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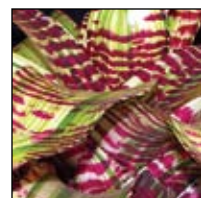
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### Covers

Believe it or not, the plants on our covers are both in *Orthophytum*. That genus is artificially divided into two groups: one with flower stalks (are those “scapes” or “peduncles”? see p.123) and one without.

Front—*Orthophytum humile* an endangered species from Brazil. Article page 101.

Back—*Orthophytum piranianum*, photo by Elton Leme. Article page 106.

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## Editorial

Has the Editor failed to answer your email? His email program deleted every message received between November 2007 and April 14 2008. Not all were recovered from backups. Please re-send if you did not get a reply, thank you.

## Scientific

Scientific disciplines need to have a clearly defined terminology in order for scientists to communicate effectively. When I started editing this Journal in 2006, and started sending scientific contributions out for peer review, I was very surprised to find that there was disagreement over the correct term to be used for the same floral part.. The question facing us now is whether we should, or could, do anything about it. The “two terminologies” used in bromeliaceae literature appear to be founded on the one hand in the Linnean tradition still dominating bromeliaceae work in Europe, and in the other a revised terminology originating with Mez and Smith & Downs that grounds work done by many american botanists, and most “popular” bromeliad literature. Back in 2006 I asked Eric Gouda if he would consider writing a paper on the terminology issue so we could get it out into the open for discussion. It turned out that he and Uwe Scharf were already working on just such a project, and their combined paper is now re-published here on p. 123.

Contributions are earnestly invited on how we should handle this situation. As I see it, there are two main issues. Firstly if, as the Scharf & Gouda article suggests, most if not all scientists working on other plant families are consistently using the Linnean terminology, is the Bromeliaceae taxonomy going to become increasingly marginalised and end up an insignificant backwater in taxonomic science because of its idiosyncratic terminology? Secondly, should we try and adopt a consistent terminology within our taxonomy and if so; which one, and if so how should we go about it? Should the BSI even try to legislate a “correct” terminology eg. as to whether the articles we publish should call flower stalks “scapes” or “peduncles.” I favour clarity and consistency in communication. What do you think?

*Orthophytum humile* is another species joining the critically endangered list, as reported by Ribeiro and de Paula on p. 101. I sometimes wonder whether we are doing the plant any favours by publishing spectacular photos such as the one on the front cover. Would it be in the interest of preserving the species in the wild if the botanists working in the field were to collect seed and make it available to our seed bank - that might lessen the risks of people trying to collect the plant in its native habitat, and provide a possible source of cultivated material to replace the wild plants if they are wiped out by fire?

Elton Leme and Claudio de Paula introduce two new species from Minas Gerais, *Orthophytum graomogolense* and *O. piranianum* followed by a report on the bromeliads native to the Rio São João Mangrove on the Brazilian coast.



## Cultivation

The cultivation sections starts of with another case of “terrible twins”, this time Derek Butcher tries to unravel the mystery of two different vriesas carrying the name “Gravisiana” or “*gravisiana*” and he also tells us how *Neoregelia* ‘Fireball’ was found to be a species by the discovery in the wild of *N.* ‘Greenball.’ Confused? see p. 135. The section concludes with some thoughts on the use of solid fast-release fertilisers as supplements applied to the compost after potting, and the perils of accidentally putting the stuff into the plant’s leaves.

## General Interest

Page 138 sees a report on The Caloosahatchee Bromeliad Society Show 2007 the last from recently retired Affiliated Shows Chair, Carolyn Schoenau. The Editor is especially grateful to Carolyn for her expertise in sending Show reports, and I wish her well in her “retirement”. Betty Ann Prevatt introduces us to a group of new Accredited BSI judges. It is very encouraging to see these new volunteers being prepared to bring their expertise to the vital judging field. Betty Ann also reports on a spectacular large bromeliad feature at this year’s Philadelphia Flower Show. We conclude with a welcome to another group of new members, and finally the Events Calendar.

## Bromeliads Deny Dengi Fever Connection.

According to a recent report by Renata Fontura in the Fiocruz Bureau of News, a study has shown that bromeliads do not play a significant role in the life-cycle of *Aedes aegypti*, the mosquitoes that transmits the virus of dengue fever. The Study by Laboratório de Transmissores de Hematozários of the Instituto Oswaldo Cruz (IOC) of Fiocruz was conducted in urban areas bordering habitats like parks and forested hills. During one year, 156 bromeliads of ten species found in Rio de Janeiro Botanical Garden were monitored and a low percentage of immature forms of *A. aegypti* was verified, suggesting the need of redirecting dengue fever prevention work away from bromeliads.

Before this study, there was a prevailing general idea that bromeliads contribute to *A. aegypti* proliferation, and so the elimination of these plants from gardens and houses, as well as the use of abundant insecticide or the elimination of wild bromeliad populations by fire were often adopted by the population to prevent the mosquitoes infestation.

The new evidence points to the prospect that bromeliads may, in fact, be host to a mosquito population that is of no danger to humans and may actually control the “dengue fever mosquito.” Thus bromeliads may be an important biological barrier to protect humans from the *Aedes aegypti* mosquitoes. According to the researchers, fight against the dengue mosquitoes should be concentrated in their main niches of propagation associated with clean stagnant water in urban and domestic environments.

*Thanks to Harry Luther for sending the article, and Elton Leme for the original translation.*

## *Orthophytum humile*: an Endangered Species of Brazilian Flora.

Otávio Batista de Castro Ribeiro and Cláudio Coelho de Paula



Figure 1. *Orthophytum humile* beginning to bloom.

The genus *Orthophytum* Beer is endemic to the northeastern and southeastern regions of Brazil, with a center of diversity along the Espinhaço Range, in the states of Bahia and Minas Gerais (Wanderley 1990; Leme 2004; Versieux and Wendt 2006). The members of this genus are rupicolous, saxicolous, or terrestrial, frequently found in open places that have much light and dry soil, on top of the rocky outcrops of the grasslands of rocky soils in the Espinhaço Range, in the scarps of the Atlantic Rainforest or in the domains of the Caatinga (Smith and Downs 1979)

There are 53 known species of *Orthophytum* and seven varieties (Louzada 2008), forming two easily distinguished groups: one with a well-developed scape, informally called “complex with scapose inflorescence,” and the other group with a sessile inflorescence (Leme, 2004, (Leme 2004)a. The taxonomical problems involving *Orthophytum* are largely derived from the shortages of good herbaria collections and limited field investigation. The majority of the characteristics of the species are





**Figure 2. Population of *Orthophytum humile* in sandstone rock.**

lost in herbaria specimens, especially in the congested inflorescence of the scapeless taxa (Wanderley and Conceição 2006).

