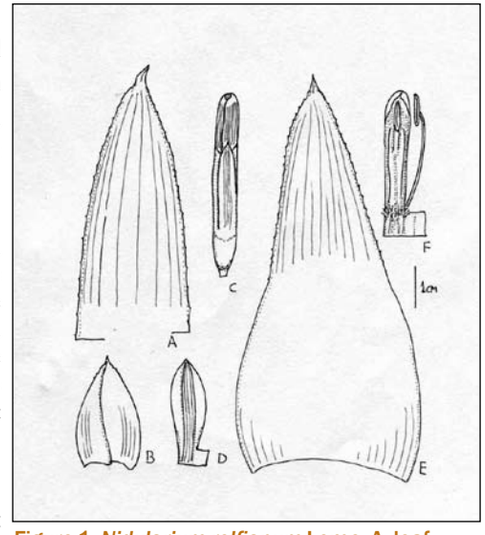


Figure 1. *Nidularium rolfianum* Leme: A. leaf apex; B. floral bract; C. flower; D. sepal; E. basal primary bract; F. petal with outer and inner stamen

***Plants*** epiphytic, propagating by short basal stolons 4-6 x 1 cm. ***Leaves*** ca. 12, green, suberect, laxly rosulate, thinly subchartaceous, forming a narrow funnelform rosette;

***sheaths*** narrowly elliptic, 8-10.5 x 3.2-4.5 cm, subdensely and inconspicuously brown-lepidote; ***blades*** sublinear-lanceolate, distinctly narrowed toward the base, canaliculate and bearing a slightly thicker median channel toward the base, 17-32 x 2.5-3 cm, inconspicuously and sparsely white-lepidote on both sides to glabrescent, green, bearing inconspicuous, darker green, irregular transverse lines visible by transmitted light, sometimes ornamented by slightly darker green, irregular apex acuminate and finely apiculate, slightly recurved, margins laxly to subdensely spinose toward the base, spines less than 0.5 mm long, 5-11 mm apart, and densely spinulose near the apex, spines 2-5 mm apart. ***Scape*** 7-11 cm long, ca. 0.5 cm in diameter, whitish-green, equaling to slightly exceeding the leaf-sheaths, inconspicuously brown lepidote; ***scape bracts*** the basal ones subfoliaceous but shorter than the inflorescence, the upper narrowly ovate, acuminate and shortly apiculate, spinulose. ***Inflorescence*** bipinnate to inconspicuously tripinnate, obconic-rosulate, substellate at the apex, ca. 6 cm long, ca. 9 cm in diameter at the apex, exceeding the leaf-sheaths, slightly elevated and distinctly visible above the rosette; ***primary bracts*** narrowly ovate, apex narrowly acute and minutely apiculate, 8-10 x 4.5-5.5 cm, with distinction between sheaths and blades, suberect toward the base and recurved toward the apex, the visible parts orange-red, sparsely and inconspicuously white lepidote on both sides, margins densely spinulose toward the apex, spines ca. 0.5 mm long; ***fascicles*** ca. 8, subflabellate, complanate, shortly stipitate, the basal ones 30-35 x 15-20 mm (excluding the petals), 2 to 4-flowered in total, sometimes bearing a 2-flowered, single secondary fascicle; ***floral bracts*** ovate-lanceolate, apex acute and minutely apiculate, entire to inconspicuously spinulose at the apex, 24-28 x 13-19 mm, slightly shorter to nearly equaling the sepals, carinate, membranaceous, greenish-hyaline, subdensely and inconspicuously pale-castaneous lepidote, trichomes fimbriate. ***Flowers*** 40-49 mm long, odorless, subsessile, pedicels inconspicuous, 1-2 mm long; ***sepals*** 24-26 x 8 mm, connate for ca. 4 mm, lobes narrowly elliptic to obovate-lanceolate, obtusely carinate, apex acute and apiculate, glabrous, whitish-green; ***petals*** 36-38 mm long, connate at the base for 7-10 mm, lobes sublinear, erect, 29-39 x 6 mm, green toward the apex except for the white apical margins, bearing 2 long fimbriate appendages at the tube apex, as well as 2 conspicuous longitudinal callosities slightly shorter than the filaments, apex obtuse-cucculate, corolla tubular; ***filaments*** the antepetalous ones adnate to the petals for 20-27 mm, the antesepalous ones adnate to the petals tube and free above it; ***anthers*** ca. 7 mm long, sublinear, base acute and apex acute and apiculate, dorsifixed at the middle, the antesepalous ones slightly exceeding the antepetalous ones; ***pollen*** biporate, broadly oblong-elliptic, pores large, exine reticulate, lumina polygonal, muri narrowed; ***stigma*** conduplicate-spiral, ellipsoid, white, lobes with densely crenulate-papillose margins; ***ovary*** clavate, trigonous, white, glabrous, ca. 10 mm long, 4-5 mm in diameter; ***placentation*** apical; ***ovules*** obtuse; ***epigynous tube*** crateriform, ca. 1 mm long. ***Fruits*** unknown.

## Etymology

The name chosen for this new species honors one of its collectors, Rolf Zorning, from Campinas, São Paulo, Brazil, a pioneer in the large scale industrial production of ornamental bromeliads, and so one responsible for the popularization of these plants in the country.





Figure 2. Closeup of *Nidularium rolfianum* that flowered in cultivation.

## Discussion

*Nidularium rolfianum* is closely related to *N. krisgreeniae* Leme, but it differs from it by the narrower leaf blades (2.5-3 cm vs. 3.5-5 cm wide), giving to it a slimmer general appearance. Also, this new species can be distinguished by its leaf blades distinctly narrowed toward the base (vs. inconspicuously if at all narrowly toward the base), bearing very inconspicuous darker green cross-veins by transmitted light (vs. bearing conspicuous and easily visible darker green, irregular cross-veins), basal margins sparsely spinulose (spines 5-11 mm apart vs. 3-5 mm apart), inflorescence bipinnate to sometimes inconspicuously tripinnate (vs. distinctly tripinnate) and substellate at the apex (vs. rosulate-capitate), basal fascicles with 2 to 4 flowers (vs. ca. 5-flowered) and by the longer sepals (24-26 mm vs. 18-22 mm long).

Figure 3. *Nidularium krisgreeniae (Leme # 3304)* is the closest relative of *N. rolfianum*.

Figure 4.The distinct cross-veins in the leaves of *N. krisgreeniae*, not present in its close relatives, allows its identification even when sterile.