*Orthophytum humile* L.B.Sm. is one of the most delicate members of the genus, with a restricted distribution in the municipalities of Grão Mogol, the type region, and Cristália, both in Minas Gerais state (Louzada, 2008). It propagates by means of short stolons, with rosettes 10-25 cm. in diameter and filiform leaves with appressed trichomes and marginal spines about 2 mm. in length. When in bloom, the rosettes exhibit a greenish-white coloration forming a narrow inner ring around the green inflorescence and an outer much broader ring of pink color, contrasting with the green to purplish distal portion of the leaves. (Figure 1).



**Figure 3. Closeup of *Orthophytum humile* beginning to bloom in rock fissure.**

According to Wanderley & Conceição (2006), the species closely related to it are *Orthophytum navioides* L.B. Sm. and *O. mucugense* Wand. & Conceição. *O. humile* differs from those species by having short rhizomes, filiform leaves, and short and appressed scales whereas *O. navioides* has long rhizomes, longer leaves, glabrous to sparse lepidote, and *O. mucugense* has triangular-lanceolate to linear-lanceolate leaves glabrous to sparse lepidote.

The grasslands on rocky soils of the Parque Estadual da Serra de Grão Mogol is characterized by the predominance of deciduous shrub vegetation among large rocks of sandstone (Figure 2) streaked with coarse sand and deposited with (Pirani, Mello-Silva et al. 2003). Its species are typically xerophytes with numerous Cactaceae, as well as typically xerophytic Bromeliaceae like *Dyckia* and *Encholirium*.

The rocky outcrops in the area of occurrence of *O. humile* are made up of sandstone rocks approximately 5 m in height with a large number of concavities and cracks, where the species is established on shallow organic material.

Practically all of the individuals of *O. humile* are intertwined with tunnels made by termites, which was also reported by Louzada (2008) (Figure 4). It has been observed that the termites do not eat any parts of *O. humile*. According to Thorne *et al.* (Thorne, Haverty et al. 1996) these foraging tunnels link the distant colony to the foraging area and are made by partially digested plant material, fecal material, soil, and water. Apparently the termites are not damaging the root system of the bromeliads, and their association may favor the nutrition of the plant. In contrast, the





Figure 4. Termite tunnels connecting two individuals of *Orthophytum humile*.

spines of the bromeliad can discourage predators of the termites, as observed with *Dyckia* and *Encholirium* in the Brazilian grasslands of rocky soils (Thorne *et al.*, 1996). Studies aiming to clarify the relationship of the termites with this species are important to help its conservation.

*Orthophytum humile* is included on the List of Endangered Species of the Brazilian Flora, together with another four *Orthophytum* species, under the “Deficient Data” (DD) category. This categorization was made despite *O. humile* being included in the List of Endangered Species of the Extinction of the Fauna and Flora of Minas Gerais categorized as “Critically in Danger” (CD) because of its limited area of occurrence (Fundação Biodiversitas, 2007). Even considering its habitat in the State Park of Serra de Grão-Mogol, created in 1998, *O. humile* is not fully protected due to the periodic fires that affect the local vegetation during the dry season.

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## Studies on *Orthophytum* - Part VIII: Two New Species from Grão-Mogol State Park, Minas Gerais, Brazil

Elton M. C. Leme & Claudio Coelho de Paula.

Illustrations by E.M.C. Leme.



**Figure 1.** General view of the “Campos Rupestres” in the State Park of Grão Mogol, Minas Gerais State, in the locality of Fazenda dos Médicos.

Grão-Mogol State Park is a 33,325 hectare public conservation unit established in 1998 and maintained by the Instituto Estadual de Florestas of Minas Gerais State (IEF-MG). It is situated at the northern region of Minas Gerais State, in the mountainous terrain of Serra Geral (Espinhaço range) and under the hydrological influence of the Jequitinhonha River, with the predominance of “Campos Rupestres” (grasslands on rocky soils) vegetation. The park shelters a peculiar bromeliad flora, including unusual endemic species originally described from the area (i.e., type locality), like *Encholirium irvinii* L. B. Sm., *Orthophytum humile* L. B. Sm. and *Dyckia granmogolensis* Rauh.

The first botanist to highlight the Bromeliaceae of Grão-Mogol was Alvaro Astolpho da Silveira (1867-1945) with the description of *Tillandsia graomogolensis* Silveira (Silveira 1931), now considered a synonym of *Tillandsia streptocarpa* Baker (Leme and Iqueira-Filho 2006). However, the first floristic survey of the family was provided by Wanderley and Forzza (2003), listing 18 species from eight genera.

An official systematic survey was initiated in August 2007 with the purpose of verifying the identity of some bromeliad species portraits (2003) whose identity was not in accordance with the respective protologue. This paper is the first result of the field expedition carried out in the period of August 9 to 12, 2007.



**Figure 2.** Holotype specimens (Leme 7175 & Paula) of *Orthophytum graomogolense*.

The two new species proposed here are members of the “subcomplex *mello-barreto*” of the “complex with scapose inflorescence”, which was originally conceived with two species, (Leme 2004), i. e., *O. mello-barreroi* L. B. Sm. and *O. eddie-estevesii* Leme, but the total number was recently raised to three species with the inclusion of *O. schulzianum* Leme & M. Machado. With the new taxa presented in this paper, “subcomplex *mello-barreto*” now comprises five species, which reinforces the importance of this subcomplex and suggests the need of a careful evaluation in order to verify whether it deserves a formal status (e.g., subgenus status) inside *Orthophytum*.

*Orthophytum graomogolense* Leme & C. C. Paula, sp. nov. **Type:** Brazil, State of Minas Gerais, Grão-Mogol, near the intersection with the road to Cristália, margin of It-





**Figure 3.** Population of the paratype specimens (Leme 7191 & Paula) of *Orthophytum graomogolense* acambiraçu river, near the bridge, terrestrial on sandy soil among quartzite outcrops of Campos Rupestres, 16°35'54"S, 42°54'11"W, 650 m elev., 9 Aug. 2007, E. Leme 7175 & C. C. Paula (Holotype, HB. Isotype, RB).

A *O. mello-barreto* L. S. Sm., cui affinis, laminis foliorum longioribus, scapo 25-28 cm longo, inflorescentia prope basin subdense florida, bracteis floriferis longioribus altitudinem sepalorum sub aequantibus, floribus longioribus, sepalis anguste lanceolato-triangularibus longioribusque, petalis longioribus et antheris longioribus differt.

**Plant** terrestrial, stemless to short caulescent before anthesis, ca. 40 cm high at anthesis, propagating by basal rhizomes, but without shoots originated from the inflorescence. leaves 6 to 10, laxly rosulate and forming a distinct rosette before anthesis and afterwards, the upper leaves not distinguishable from the scape bracts; **sheaths** inconspicuous, subreniform, ca. 5.5 x 1.5 cm, strongly corrugate; **blades** sublinear-attenuate, long-caudate, 38-90 cm long, 3-4 cm wide at the base, ca. 2 mm thick near the



**Figure 4** Close up of the holotype specimen (Leme 7175 & Paula) of *Orthophytum graomogolense*

base, coriaceous, suberect-arcuate, distinctly channeled toward the base mainly under water stress, nearly flat toward the apex, dark red, densely adpressed and coarsely white-lepidote abaxially to glabrescent, nerved, adaxially glabrous, margins strongly revolute mainly under water stress, subdensely to laxly spinose, spines narrowly-triangular, acicular, prevailingly spreading, castaneous toward the apex, glabrous, 3-4 mm long, ca. 2 mm wide at the base, 5-12 mm apart. **Scape** erect, greenish to bronze colored, densely white-lanate, 25-28 cm long, 0.8-1 cm in diameter, sulcate; **scape bracts** foliaceous and not distinguishable from the leaves, not covering the scape. **Inflorescence** bipinnate except for the inconspicuously simple extreme apex, subellipsoid to capitate, erect, ca. 9 x 4 cm (not including the primary bracts), fascicles subdensely (basal ones) to



densely arranged (upper ones), 1-1.5 cm apart (basal ones), rachis ca. 0.8 cm in diameter, slightly flexuous, sulcate, terete, green, densely white-lanate; **primary bracts** strongly spreading or nearly so, many times longer than the fascicles but reduced in size toward the inflorescence apex, the basal ones foliaceous to subfoliaceous and resembling the scape bracts, the upper ones narrowly ovate-triangular, long acuminate-caudate, 8-16 x 2.8-3.2 cm, densely and coarsely white-lepidote on both sides to glabrescent, greenish toward the base and dark red toward the apex, distinctly nerved abaxially, densely to laxly spinulose, spines narrowly triangular, acicular, 2-4 mm long, ca. 1.5 mm wide at base, 2-10 mm apart, prevailing spreading; **fascicles** ca. 7, polystichously disposed, suberect, sessile, subflabellate-pulvinate, 35 x 15-20 mm (excluding the petals), 3- to 4-flowered; **floral bracts** of the fascicles narrowly ovate-triangular, acuminate and ending in a short, acicular mucron, distinctly carinate mainly toward the apex, slightly shorter than the sepals, suberect, apple green, finely nerved, glabrous except for the densely white-lanate apex and apical keel, 28-30 x 10-15 mm, thinly coriaceous toward the apex and along the keel and membranaceous toward the base and the margins, margins densely spinulose at the middle, spines ca. 0.6 mm long; **flowers** 38-40 mm long (including the petals), sessile, densely arranged, odorless; **sepals** narrowly triangular-lanceolate, subsymmetrical, apex acuminate and shortly acicular-mucronulate, 23-25 x 4-5.5 mm, free, margins entire, pale green except for the hyaline membranaceous margins, glabrous except for the densely white-lanate apex, the posterior ones alate-carinate, with keels decurrent on the ovary, keels irregularly spinulose to crenulate toward the apex, the anterior one ecarinate; **petals** sublinear-subspathulate, obtuse-cucullate, 27-31 x 4.5-5 mm, free, erect at anthesis and forming a tubular corolla, green except for the white apex, bearing 2 irregularly and broadly laminate, irregularly lacinate-crenulate appendages ca. 4 mm above the base, as well as 2 conspicuous longitudinal callosities nearly equaling the antepetalous filaments; **filaments** terete, green, the antepetalous ones ca. 18 mm long, adnate to the petals for ca. 14 mm, the antesepalous ones ca. 20 mm long, free; **anthers** linear, ca. 5 mm long, slightly laterally complanate, the base obtuse, apex obtuse and inconspicuously and finely apiculate, dorsifixed at the middle; **pollen** subelliptic, sulcate, exine broadly reticulate at the middle with polygonal lumina, muri narrowed, near the poles the exine is microreticulate to perforate, muri thickened; **stigma** weakly conduplicate, ca. 1.5 mm in diameter, white, blades obtuse, slightly recurved, margins densely papillose; **ovary** ca. 8 mm long, ca. 7 mm in diameter at the apex, trigonous, glabrous, green; **epigynous tube** inconspicuous; **placentation** central; **ovules** obtuse, numerous. **Fruits** unknown.

Despite the generally much larger stature of *Orthophytum graomogolense* which puts it apart from all known members of “subcomplex *mello-barreto*”, it represents a closer morphological affinity with *O. mello-barreto*. However, this new species differs from *O. mello-barreto* by the following features: much larger size when in bloom (ca. 40 cm high vs. 14-18 cm high, not including the extended leaves); many times longer leaf blades (38-90 cm vs. 12-14); longer scape (25-28 cm vs. 6-8 cm); inflorescence subdensely flowered at the base, with the flower fascicles slightly apart from each other (vs.



**Figure 5.** The natural variation in the general aspect of *Orthophytum graomogolense* includes green-leafed and this densely white-lepidote specimen observed in the type locality. However, in all cases the floral details retained the typical morphological pattern.

densely flowered throughout); floral bracts nearly equaling sepals length (vs. equaling the middle of the sepals) and longer (28-30 mm vs. 12-15 mm); flowers longer (38-40 mm vs. 28-31 mm); sepals narrowly triangular-lanceolate (vs. suboblong) and longer (23-25 mm vs. 13-15 mm); petals longer (27-31 mm vs. 23-26 mm), and by the longer anthers (ca. 5 mm vs. 2-2.5 mm).