In "subcomplex amazonicum" of the "white complex" of species proposed by Leme (2000), *N. rolfianum* holds an intermediate morphological position between its close relatives *N. krisgreeniae* and *N. minutum* Mez. It shares with *N. minutum* the general slimmer appearance, the narrower leaf blades which are canaliculate and distinctly narrowed toward the base, and the usually bipinnate and apically substellate inflorescence.

*Nidularium rolfianum*, *N. krisgreeniae* and *N. minutum* are endemic species of the Atlantic Forest of São Paulo state. *Nidularium rolfianum* was found growing as an epiphyte in the forest understory in the region of Tapiraí, from 400 to 800 m elevation, while the typical *N. krisgreeniae* lives in the region of Sete Barras and São Miguel Arcanjo, not far away from Tapiraí.





Figure 5. *Nidularium minutum* (*Leme # 4273*), from São Paulo, is also related to *N. krisgreeniae*

Figure 6: *Nidularium amazonicum* (*Leme # 1759*), with dorsally purplish-wine leaves, from Paraná State (photo E. Leme).

Figure 7. More common in the wild than the purplish-wine plants, this *Nidularium amazonicum* (*Leme # 4453*) ranges to Rio Grande do Sul, the southernmost distribution of the genus





The few specimens from Tapiraí identified in herbaria as *N. krisgreeniae* may very probably represent this new taxon. *Nidularium minutum* occurs nearby in the region of Santo André, at Alto da Serra de Paranapiacaba, where it forms large populations on the forest floor at high altitudes, with *N. albiflorum* (L. B. Sm.) Leme and *N. rubens* Mez, which are also members of the "white complex". *Nidularium amazonicum* is the remaining member of the "subcomplex amazonicum" and it grows typically in the states of Rio Grande do Sul, Santa Catarina and Paraná, with putative residual occurrence in São Paulo (one specimen collected about 78 years ago in Cotia river (Leme, 2000), which is supposed to belong to the micro-region of Itapecerica da Serra, however, there is a "Cotia river" in the state of Paraná too). Another more recent collection (28 Aug. 1999, *Leme # 4745 et al.*, deposited in HB) indicates the presence of this species on a hill of about 200 m elevation in the region of Cananéia, close to the border with Paraná State, near the coast.

With this new species, the identification key for the "subcomplex amazonicum" in Leme (2000) must be amended as follows:

**42b**- Petals connate at the base for less than 1/2 of their length, bearing fimbriate appendages at the apex of the petal tube.

**53a**- Scape distinctly shorter than the leaf sheaths or exceeding them for ca. 2 cm; petals green or yellowish at the apex with white margins.

**54a**- Leaf sheaths 5-7 (-12) cm wide; leaf blades 3-6 (-9) cm wide; inflorescence distinctly tripinnate, rosulate-capitate, basal fascicles 5- to 8- (to 13-) flowered.

**55a**- Leaf blades acuminate-caudate; scape distinctly shorter than the leaf sheaths; inflorescence sunken in the leaf-rosette; primary bracts suberect-recurved toward the apex; flowers sessile.

.....43- ***N. amazonicum***.

**55b**- Leaf blades acute to acuminate; scape equaling to slightly exceeding the leaf sheaths; inflorescence equaling to slightly elevated above the leaf-rosette; primary bracts recurved to revolute toward the apex; flower pedicels 2-3 mm long.

.....44- ***N. krisgreeniae***.

**54b**- Leaf sheaths 3.2-4.5 cm wide; leaf blades 2.5-3 cm wide; inflorescence usually bipinnate to inconspicuously tripinate, substellate at the apex, basal fascicles 2- to 4-flowered.

…….44a- ***N. rolfianum***

**53b**- Scape distinctly exceeding the leaf sheaths for 1.5-2.5 times of their length; inflorescence bipinnate, stellate at the apex; petal apex totally white.

.....45- ***N. minutum***.

## Conclusion

The issues of synonymy and formal extinction are indisputably complex. Clearly, there is a need for legitimate, objective, data-driven synonymy in taxonomy. However, superfluous synonym can have adverse consequences, and this type of taxonomic error in the past probably had no effect on the real world, and could await corrective measures in the subsequent taxonomic revisions. Today however, especially in highly endangered biomes like the Atlantic Forest, any one of man's activities, academic or not, that interferes negatively with conservationist activities and policies leads to real consequences that cannot be ignored. As stressed by Ibisch (2008), in a rapidly changing world with declining biodiversity it becomes ever more difficult and even questionable to study the richness of life without looking beyond the pure natural sciences. He concluded: "without being responsible by the imminent threats to biodiversity, those naturalists who close their eyes and pretend they cannot make a difference become accomplice to the destruction of nature". In synthesis, a "conservation-taxonomy" activism is more than desired. It is urgently needed.

## Acknowledgements

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# *Guzmania nangaritzae*, A new species from South-eastern Ecuador

**Harry E. Luther[1] & Karen F. Norton[2]**

*Guzmania nangaritzae* H. Luther & K. Norton, sp. nov.

A ***G. madisonii*** H. Luther et ***G. condorensis*** H. Luther cui affinis sed pedunculis longioribus et bracteis florigeris minoribus differt.

HOLOTYPE: Ecuador, Zamora-Chinchipe, along the Rio Nangaritza, ca. 1000 m elev., *J. Kent legit*, flowered in cultivation SEL 2007 – 43, 22 Jan 2009, *H.E. Luther s.n.* (Holotype: SEL. Isotypes: QCNE, MO).

Figure 1. *Guzmania nangaritzae*, flowering in cultivation

***Plant*** an epiphyte, flowering 30 – 40 cm tall. ***Leaves*** densely rosulate, 20 to 35 in number, erect to spreading, 30 – 45 cm long: ***leaf sheaths*** narrowly elliptic, 45 – 65 x 20 – 30 mm, thin, nerved, sparsely punctate lepidote, more so abaxially, somewhat castaneous; ***leaf blades*** linear lanceolate, attenuate, 10 – 16 mm wide, thin coriaceous, nerved, sparsely punctate lepidote throughout, light green or green tinged reddish.

1 Now at Gardens By The Bay, National Parks Board Headquarters, 1 Cluny Road, Singapore 259569. email harry_luther@nparks.gov.sq.

2 Marie Selby Botanic Gardens, 811 South Palm Avenue, Sarasota, FL 34236, USA.





Figure. 2 *Guzmania nangaritzae*, note green stigma (upper right in photo).