*Orthophytum graomogolense* was identified by Wanderley & Forzza (2003) as *O. compactum* L. B. Sm., which is a clearly distinct species from the region of Nanuque, Minas Gerais, close to the boarder with Bahia. In contrast to *O. graomogolense*, which forms comparatively small scattered populations in the domain of the “Campos Rupestres” on sandstone outcroppings or on sandy soils, *O. compactum* is observed forming large compact populations on shallow soils on granite surfaces of the inselbergs relatively close to the coast in the domain of the Atlantic Forest. The leaf and floral morphogology of *O. compactum* is even more distinct, mainly due to the rosulate fascicles with polystichously disposed flowers (vs. subflabellate fascicles), larger number of flowers per fascicle (8 to 12 flowers vs. 3 to 4 flowers), smaller flowers (ca. 30 mm vs. 38-40 mm long), smaller sepals (ca. 16 mm vs. 23-25 mm long), smaller petals (ca. 23 mm vs. 27-31 mm long), completely white (vs. green toward the base), with a subobtusate and distinctly apiculate apex (vs. obtuse-cucullate apex), forming a narrow campanulate corolla (vs. tubular, clavate corolla), with basal bladeless cupulate appendages (vs. distinctly laminate appendages).

The preliminary observations on field populations of *O. graomogolense* suggest it is a quite variable species in its general vegetative appearance. Sometimes, the typical red-leaved plants can be seen growing side by side with green-leaved specimens. Specimens with very densely white-lepidote leaves, scape bracts and primary bracts were also observed, but in all cases the floral details consistently show the typical morphological pattern indicated in the description. The same pattern of leaf variation has been observed in other *Orthophytum* species like *O. macroflorum* Leme & M. Machado (Leme and Machado 2005), which suggest the need of precaution in the evaluation of taxa delimitation.

Paratype: Brazil, State of Minas Gerais, Grão-Mogol State Park, Trilha do Váu, right margin of Ribeirão do Inferno, terrestrial on sandy-rocky quartzite soil of Campos Rupestres, 16°34'77"S, 42°53'47"W, 745 m elev., 11 Aug. 2007, E. Leme 7191 & C. C. Paula (HB).

*Orthophytum piranianum* Leme & C. C. Paula, sp. nov. **Type:** Brazil, State of Minas Gerais, Grão Mogol, Trilha do Barão toward the Pico do Pagão, terrestrial on sandy soil among quartzite outcrops of the Campos Rupestres, 16°33'18"S, 42°53'42"W, 919 m elev., 10 Aug. 2007, E. Leme 7189 & C. C. Paula. Holotype: HB. Isotype: RB.

A *O. mello-barreto* L. B. Sm., cui affinis, laminis foliorum utrinque dense et grosse albo-lepidotis, bracteis floriferis dense et grosse albo-lepidotis sed apice haud lanato, manifeste suberecto-recurvatis, altitudinem sepalorum aequantibus, longioribus et latioribus, sepalis anguste lanceolato-triangularibus apice haud lanatis et ovario dense albo-sublanato differt.



Figure 6. The holotype specimen (Leme 7189 & Paula) of *Orthophytum piranianum* at type locality.

**Plant** terrestrial, stemless, ca. 19 cm high at anthesis, propagating by basal rhizomes, but without shoots originated from the inflorescence. **Leaves** ca. 12, laxly rosulate and forming a distinct rosette before anthesis and afterwards, the upper leaves not distinguishable from the scape bracts; **sheaths** inconspicuous, strongly corrugate; **blades** narrowly triangular-attenuate, long-caudate, 15-16 cm long, ca. 3 cm wide at the base, ca. 1 mm thick near the base, coriaceous, subspreading-recurved, distinctly channeled throughout mainly under water stress, completely covered on both sides by coarse cinereous





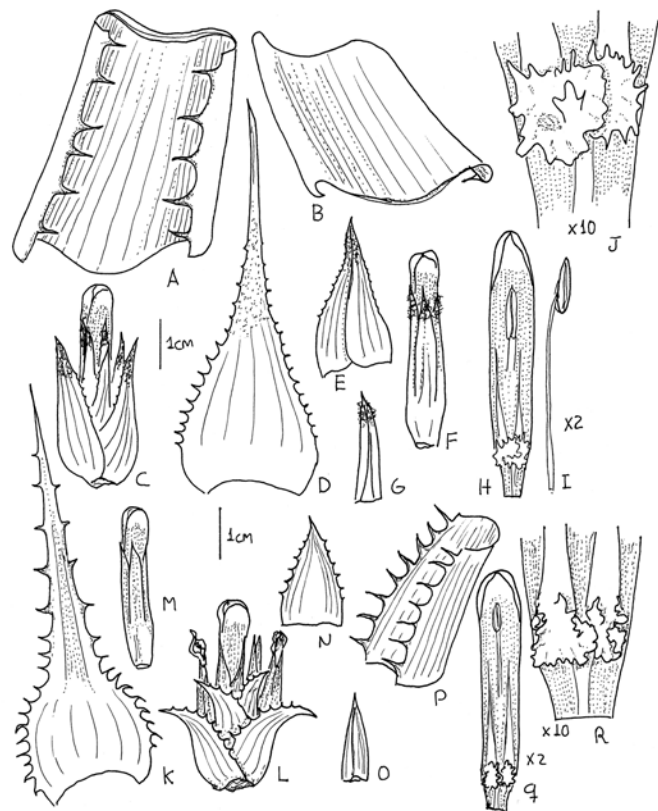
Figure 7. Close up of the holotype specimen (Leme 7189 & Paula) of *Orthophytum piranianum*

trichomes which obscure the pale bronze color of the leaves, nerved abaxially, margins upright, straight, subdensely to densely spinose, spines narrowly-triangular acicular, prevailingly spreading-retrorse, yellowish at the apex, densely white-lepidote at base, 2-3 mm long, ca. 1.5 mm wide at the base, 3-7 mm apart. **Scape** erect, pale bronze colored, densely and finely white-lanate, ca. 9 x 0.6 cm in diameter, slightly sulcate; **scape bracts** foliaceous and not distinguishable from the leaves, not covering the scape. **Inflorescence** bipinnate except for the simple extreme apex, capitate, erect, ca. 4 x 3.5 cm (not including the primary bracts), fascicles densely arranged, rachis not visible; **primary bracts** strongly spreading-recurved, longer than the fascicles, with a greenish, suborbicular base and a bronze-colored, narrowly triangular-attenuate, canaliculate, acuminate-caudate blade, densely and coarsely cinereous-lepidote on both sides, distinctly nerved abaxially, the basal ones 3 to 4 times longer than the fascicles (excluding the petals), the upper ones twice as long as the fascicles (excluding the petals), margins densely (at the base) to laxly (toward the apex) spinose, spines prevailingly spreading-retrorse, narrowly triangular-acicular, 1.5-3 mm long, ca. 1 mm wide at base, 2-6 mm apart; **fascicles** ca. 4, polystichously disposed, suberect, sessile, subflabellate-pulvinate,

ca. 27 x 25 mm (excluding the petals), 4- to 5-flowered; **floral bracts** ovate-triangular, acuminate and ending in a short, acicular mucro, distinctly carinate, about equaling the sepals but distinctly recurved toward the apex and exposing the sepal apex, apple green, finely nerved, abaxially densely and coarsely white-lepidote throughout, adaxially densely and coarsely white-lepidote toward the apex, 20-24 x 12-16 mm, thinly coriaceous toward the apex and along the keel, membranaceous toward the base and the margins, margins densely and coarsely spinose toward the apex, spines 1-1.2 mm long, the floral bracts of the simple part of the inflorescence slightly longer than the sepals, ecarinate, marginal spines ca. 2 mm long; **flowers** 31-33 mm long (including the petals), sessile, densely arranged, odorless; **sepals** narrowly triangular-lanceolate, subsymmetrical, apex acuminate and shortly acicular-mucronulate, 18 x 4.5-5 mm, free, margins entire, pale green except for the hyaline membranaceous margins, subdensely to densely and coarsely white-lepidote abaxially, the posterior ones alate-carinate, with the keels decurrent on the ovary, keels entire, the anterior one ecarinate; **petals** sublinear-subspathulate, obtuse-cucullate, 24-25 x 4.5-5 mm, free, erect at anthesis and forming a tubular corolla, green except for the white apex, bearing 2 irregularly lacerate-crenulate, obovate to suborbicular-laminate, prevailingly downwardly oriented appendages ca. 4 mm above the base, as well as 2 conspicuous longitudinal callosities distinctly shorter than the antepetalous filaments; **filaments** terete, greenish, the antepetalous ones ca. 16 mm long, adnate to the petals for ca. 9 mm, the antesepalous ones ca. 17 mm long, free; **anthers** suboblong, ca. 2.5 mm long, strongly laterally complanate, the base obtuse, apex obtuse and inconspicuously apiculate, dorsifixed at 1/3 of its length above the base; **pollen** oblong-elliptic, sulcate, exine microreticulate to perforate throughout, muri thickened; **stigma** ca. 1.5 mm in diameter, white, blades weakly conduplicate, obtuse, spreading-recurved, margins densely papillose; **ovary** ca. 5-6 mm long, ca. 4.5 mm in diameter at the apex, trigonous, densely white-sublanate, white; **epigynous tube** inconspicuous; placentation apical; ovules obtuse, numerous. **Fruits** unknown.

The close morphological resemblance of *Orthophytum piranianum* with *O. mello-barretoii* justified its identification done by Wanderley & Forzza (2003) as being the latter one. However, the comparison of this new species with flowering specimens of typical *O. mello-barretoii* from type-locality (Jaboticatubas, Serra do Cipó, Minas Gerais; unpublished data), revealed important distinctive features. This new species can be distinguished from its close relatives by leaf blades densely and coarsely white lepidote on both sides (vs. adaxially densely and coarsely white-lepidote near the base and subdensely white-lepidote to glabrescent toward the apex), floral bracts densely and coarsely white lepidote but at the apex not lanate (vs. apex conspicuously white-lanate), distinctly suberect-recurved (vs. erect or nearly so with the calyx), about equaling sepals length (vs. equaling the middle of the sepals) and larger (20-24 x 12-16 mm vs. 12-15 x 8-10 mm), sepals narrowly triangular-lanceolate (vs. suboblong) with apex not lanate (vs. conspicuously lanate at apex), and by the densely white-sublanate (vs. glabrous) ovary.





**Figure 8. (A-J) *Orthophytum graomogolense* Leme & Paula: A) abaxial side of the basal segment of leaf blade; B) adaxial side of the basal segment of leaf blade; C) basal fascicle; D) upper primary bract; E) floral bract of the fascicle; F) flower; G) sepal; H) petal; I) antepetalous filament and anther; J) details of the petal appendages. (K-R) *Orthophytum piranianum* Leme & Paula: K) upper primary bract; L) basal fascicle; M) flower; N) floral bract of the fascicle; O) sepal; P) basal segment of leaf blade; Q) petal; R) details of the petal appendages (drawing E. Leme).**

Because *Orthophytum piranianum* and *O. graomogolense* are sympatric species and their populations may overlap, it is important to establish the morphological differences between them. *O. piranianum* differs from *O. graomogolense* by its much shorter stature (ca. 19 cm high vs. ca. 40 cm high), shorter leaf blades (15-16 cm long vs. 38-90 cm long) with upright margins (vs. margins strongly revolute mainly under water stress) and bearing comparatively shorter spines (2-3 mm long vs. 3-4 mm long), scape shorter (ca. 9 cm long vs. 25-28 cm long), inflorescence shorter (c. 4 cm long vs. ca. 9 cm long) and more compact (vs. basal fascicles subdensely arranged), floral bracts shorter (20-24 mm long vs. 28-30 mm long) strongly recurved (vs. suberect), densely white-lepidote throughout (vs. densely white-lanate at apex) and distinctly spinose with spines 1-1.2 mm long (vs. spinulose at middle with spines ca. 0.6 mm long), flowers shorter (31-33 mm long vs. 38-40 mm long), sepals shorter (cs. 18 mm long vs. 23-25 mm long) and subdensely to densely and coarsely white lepidote throughout (vs. glabrous except for the densely white-lanate apex), and by the anthers shorter (cs. 2.5 mm long vs. ca. 5 mm long).

On the other hand, when compared to the preferable habitat of *O. graomogolense*, *O. piranianum* was encountered in higher altitudes on sandy to rocky soils or on accumulated organic material on sandstone outcrops of the “Campos Rupestres”, in full exposed areas or more often under the partial shade protection of shrubs. Most of the observed individuals were scattered in the area and not forming comparatively large populational groups of plants like those of *O. graomogolense*.

This new species honors the botanist José Rubens Pirani from the Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, for his monumental botanical research on the Flora of Grão-Mogol, where this new species was discovered.

### Acknowledgments

We would like to thank the Instituto Estadual de Florestas de Minas Gerais – IEF-MG, for providing the research permit and logistical support for the investigation conducted here. We are also grateful to the Director of Grão-Mogol State Park, Carla Cristina de Oliveira Silva, for her valuable support during field activities, as well as the Park Ranger Wagner Souza Carvalho, for guiding us to the most hard-to-reach sites of the Park and for field assistance.