***Scape*** erect, 28 – 35 cm x 2 mm, somewhat sulcate, very sparsely punctate lepidote, reddish; ***scape bracts*** erect, imbricate throughout, the lower green, the uppermost tinged reddish, all with a foliaceous attenuate blade. ***Inflorescence*** bipinnate, 4 x 4 cm, 4 to 8-branched. ***Primary bracts*** elliptic, acute to attenuate, much exceeding the stout, 1-bracteate peduncle, about 1/3 to ½ as long as the branches, red. ***Branches*** ovoid or short cylindric with a stout 2 – 4 cm long, 1 – bracteate peduncle, 1 – 4 cm long, 5 to 16 – flowered, spreading at 45º - 90º from the axis at anthesis; ***floral bracts*** broadly elliptic, broadly acute, 5 – 8 x 4 – 6 mm, thin coriaceous, nerved, sparsely lepidote, red or red tipped with white. ***Flowers*** with a 1 – 2 mm pedicel, spreading at ca 30º from the axis at anthesis, opening during the day; ***sepals*** elliptic, broadly acute, 10 – 11 mm long, basally connate 3 – 4 mm, the adaxial pair carinate, red or white; ***corolla*** semi-spreading; ***petals*** oblanceolate, obtuse 17 – 19 mm long, cucculate; aggutinated into a tube for 7 – 8 mm, unappendaged, white; ***stamens*** & ***style*** somewhat exposed at anthesis; ***anthers*** 4 mm long, versatile, cream to white; ***stigma*** convolute-blade with semi-spreading lobes, green.

Paratype: Ecuador, Zamora-Chinchipe, Nangaritza Canton, above Pachicutza in the valley of the Rio Nangaritza, 78° 37' W, 04° 07' S, 1200 – 1300 m. 6 Dec. 1990, *Walter Palacios & D. Neill 6597* (SEL, MO, QCNE), previously det. as *G. condorensis!* ( HEL, 1992).

Figure. 3 *Guzmania condorensis.*

Figure. 4 *Guzmania madisonii.*

Figure. 5 *Guzmania sphaeroidea*





*Guzmania nangaritzae* can be distinguished from two southern Ecuador relatives by having its generally ovoid (rarely short cylindrical) branches borne on conspicuous peduncles (1 – 4 cm long vs. 2 – 8 mm long), and generally shorter floral bracts (5 – 8 vs. 7 – 12 mm long). In addition, it differs from *G. condorensis* by its white (not pale green) corolla and from *G. madisonii* by its mostly pale (not castaneous) leaf sheaths. All three of these narrowly endemic taxa appear to be related to the very widespread *G. sphaeroidea* (André) André ex Mez a rather subdued colored nocturnal flowering species.

**Acknowledgements.**

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# Survey of Invertebrates Associated with Bromeliads in a Conservation Unit of the Brazilian Atlantic Rainforest, and its Relevance for Environmental Risk Studies.

**Roberto Lima Santos, Maria das Gracas Almeida, Elineí Araújo de Almeida, Reberth Richelle Bezerra Barca.[1]**


## Abstract

An inventory of the invertebrate fauna found in the leaf crown and phytotelm of tank bromeliads (*Aechmea lingulata* and *Hohenbergia ramageana*) was carried out in the Parque Estadual Dunas do Natal (Natal Dune State Park or NDSP), Natal, Rio Grande do Norte State, northeastern Brazil . A total of 874 invertebrate specimens were obtained, belonging in 33 taxa within the Mollusca, Annelida, Arachnida, Myriapoda, and Insecta, and most of the taxonomic determinations reported were taken to rank of family. Insects and chelicerates were the most taxonomic diverse and abundant taxa (mature and immature forms considered). Immature forms were recorded for 15 taxa, indicating a significant role of tank bromeliads as a breeding site. Larvae of scirtid beetles (Insecta, Coleoptera) were the most abundant group recorded in the present inventory. Detritivore, predator, and herbivore feeding guilds were recorded. The detritivore guild was the most representative both in number of taxa and abundance, indicating a detritus-processing food chain community. The relevance of inventorying and monitoring bromeliad–inhabiting biota as a tool for environmental risk assessment is discussed.



## Keywords

*Aechmea*, *Hohenbergia*, Scirtidae, feeding guilds, public health, environmental education


## Introduction

In some species of Bromeliaceae the tight imbrication of the leaf blades impound rainwater, thus forming a water reservoir or phytotelm (Fish, 1983; Benzing 2000; Kitching 2000). Decaying organic matter that collects inside the phytotelm releases nutrients which are tapped by the bromeliad through specialized foliar trichomes; this process is enhanced by detritivorous animals whose feeding activity further degrade the organic debris (Benzing 2000). Phytotelm bromeliads can be considered a keystone resource for many other organisms since they provide, among other things, shelter against predation, a water source and breeding grounds for a diversified assemblage of organisms, some limited to this habitat (Laessle 1961; Fish 1983; Hagler *et al.* 1993; Richardson 1999; Carrias *et al.* 2001; Dias & Brescovit, 2004; Santos *et al.* 2003a,b, 2004, 2006, Coelho et al. 2009).

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The "Parque Estadual Dunas do Natal" ("Natal Dune State Park" or NDSP), a biological conservation unit recognized as a biosphere reserve by UNESCO in 1993, is located within the city of Natal, capital of Rio do Grande do Norte State, and is important for preserving air and water quality as well as thermal comfort for its population (Carvalho, 2001).

The NDSP is located in a xeric climatic zone subjected to marked rain seasonality and has sandy permeable soil which does not allow for the formation of temporary ponds (Coelho et al. 2009). Large populations of terrestrial tank bromeliads provide a major source of free water that compensates for the intermittent water supply (Zotz & Thomas, 1999). Besides the biologically diverse Brazilian Atlantic Coastal Rainforest, the NDSP also features a mosaic of floristic, and associated faunistic elements, characteristic of other endangered biomes such as the caatinga and the coastal tabuleiro woodland (Freire 1990; Rizzini 1997; Varela-Freire, 1997). Little has been published regarding taxonomical inventories of invertebrate fauna associated with bromeliads in northeastern Brazil. Considering this lack of knowledge, the legal and ethical imperatives for conserving biodiversity and the significance of phytotelm bromeliads for conservation, this study aimed at gaining information regarding the taxonomic and feeding-guild diversity of the invertebrates found in terrestrial tank bromeliads located in NDSP.

Figure 1. Micrograph of scirtid larva with detritus-laden digestive tract (100X). Photo by Ruy Anderson Lima.

**Figure 2.** Unidentified katydid (*Tettigoniidae*) in typical head down posture on bromeliad leaf blade. Photo by Roberto Lima Santos.