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## Bromeliaceae of Rio São João Mangrove, Cabo Frio, Rio De Janeiro, Brazil

Cláudio Coelho de Paula, Renato Ramos da Silva & Tereza Kolontai

**Abstract:** This work is an assessment of the family Bromeliaceae of Rio São João mangrove, Cabo Frio, RJ, Brazil—the project being sponsored by the Tauá Reserve. A species discussion is presented. Twelve species were found, five belonging to the subfamily Tillandsioideae: *Tillandsia gardneri*, *Tillandsia stricta*, *Tillandsia usneoides*, *Vriesea flammea* and *Vriesea procera* var. *procera*; and seven to the subfamily Bromelioideae: *Aechmea bromeliifolia*, *Aechmea floribunda*, *Aechmea patentissima*, *Aechmea nudicaulis*, *Billbergia zebrina*, *Bromelia antiacantha* and *Quesnelia quesneliana*.

**Key-words:** Bromeliaceae, mangrove, Rio São João, Cabo Frio

The Brazilian coast is 9,200 km long and in the coastal vegetal physiognomies, the mangrove — a tropical ecosystem of utmost ecological importance — is widely distributed, occurring from the state of Santa Catarina to Amapá, extending to the French Guiana as well as to other continents. Two types of mangrove environment can be found in Brazil, the “mangue” feature and the “apicum” feature. The “mangue” is the typical environment of this ecosystem, presenting mobile soil. The “apicum” are the old “mangue” currently found in higher areas of the landscape in which flooding no longer occurs, leading to the formation of a consistent soil (Schaeffer-Novelli 2002). The mangrove tree stratum is basically three species: *Rhizophora mangle* L., *Avicennia tomentosa* Jacq. and *Laguncularia racemosa* (L.) C.F.Gaertn. Their sizes range from 25 m

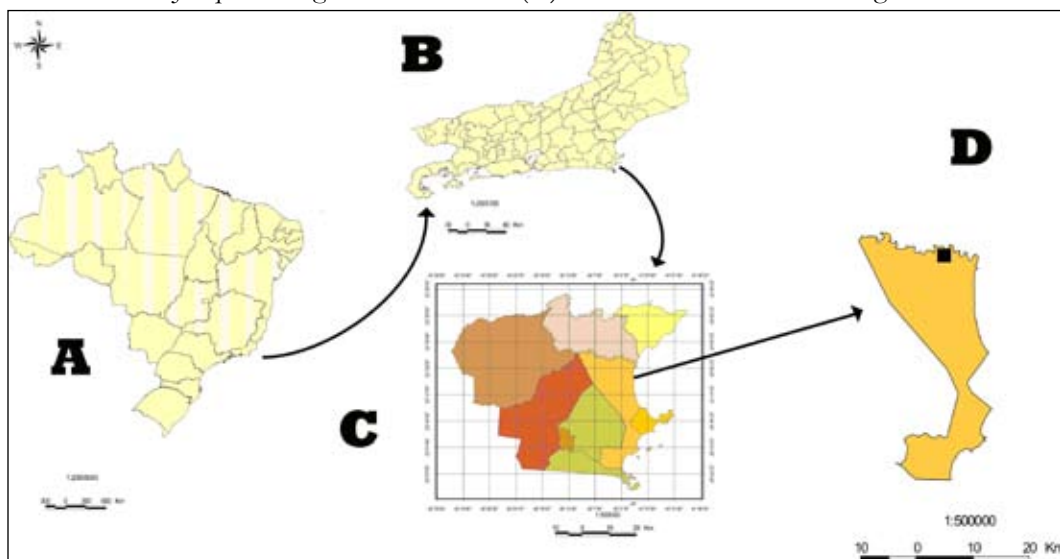


Figure 1: (A) Brazil and its state borders. (B) Rio de Janeiro and its municipality borders. (C) Region of Cabo Frio. (D) Municipality of Cabo Frio and collection site cited in this work.

high in the southeast Brazil to 40 m high in the north along the coast (Rizzini, Coimbra-Filho et al. 1991).

The high humidity and salt content in the mangrove soils have made survival difficult for a great diversity of phanerophyte plants that need strategies for surviving in an anoxide and salubrious environment. Lenticels, breathing roots and “escora” are adaptations that allow vegetation to remain in this environment (Rizzini, Coimbra-Filho et al. 1991, Mantovani 2002). The Bromeliaceae family is of major importance in the mangrove environment. Due to mangrove’s proximity to Atlantic rain forest, these habitats have many species in common. Despite its poor flora diversity, fauna is highly diversified, especially that of birds and invertebrates (Rizzini, Coimbra-Filho et al. 1991).



Figure 2. *Aechmea bromeliifolia*.

Rio de Janeiro coast lies at a transition area between two great coastal regions: the Rio Grande do Sul coastal lowlands and the coastal lowlands at the mouth of Rio Doce, Espírito Santo. Due to its proximity to the major centers of research in the southeastern area, the flora of Restinga from Rio de Janeiro is one of the best known in this country (Araújo 2000).

The Cabo Frio region is considered a center of plant diversity, sheltering 65 % of the species listed as endemic for the Restingas in the state of Rio de Janeiro (Araújo 2000). Based on the fact that previous floristic assessments did not differentiate mangroves from Restingas proper, there is an information gap about the species restricted to the mangrove environment. Thus, this work aimed to contribute to the specific knowledge of the Bromeliaceae family in the Rio São João mangrove area.

This work is part of a study on the family Bromeliaceae of the Restinga in the Cabo Frio region, sponsored by the Tauá Reserve.

### Material and Methods

Rainfall in the Cabo Frio region is lower than in the remaining southern coast. Cabo Frio Weather Station data show an annual precipitation of 823 mm, mean temperature



of 23° C, air relative humidity of 83%. The climate in the Cabo Frio region can be classified as a variation of warm semi-arid climate, Bsh de Koeppen (Araújo 2000). The collecting site in Rio São João mangrove is around three hectares and is located in the Second District in the municipality of Cabo Frio, Rio de Janeiro, Brazil (Figure 1). Approximately two thirds of the collecting site fits the “apicum” feature and a third of it the “mangue” feature. The arboreal vegetation ranges from 7 to 15 m in both the features. Its undergrowth is mainly bushes, terrestrial bromeliads and grasses as well as epiphytes (Orchidaceae, Araceae and, mainly, Bromeliaceae).

The sampling area was visited through the existing trails where one inflorescence and one leaf from fertile state plants were collected. Seedlings were collected and cultivated in the greenhouse of the Center for Research and Conservation of Bromeliaceae (UPCB – UFV). As soon as these plants flourished they were herbalized. All the material collected was duly deposited at the Herbarium VIC in the Department of Vegetal Biology of the Universidade Federal de Viçosa. This material was identified through available taxonomic keys, comparison and other exsiccate as well as specialist help. Plant drawings were made, showing their habit and reproductive character diagnosis.

## Results

Twelve Bromeliaceae species were collected in the Rio São João mangrove. The subfamily Tillandsioideae has five species belonging to the genera *Tillandsia* and *Vriesea*. The subfamily Bromelioideae presents seven species of the genera *Aechmea*, *Billbergia*, *Bromelia* and *Quesnelia*. No species of the subfamily Pitcairnioideae was observed (Table 1).

## Discussion

*Aechmea floribunda* may be considered the most abundant species in this mangrove. plants display, in general, one to two rosettes, with leaves to 1.5 m long. Populations with few individuals are sparsely distributed in the inferior stratum of the arboreal vegetation. It is an epiphytic species and lives 1.0 m from the soil, on trees over 5.0 m tall. It was also observed as terrestrial in areas with “apicum” features. *Aechmea patentissima* has a population with a few individuals dispersely distributed. It occurs in dense clumps with various rosettes, many of which are associated to the Orchidaceae, forming densely entangled adventitious roots near the rosettas. In “mangrove” areas it occurs as epiphytic from near the tide limit, with some crab species being observed

### Tillandsioideae

*Tillandsia gardneri* Lindl.

*Tillandsia stricta* Sol. ex Ker Gawl.

*Tillandsia usneoides* (L.) L.

*Vriesea flammea* L.B.Sm.

*Vriesea procera* var. *procera* (Mart. ex Schult. & Schul. f.) Wittm.

### Bromelioideae

*Aechmea bromeliifolia* (Rudge) Baker

*Aechmea floribunda* Martius ex Schult. & Schult. f.

*Aechmea patentissima* (Mart. ex Schult. & Schult. f.) Baker

*Aechmea nudicaulis* var. *cuspidata* Baker

*Billbergia zebrina* (Herbert) Lind.

*Bromelia antiacantha* Bertoloni

*Quesnelia quesneliana* (Brongn.) L.B.Sm.

**Table 1: Bromeliaceae Subfamilies (sensu Smith & Downs, 1974; 1977; 1979) and species occurring in Rio São João mangrove**



**Figure 3. *Quesnelia quesneliana*.**

on its rosettes up to 4.0 m high. In the “apicum” feature it is mainly terrestrial but may also occur as epiphytic. This behaviour is what Leme and Marigo (1993) classify as a facultative epiphytism.



**Figure 4. *Bromelia antiacantha***

*Tillandsia stricta* and *Tillandsia gardneri* were observed as epiphytic in both features, being the species with the largest number of specimens in the sampled area. They can be found under different light conditions, from 1.5 m height to tree tops. Curiously, two *Tillandsia stricta* individuals were found epiphytic in *T. usneoides*. *Tillandsia usneoides* forms real “curtains” hanging from the medium and superior strata of large trees, and is regularly found in mangrove areas. *Vriesea flammea* is a typical Atlantic forest species, but it is also found in this mangrove area. This can be explained due to the proximity to the well preserved Atlantic forest of Morro São João, located near the collection site. It was found in a single population with seven rosettes. *Vriesea procera* var. *procera* was found in a low number of individuals (ca. five) in sunny areas of open vegetation.

*Quesnelia quesneliana* occurs in shade areas displaying light green leaves which can be over 1 m long. It occurs over litter in the “apicum” feature and at the transition area of adjacent ecosystems. It sometimes presents groupings with about 40 rosettes. Only one individual of each *Billbergia zebrina* and *Aechmea nudicaulis*, both normally epiphytic, was observed. *B. zebrina* occurs isolatedly in the region of Cabo Frio. It normally displays one or few rosettes per individual, occurring in areas where the dossel allows a higher light incidence. *A. nudicaulis* is a common species in the region and may occur as terrestrial in Restinga areas and open formations over sandy substratum. It presents a





Figure 5. *Aechmea floribunda*.

great phenotypic range, with rather varied leaf coloration and texture.

*Aechmea bromeliifolia* occurs as terrestrial at transition areas (between “mangrove” and “apicum”). It grows in flooded soil, and tolerates salubrious water in high tides. According to Leme and Marigo (1993) *A. bromeliifolia* is broadly distributed and has a large range of ecological adaptations. *Bromelia antiacantha* has populations spread all over the mangrove area. Although occurring in sandy and well-drained areas in the Restingas, it develops in flooded soils in partially shaded mangrove areas.

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## Bringing Bromeliaceae Back to Homeland Botany

Uwe Scharf & Eric J. Gouda

#### Summary

The terms used by Mez (1896, 1934), and Smith & Downs (1974, 1977, 1979), such as “bi-/tripinnate”, “scape” and “inflorescence” for example, in ways that deviate from those proposed by Linnaeus, and other terms used in a non-Linnaean tradition in Bromeliaceae literature (anterior, posterior, actinomorphic, zygomorphic, irregular, imbricate) are presented together with their use in general botany. Furthermore, a catalogue of all parts of a bromeliad plant (Gouda 2007) is published as a guideline to describe, for example, specimens of a new taxon. Definitions of differently understood organs (inflorescence, scape, bi-/tri-pinnate) are given. This article was previously published in German language in *Die Bromelie* 2007(2): 68–73.

Throughout its history, descriptive botany acquired its value by always using the same terms for the same organs. This consistent terminology is the base for a broad and immediate understanding of species descriptions, especially descriptions of new species, and transmits effectively the knowledge from the author to the reader.

Modern descriptive terminology is mainly based on the works of Linnaeus (1707–1778). His perfect drawings are still used as illustrations, e.g. in Stearn (2004: 309, fig. 1). In Germany Johann Wolfgang von Goethe (1749–1832) from Weimar, and Wilhelm Troll (1897–1978), who mainly worked in Halle/Saale and Mainz, developed descriptive botany in the Linnaean tradition towards becoming a finely detailed science (the studies of W. Troll concerning comparative morphology were based on the tradition of von Goethe and thus still on Linnaeus).

While Baker (1889 still used the general morphological terms, with Mez (1934) Bromeliad terminology was led onto a path deviating from that of the main plant terminology. Obviously, some terms were misinterpreted, misunderstood, misused, or even wrongly used by him. Afterwards, the terminology of Mez was copied and used on a broad scale by Smith & Downs (1974, 1977, 1979) for their important monograph of all then known species of Bromeliaceae. Subsequently, these terms were extensively used and multifariously copied by gardeners, bromeliad lovers, enthusiasts, amateurs, and even scientists who based their work on the monograph of Smith & Downs e.g., Gouda (1989).