## Materials and Methods

The NDSP is located on the eastern coast of Rio Grande do Norte State, (05°48'S-05°53'S and 35°09'W-35°12'W), and encompasses an area of 1,172.80 hectares, with a mean width of two kilometers by 15 km in the north-south axis. Its most characteristic feature is a series of Pleistocene quartz sand dunes, some up to 120m high, arranged in a SSE-NW direction and covered with lush vegetation (Varela-Freire, 1997). The park is located in the humid tropical zone, with mean low and high temperatures of 22,0°C and 29,2 °C respectively. The mean yearly rainfall ranges from 1,200 to 2,000 mm. Highest rainfall occurs mostly from July thru August (Freire, 1990).

The samples were collected in March and April, 1997. Mean monthly temperatures (27.2 & 26.6 °C), mean rainfall (159.6 & 256.2mm) , and mean relative humidity (82% & 85%) were recorded for March and April respectively (data from the Meteorological Station of the Universidad Federal do Rio Grande do Norte -UFRN Natal, Brazil located about 3 km from the collecting site) . The sampling unit was considered to be a single bromeliad ramet. Eleven specimens of *Hohenbergia ramageana* and 14 ramets of





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Covers are listed as if numbered. Page numbers in **bold face** refer to photos or illustrations, new species are shown under the appropriate genus in both *italics* and **bold face.**

**Figure 3. Stand of *Hohenbergia ramageana* shaded by tree canopy in the Natal Dune State Park. Photo by Roberto Lima Santos.**

*Aechmea lingulata* were collected. All ramets sampled had multilayered outspreading leaf crown architecture with phytotelmata, which help catch falling leaves and other organic debris ( Benzing 2000).

The methods for obtaining the bromeliad associated fauna were adapted from Oliveira *et al.* (1994). Individual host bromeliads were collected and placed inside a large plastic bag and transported to the laboratory, where 250 ml of 70% ethanol solution was added to each bag which were left to rest for approximately 30 minutes in

order to kill the animals within the leaf crown. The rhizome and the dry leaves were discarded. The green leaf blades were removed and individually rinsed in tap water, and the wash-water was passed through a sieve (mesh diameter 0,5mm**).** Only the specimens collected in the sieve were preserved in 70% ethanol and considered in the present study**.** The invertebrate voucher specimens were deposited in the Laboratório de Filogenia e Taxonomia (Departamento de Botânica, Ecologia e Zoologia / UFRN).

The bromeliad specimens were identified according to the descriptions and geographic distribution provided by Smith & Downs (1979). The animal specimens were identified according to Costa *et al.* (1988), Borror *et al.* (1989); Oliveira & Almeida (1999), Kitching (2000), Lourenço (2002), Adis (2002) and Dias & Brescovit (2004). In order to estimate feeding guild assemblages, each specimen was assigned the general feeding guild categories of detritivore, herbivore or predator, based on the feeding habits reported for each taxon. Taxa for which no categories could be unambiguously assigned were categorized as unknown. We follow Begon et al. (1996 p.960) definition of guild as *"a group of species that exploit the same class of environmental resource in a similar way*".

## Results and discussion

A total of 874 invertebrate specimens belonging in 33 taxa were obtained from the pooled 25 bromeliads sampled (Table I). Insects were the most diversified and abundant group found in this survey with 20 taxa and 747 specimens collected.

As to feeding guild analysis, predators comprised 11 taxa, with low abundance (only 79 individuals). Similarly, the herbivore guild was represented by 64 individuals in seven taxa. The detritivore guild was the largest both in taxon diversity (15 taxa) and abundance (731 individuals). Also, the dominance of scirtid larvae further indicates that the bromeliad food chain in the NDSP is based on detritus-processing. Daugherty & Juliano (2002) found evidence that scirtid larvae are an important link in detritus-processing food-chains. The prevalence of scirtid larvae was also observed in the faunal assemblage associated with *Vriesea inflata* in the Atlantic Coastal Rainforest of Parana State in southern Brazil (Mestre *et al.* 2001) and in *Guzmania* and *Vriesea* spp. in Puerto Rico (Richardson 1999). Laessle (1961) recorded a high abundance of scirtid larvae in Jamaican bromeliads and considered this taxon as one of the basal elements in the bromeliad phytotelm food chain.

In the present survey immature stages were recorded in 15 taxa belonging to Annelida, Arachnida, Myriapoda and Insecta, corroborating the hypothesis that bromeliads function as nursery and breeding sites for members of different phylogenetic lineages and thus represent a significant key resource for maintaining biodiversity (Kitching 2000, Rocha *et al.* 2004 ). The results reported here agree with those of Mestre *et al.* (2001) and Richardson (1999) who also found a high frequency of immature forms in bromeliads.





| Taxa | Feeding Guild | Number of individuals | Number of bromeliads with taxa | Life cycle stage |
|---|---|---|---|---|
| Mollusca | | | | |
| Gastropoda, Bulimulidae | Hb | 3 | 3 | A |
| Gastropoda, Subulinidae | Hb | 1 | 1 | A |
| Annellida | | | | |
| Oligochaeta | Dt | 48 | 20 | A+I |
| Chelicerata | | | | |
| Aranae, Lycosidae | Pr | 13 | 8 | A |
| Aranae, Argiopidae, Argiope argentat | Pr | 1 | 1 | A |
| Aranae, Theraphosidae, Pachistopelma rufonigrum | Pr | 14 | 13 | A+I |
| Aranae, Salticidae | Pr | 6 | 5 | A |
| Aranae, Theraphosidae sp 2 | Pr | 2 | 2 | A |
| Pseudoscorpiones | Pr | 1 | 1 | A |
| Scorpiones, Bothriuridae, Bothriurus asper | Pr | 1 | 1 | A |
| Scorpiones, Buthidae Tityus neglectus | Pr | 4 | 4 | A |
| Myriapoda | | | | |
| Chilopoda, Scolopendridae | Pr | 8 | 7 | A |
| Diplopoda , Spirobolida | Dt | 25 | 15 | A+I |
| Hexapoda, Insecta | | | | |
| Blattariae, Blattidae sp. 1 | Dt | 15 | 11 | A+I |
| Blattariae, Blattidae sp.2 | Dt | 33 | 7 | A+I |
| Blattariae, Blattidae sp.3 | Dt | 1 | 1 | A |
| Collembola | Dt | 10 | 5 | A |
| Coleoptera, Elateridae | Pr | 26 | 15 | I |
| Coleoptera, Scirtidae | Dt | 481 | 24 | I |
| Diptera, Chironomidae | Dt | 54 | 16 | I |
| Diptera, Culicidae , Culex sp | Dt | 32 | 12 | I |
| Diptera, Drosophilidae | Dt | 1 | 1 | A |
| Diptera, Muscidae | Dt | 2 | 1 | I |
| Diptera, Tipulidae | Dt | 7 | 5 | I |
| Diptera, Ceratopogonidae | Dt | 10 | 8 | I |
| Embioptera | Dt | 1 | 1 | A |
| Homoptera, Aphidae | Hb | 1 | 1 | A |
| Homoptera, Cicadellidae | Hb | 1 | 1 | A |
| Hymenoptera, Formicidae (*) | Pr | 3 | 1 | A* |
| Isoptera, Termitidae (*) | Dt | 11 | 4 | A* |
| Lepidoptera | Hb | 46 | 13 | I |
| Orthoptera, Gryllidae | Hb | 5 | 5 | A |
| Orthoptera, Tettigoniidae | Hb | 7 | 7 | A+I |
| TOTAL | | 874 | | |

**Table 1. Inventory of invertebrates collected in 25 tank bromeliads in NDSP with respective feeding guild and ontogenetic stage assigments (Hb=herbivore, Pr=predator, Dt=detritivore; A=adult, I=immature, * non-reproductive worker caste).**

The taxonomic composition of the invertebrates found in the bromeliads in the NDSP differs from published surveys of bromeliad fauna (Oliveira *et al.* 1994; Mestre *et al.* 2001; Junca & Borges 2002) mainly regarding the small diversity of mosquito larvae and the absence of tadpoles and damselfly nymphs. Such variations in bromeliad-inhabiting fauna may reflect the taxonomic diversity found in the surrounding ecosystem (Oliveira *et al.* 1994, Rocha *et al.* 2004). In fact, Richardson (1999) states that the analysis of the bromeliad microcosm is a useful method for assessing an important segment of forest biodiversity.

In the NDSP, phytotelm bromeliads are the sole known habitat of the arachnids *Tytius neglectus* and *Pachistopelma rufonigrum,* thus playing a critical role in their conservation (Santos *et al.* 2004, 2006). Besides harboring endemic species, tank bromeliads, as a source of free water in dry weather, are relevant as foraging areas and as breeding sites for species with water-dependent life cycles. According to Rocha *et al.* (2004) those attributes are known to increase biodiversity and, therefore, we suggest assigning tank bromeliads as an environmental assessment endpoint, that is, an environmental value to be protected and surveyed in risk analysis (Suter & Barnthouse, 1993).

By monitoring bromeliad biota, researchers may be able to detect introduced species (especially those with water-dependent life-cycles), and later evaluate its survival, multiplication, dispersal capacity and ecological effects in the recipient ecosystem, which, according to Simberloff & Alexander (1998), are factors that determine the potential environmental risk of an invasive species. In the particular case of disease prevention, the inventory and monitoring of mosquito larvae in bromeliad phytotelmata can readily spot introduced vector species (such as *Aedes aegypti* and *A. albopictus*) establishing populations in the wild. Such information is essential to properly manage public health risks, especially regarding the spread of arthropod-borne viral diseases such as dengue and yellow fever, which according to Console & Oliveira 1998; Marques et al. 2001, represent a major concern in Brazil .

Besides the advocated use of bromeliads, such as *Tillandsia caput-medusae,* as bio-indicators for monitoring air quality (Brighina *et al.* 1997, Malm *et al.* 1998, Benzing 2000), we recommend that inventories and monitoring of bromeliad-associated biota be carefully evaluated as a potentially useful tool for environmental risk assessment.

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# The Bromeliad Cultivar Registry Online.

**Andrew Flower, BSI Editor.**

It has been some time since an up-to-date cultivar registry has been available online. A lot of work has been going on with a view to restoring this facility to the public, and we are nearing the stage where the BSI Cultivar Registrar will have a new, improved online cultivar registry available. Many of you will have been wondering what is going on, so here is a progress report as I see it. In particular, many non-members have been claiming that the BSI decided to withdraw the registry from public access: this fear is absolutly without foundation, and our Board is fully committed to restoring full online access to the public as well as our members (an interim BSI produced online database is already on our website).

The first online cultivar database was developed some 10 years ago by Michael Andreas, webmaster for the world-renowned fcbs.org site. Michael was asked to develop an online version for public view because at the time BSI officers and directors were unable or unwilling to do the work and host the online database on the bsi website. Thus the online cultivar registry was developed by Michael and Derek Butcher (BSI Cultivar Registrar at the time) and hosted on the fcbs website, with a link from it to the BSI website which made it look as though it was actually on the BSI site.


Figure 1. Home page of the proposed new searchable online cultivar registry.

The Cultivar Registry itself is owned and updated by the BSI, and maintence of an up-to-date registry is the responsibility of a BSI Officer, the Cultivar Registrar.

Over recent years the working relationship between Michael Andreas and some BSI Board members started to deteriorate, finally culminating in the removal of his online cultivar database by Michael. Following this breakdown in the relationship, the new BSI Cultivar Registrar, Geoff Lawn, has been developing a replacement solution for the BSI website (see figure 1). Geoff's solution is based on a program designed and built by Eric Gouda to display the cultivar register online in a format that allows us to search out and find the cultivar records that match user requests, for example all the cultivars with a given parent, a certain cultivar name, or a given hybridiser. A bonus with this type of program is that it can also be distributed on a CD for those of us without internet access from home or the potting shed. Derek Butcher has also put in a huge amount of time assisting them.

Lets have a look at how the proposed new online registry works.

The first set of search options, available on the home page, let us look through all sections of the database "All", just the cultivar names, the Breeder names or the parent plants linked to cultivars. In the example, I looked for cultivars registered in the name of Dimmitt, results shown in Figure 3.

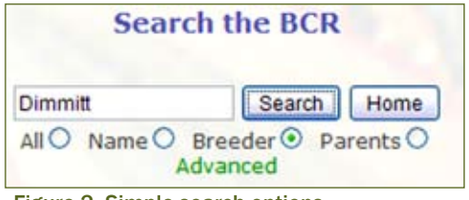


Figure 2. Simple search options.


Figure 3. Results of a search through the breeder sections on the name "Dimmitt." All registrations bearing his name are shown in the list of the left hand side.






Figure 4. Registration detail for Tillandsia 'Feather Duster'.

We can now click on one of the cultivar names, and the program will display the registration record for that cultivar, in this case *Tillandsia* 'Feather Duster' is shown in figure 4. Here we have photos of the plant (click on the photo and you get a larger version in a new window), hybrist's name if known, parents, and some notes plus a section showing where the cultivar is referred to - in this case references include Bird Rock Tropicals, Tropiflora's "Cargo Report" #7-3, BSI Journal and the illustration in "New Tillandsia Handbook."

The record for *Tillandsia* 'Mystic Albert' (figure 5) shows the addition of a lengthy text document, detailing the background to this and other *T. albertiana* hybrids.


Figure 5. The record for *Tillandsia* 'Mystic Albert' showing the addition of a text document discussing the group of hybrids sharing the parent *T. albertiana*.


Figure 6. The window for "advanced" searching of the proposed Cultivar online database.

# Book Review: Tillandsia II

Eric Gouda

*Tillandsia* II - "The Worlds Most Unusual Airplants" by Paul T. Isley III, 2009. 285x223x30 mm in size, 288 pp. 1.7 kg in weight, hard bound and with dust cover, including 396 color photographs, 33 black and white photos and 30 figures. Publisher: Botanical Press, Redondo Beach, California, USA. ISBN 9780981701011

This beautiful coffee-table book is the successor to a 1987 edition with the title *Tillandsia*. It is clearly an update of the earlier book: it is exactly the same size, the same green cloth cover with gold print. It is 30 pages thicker and has a different Tillandsia image on the black dust cover. The 1987 book has been out of print for a long time and consequently demand for the new book was great, especially because of its nice big pictures.

Chapter 1 consists of the same eleven subjects and little has changed, except for minor textual changes. The second chapter, again similar to the first book, is about the (natural) Species. Not all the book's species pictures are included in this chapter - later in chapter 4 "Other images" there are more species images. This part of the book is more a part with plant portraits, often with multiple images per species, the declaration of the name, something about the distribution and growth location and some characteristics of the plant itself, but not a detailed description.

You would have expected an increase of plant portraits, since the availability of species 20 years ago was more limited than nowdays and the number of known species has increased by 50%. With this expectation, the description and illustration of 61 species is a little bit disappointing (against 56 species in 1987). Remarkably, some plant portraits have been replaced by other species portraits. The text has changed little, except for the new plant portraits. However, the layout is more comfortable, by working with different colors and the text formatting is tighter, which gives a more modern appearance. Many photographs are replaced and although the pictures in the first book were also beautiful, there must have been another reason to replace them.

There is a new Chapter in which about 75 Tillandsia hybrids are shown with their name and parents. Chapter 6 on naming, pronunciation and taxonomy and Chapter 7 on Tillandsia evolution and biology are almost unchanged from the 1987 edition, but Chapter 5, Tillandsia biography and history, has been updated. The Exotica Hort. Color Guide has been included again and is very practical for color description.

All in all, this book has to be seen as an improved version of the first book. The question therefore arises whether "it is a must", for Tillandsia enthusiasts who already have the first book, to buy this one too. I expect most of them will surely do so, because it is another wonderful book in which much is the same but also a lot has changed. A beautiful book like this for that price ($ 72), I'm afraid you can't resist the temptation! If you do not have the first book, I would not hesitate one minute and buy it immediately.





# Bromeliad icons in old publications, part 5

Leo Dijkgraaf

The diversity of horticultural magazines and other botanical publications in Belgium during the 19th century was quite staggering, taking into account the relatively small size of the country. Center of this productivity was the city of Gent (or Ghent, in French Gand) where the cultivation of ornamental flowers was concentrated. The region around Gent is still home of many plant nurseries, including some with bromeliads. And once in every 5 year there is the International Flower Exhibition called the Floralies of Ghent (the next one will be held in 2010, this will be for the 34th time).

The oldest publications with coloured plates however originated from Brussels. I already mentioned *Sertum Botanicum* (with 600 plates from 1828-1832) in the first part of this series on bromeliad icons (Dijkgraaf 2007); in 1834 this work has been reprinted in Paris under the title *Flore des serres et des jardins de Paris*. About the same time Pierre Auguste Drapiez produced an album entitled *Herbier d'amateurs de fleurs* in 8 volumes (1828-1835). The drawings for most of the 600 engravings (5 of bromeliads) were not original and the album was in fact a reissue with extra plates of *Herbier Général de l'Amateur* by Loiseleur-Deslongchamps, published 1816-1827 in Paris. Drapiez also directed the *Encyclographie du règne végétal* (Brussels 1833-1838, 6 volumes, 372 colour plates), classified as a work of mediocrity and imitation (Stafleu & Cowan 1976).

The first Belgian horticultural magazine was *L'Horticulteur Belge, journal des jardiniers et amateurs*, founded by Louis Van Houtte and Charles Morren in 1833 and published in Brussels. The 5 volumes (1833-1838) did not contain coloured plates but there were some black and white drawings, one of them depicting *Tillandsia streptophylla*. This new species was described here in brief terms by Charles Morren. The Latin diagnosis was from the hand of German-born Michel Scheidweiler, a teacher at the veterinary and agricultural school in Brussels who also worked in that town for the geographical institute of Philippe and François Vandermaelen. François was interested in natural history and at his institute Scheidweiler was a part-time lecturer on plantfysiology. The firm of Vandermaelen had send Henri Galeotti to Mexico to gather geological information; together with botanists Nicolas Funck, Auguste Ghiesbreght and Jean Jules Linden, Galeotti made one of the first recorded ascents of the Pico de Orizaba, Mexico's highest mountain. Galeotti became interested in botany and began collecting plants, mainly orchids and cacti. After 5 years he went back to Brussels where he started a nursery. He became editor of *Journal d'horticulture pratique* and in 1857 he started the first bulletin of the botanic garden in Brussels. Among the many plants that were send by him to Belgium was *Tillandsia streptophylla*. Galeotti had sent along a package of seed believed to belong to the same species, but it is not clear how the seeds developed.

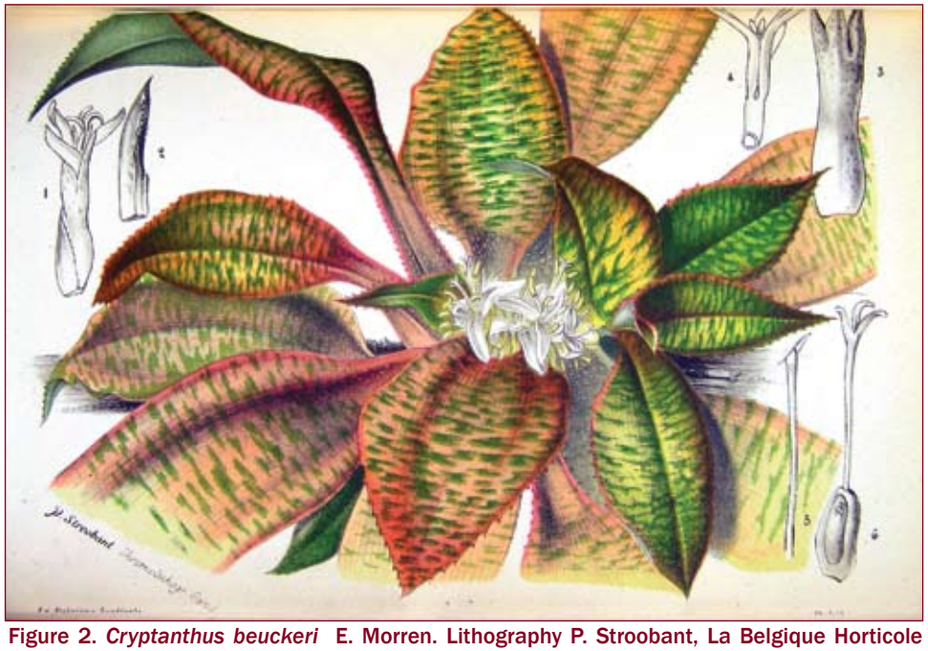

Figure 2. *Cryptanthus beuckeri* E. Morren. Lithography P. Stroobant, La Belgique Horticole vol.31 plate 17 (1881).

Some 40 years later a coloured plate of *Tillandsia streptophylla* (Figure 1 on front cover) appeared in *La Belgique Horticole; Journal des Serres, des Jardins et des Vergers*. The text was by Édouard Morren, son of Charles Morren - both had been directors of the botanical garden at the university of Liège. That plant was collected by Omer de Malzine in 1870. A citation from Morren's text with the plate: "The plant is remarkable for various reasons. The stem is swelled like a thick bulb, the leaves are dense, a bit succulent, and covered with a kind of raw velvet formed by the adpressed scales, which when dry form a yellowish surface. But those leaves are still more remarkable because with their narrow tips they can wrap them around the treebranches that are within reach. The epiphytic plant uses them as ropes to secure itself and to keep its balance in spite of bumps and gusts of wind". This species has been described later by German botanist Diedrich von Schlechtendal under the name *Tillandsia circinnata* (now a synonym), with the remark that he had not seen the description of Galeotti's plant and that it could well be the same.

Charles Morren was the founder of *La Belgique Horticole* and edited the first 7 volumes. Édouard Morren, who was already co-editor for some years, took over after his father's death; both men died young, in their early fifties. The subtitle of the journal *La Belgique Horticole* had the variations *Annales d'horticulture belge et etrangère* and *Annales de botanique et d'horticulture* during the period 1851-1885 when the 35 volumes were published in Liège. Bromeliad specialist Édouard Morren collected drawings of bromeliads and also commisioned artists to illustrate them, this collection of 250 drawings is now at the Kew Library and some plates have been published in this journal in the period 1984-1988 in a series of articles by Lyman Smith. In the same journal containing the first article (Smith 1984) is also a reprint of a biography on Éd. Morren (Padilla 1984).





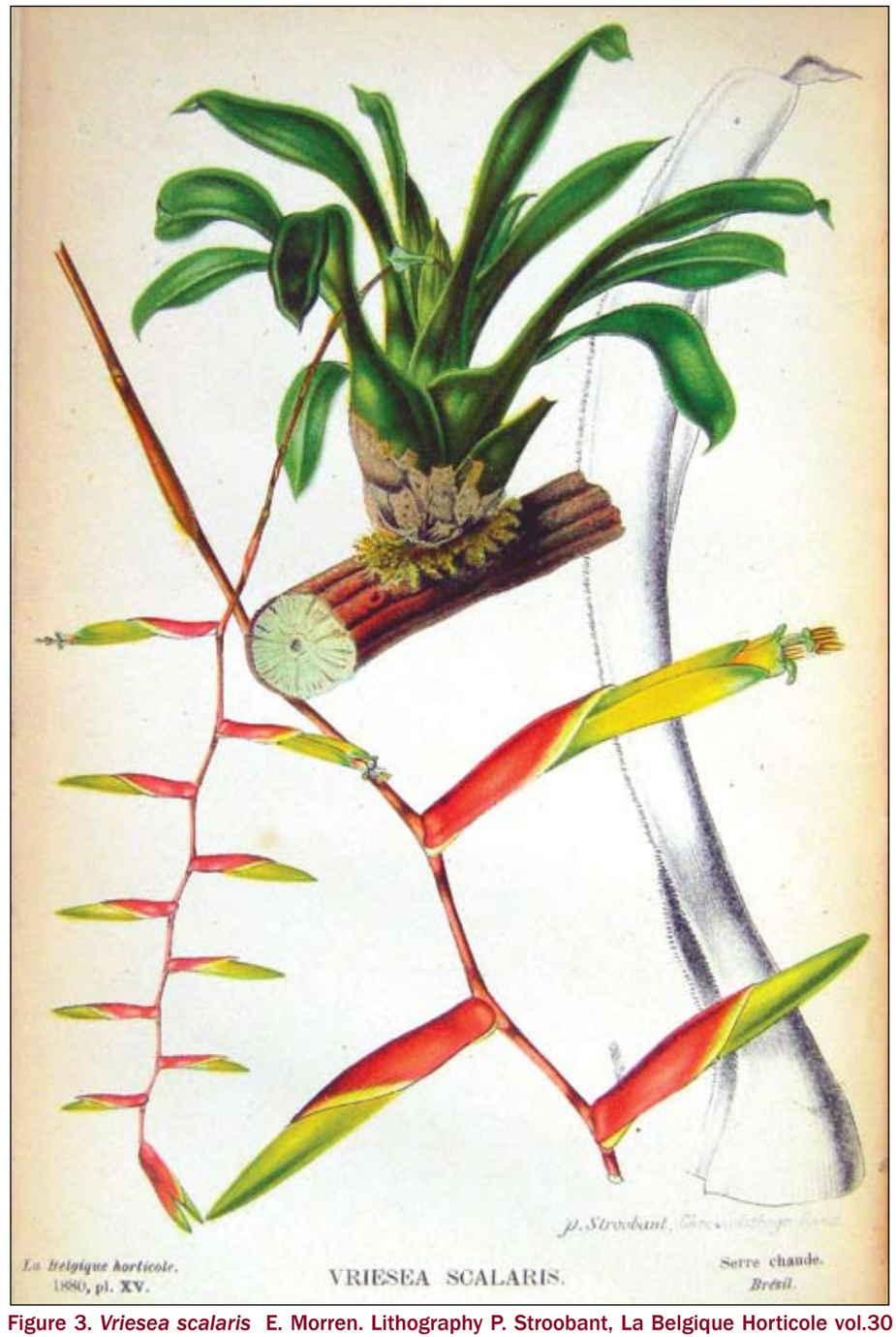


Figure 3. *Vriesea scalaris* E. Morren. Lithography P. Stroobant, La Belgique Horticole vol.30 plate 15 (1880).


**Figure 4. *Guzmania osyana* (E. Morren) Mez. Syn.: *Caraguata osyana* E. Morren. Drawing J. Cambresier, lithography P. Stroobant, La Belgique Horticole vol.35 plate 16-17 (1885).**

The total number of plates published in *La Belgique Horticole* is a bit difficult to ascertain as plate numbering was not continuous and folding plates were counted double or triple, but per volume there were about 15 plates. As Morren was a promotor of bromeliads, that genus was well represented with over 100 plates; some have been reproduced a long time ago in the BSI Journal, illustrating an article on cultivars of the genus *Billbergia* (McWilliams 1968).

The fine colourful plate of *Cryptanthus beuckeri* (Figure 2) was published in *La Belgique Horticole* a year after this new species was described by Morren in the same journal. The plant is of unknown origin, the lectotype is a Morren Icon at Kew, possibly the same illustration as in *La Belgique Horticole*. It was collected by S. de Beucker, a horticulturist from Antwerp, and Morren describes it as the most elegant of the *Cryptanthus* species known.

One of several *Vrieseas* from Brazil published in *La Belgique Horticole* is *Vriesea scalaris* (Figure 3), described by Éd. Morren in 1879 and illustrated one year later. The plant was send to Morren by Pedro Binot from Petropolis who had already introduced many plants from Brazil in Europe. Flowering lasted for several months in the greenhouse of Morren who mentions that he already had obtained some seed from crosses made with *Vriesea psittacina* and *Vriesea brachystachys*.





From the last volume of *La Belgique Horticole* is the plate of the newly described *Caraguata osyana* (Figure 4). The names of the illustrators were not always recorded on a plate, but in this case in the lower left corner is that of J. Cambresier, who made the drawing, and below right the name of P. Stroobant, the lithographer. The description was made after a plant grown from seed that was obtained from a plant collected in Ecuador without exact locality by Gustave Wallis in 1875; flowering occurred in 1885. It is dedicated to Édouard Osy de Wychen, president of the royal horticultural society of Antwerp. At an exhibition in that city it was shown by Jacob-Makoy from Liège, a firm founded in 1810 by Lambert Jacob and his father-in law the florist Makoy. This species was transfered to the genus *Guzmania* by Mez in 1896. It is an epiphyte in the forests of central Ecuador.

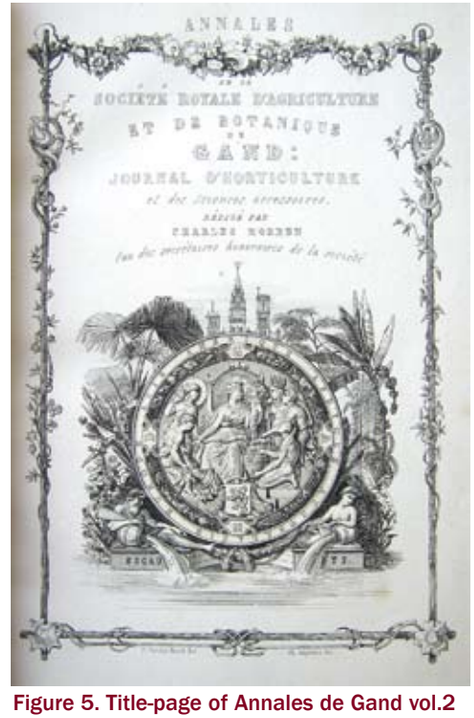


**Figure 5. Title-page of Annales de Gand vol.2 (1846).**

Before Charles Morren started *La Belgique Horticole* he had directed some other journal: *Annales de la société royale d'agriculture et de botanique de Gand*. The illustration on the title-page of this journal with the three towers of the city of Gent is worth looking at (Figure 5). The 5 volumes from 1845-1849 were illustrated with 291, many folding, handcoloured lithographed or chromolithographed plates. Most plates were made by G. Severeyns, one of the most prominent lithographers in 19th century Belgium who started in 1829 a firm that would become the leading printing-establishment in that country. Some of the 9 bromeliads in *Annales de Gand* were new species, such as *Puya maidifolia* (Figure 6). The drawing was made from a plant exhibited at a flowershow in 1849 in Gent; it had first flowered in the greenhouse of Jean Jules Linden in December 1848. Funck and Schlimm collected it in Venezuela. Linden had send some material of this plant to Joseph Decaisne, a Belgian botanist working in Paris. Decaisne only received withered flowers and shriveled leaves, good enough though for him to think of the name *maidifolia* because the leaves looked like that of maize. Morren adopted this name although he had not seen the plant himself and therefore did not give a full description, having only the drawing at his disposal. On the drawing the zygomorph character of the flowers is not discernable. Decaisne later made the combination *Pitcairnia maidifolia*, this was published by J. Planchon in *Flore des serres et des jardins de l'Europe* in 1854. The distribution of *Pitcairnia maidifolia* ranges from Honduras to Colombia and Surinam where it grows as a terrestrial and saxicolous plant.


Figure 6. *Pitcairnia maidifolia* (E. Morren) Decaisne ex Planchon. Syn. : *Puya maidifolia* E. Morren. Drawing B. Léon, lithography G. Severeyns, Annales de Gand vol.5 plate 289 (1849).





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# EVENTS CALENDAR

### Australia

September 11-12, 2010. Illawarra Bromeliad Society Show. Uniting Church Hall, Russell Street, Corrimal

October 9-10, 2010. Bromeliad Society of Australia Spring Show. First floor, Burwood RSL Club, 96 Shaftesbury Road, Burwood, NSW. Free Entry.

October 23-24, 2010. Bromeliad Society of New South Wales Spring Show. Concord Senior Citizens Centre, 11 Wellbank Street, Concord. Contact (02) 9876-8222.

April 7-10, 2011. 16th Australasian Bromeliad Conference "Broms on Arafura" Holiday Inn, 116 The Esplanade, Dawin.

### United States of America

August 14-15, 2010. Seminole Bromeliad & Tropical Plant Society Sale. Garden Club of Sanford.

October 1-3, 2010 Tropiflora Fall Festival, 3530 Tallevast Road, Sarasota. Contact 941-351-2267





# 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.