For bromeliad specialists, these terms do not raise any uncertainties as long as the specialist stays in this field. However, for botanists working in other plant families, the terms of Mez and Smith & Downs cause considerable confusion, because the same terms are used to name different morphological details in other families. Mez and Smith & Downs used terms in botanical Latin and English despite the fact that



descriptive botany was undertaken in Germany long before English-speaking scientists entered the field.

For Bromeliaceae, the basic importance of Linnaen-based works and treatments (Linnaeus 1751, 1789-1791); (Troll 1937-1943, 1954-1957, 1964-1967); (Von Goethe 1790, 1984) is frequently overlooked in recent times due to the presence of the monograph of Smith & Downs.

World communities are coming closer together, and the different fields of botany are interacting more intensively than ever before. The exchange of information takes place much faster than a few decades ago. Therefore, it is very important to speak a common language to avoid the misunderstanding and misinterpretation of genuinely correct information.

In the meantime, some bromeliad specialists have again started to use the main plant terms in their original sense e.g., Gouda (1997), and the first articles explaining why and how the terms are used have appeared e.g., Gouda (2002). In 1998 a provisional catalogue was published by E.J. Gouda on a webpage. Since then, many improvements and replacements have taken place, from which finally the recent version has resulted (Gouda 2007). This catalogue of all parts of a bromeliad plant is a guideline to describe, for example, specimens of a new taxon.

For a description of a bromeliad the same terms should be used as for a description of plants of other families. The following can be considered the main organs: 1. roots; 2. stem; 3. (vegetative) innovation zone, stolons/runners with bracts, addorsed prophyll; 4. leaf, 4a. leaf sheath, 4b. leaf blade, lamina, 4c. leaf margin (with marginal teeth); 5. inflorescence, floral region, 5a. peduncle, basal/sterile/unbranched part of the inflorescence with peduncle bracts, 5b. apical/fertile/branched part of the inflorescence with 5b1. bracts along main axis/rachis in branched part (spike bracts), 5b2. side-branches = spikes (of first, second, ... order), 5b3. floral bracts; 6. flower, 6a. sepals (forming the calyx), 6b. petal with 6b1. claw (part of the petals that is covered by the sepals), 6b2. throat, 6b3. blade of petal, 6c. stamen with 6c1. filament and 6c2. anther, 6d. pistil with 6d1. ovary (inferior: develops mostly into a berry, superior: develops mostly into a capsule), 6d2. style, and 6d3. stigma (with stigmatic lobes); 7. fruit (capsule or berry); 8. seeds.

In the following table, the terms used by Mez (1896, 1935) and Smith & Downs (1974, 1977, 1979) in a deviating way (bi-/tripinnate, scape, inflorescence) and other incorrect uses in Bromeliaceae are explained and presented together with their use in general botany. Definitions of differently understood organs (inflorescence, scape, bi-/tri-pinnate) are given after the table.

**An inflorescence** consists of all parts of the plant that are genuinely connected with the sexual organs or fruits and developed for their presentation during anthesis (for pollination) and fructification (for distribution of the seeds). In contrast to a vegetative plant (bearing roots, stems, leaves, vegetative innovation

term	correct application	misused in bromeliad literature for	and means (erroneously)
anterior	applicable only in strongly zygomorphic flowers, but even there it remains doubtful	description of sepals	abaxial (= the side away from the axis), inapplicable in long and/or twisted pedicels
posterior	see anterior	description of sepals	adaxial (= the side towards the axis), inapplicable in long and/or twisted pedicels
pinnate	description of compound leaves with leaflets arranged on opposite sides of an elongated axis or of a certain venation pattern	description of the architecture of the fertile part of the inflorescence	not used this way, but see bi- and tri-pinnate, an unbranched inflorescence is a spike or a raceme
bipinnate	twice pinnate (leaves), see above	branched inflorescence even if not in one plane	side-branches of first order, once-branched
tripinnate	pinnately compound three times, with pinnate pinnules (leaflets)	see bi-pinnate	side-branches up to second order, twice-branched
quadripinnate	pinnately compound four times, with pinnate pinnules (leaflets)	see bi-pinnate	side-branches up to third order, thrice-branched or three times branched
scape	leafless peduncle arising from ground level (usually from a basal rosette) in acaulescent plants (e.g. Amaryllidaceae)	the basal part, the sterile portion, the stalk of an inflorescence	peduncle
scape-bracts	non existent, non extant	bracts on a scape (a peduncle is meant, see under scape)	peduncle-bracts
inflorescence*	all organs for displaying flowers or fruits, including the sterile parts, e.g., peduncle and stalk	apical part of the inflorescence from the first branch on	fertile part of the inflorescence
zygomorphic	descriptive term for flower symmetry, means bilaterally symmetrical, e.g. flowers of Lamiaceae or Fabaceae	description of petals and sepals	sepals or petals are asymmetric, propeller-like
actinomorphic	descriptive term for flower symmetry, means radially symmetrical, e.g. flowers of Ranunculaceae (the majority of Bromeliaceae has actinomorphic flowers)	description of petals and sepals	sepals or petals are symmetric (also flowers with asymmetric sepals or petals can be actinomorphic, compare flowers of Apocynaceae)
irregular	means 'without rule or order', doubtful term, applicable only for description of repeatedly arranged organs like flowers or leaves along an axis or of irregular distribution of structures or organs on a surface (e.g. hairs)	description of the shape of organs, i.e. sepals and petals	1. asymmetric, 2. correct description of the shape, e.g. by comparing the organ with similar structures elsewhere, 3. many-shaped, from ... to ...
thyrsus, thyrsoïd	type of inflorescence with terminal flower at the branches (doesn't exist in Bromeliaceae)	description of inflorescences where the branches emerge close to each other and bend upwards	panicle fascicled, clustered, broom-like
imbricate #	described organs are arranged like tiles on a roof, i.e. overlapping each other	description of appressed bracts loosely arranged along the peduncle	bracts appressed to the peduncle





Figure 1. Types of compound leaves as illustrated in Linnaeus, *Philosophia botanica* (1751), from Stearn (2004: 309): 63. binatum, 64. ternatum foliolis sessilibus, 65. do. petiolatis, 66. digitatum, 67. pedatum, 68. pinnatum cum impari, 69. pinnatum abruptum, 70. do. alternatim, 71. do. interrupte, 72. do. cirrhosum, 73. do. conjugatum, 74. do. decursive, 75. do. articulate, 76. lyratum, 77. biternatum, duplicato-ternatum, 78. bipinnatum, (Sauvag.), duplicato-pinnatum, 79. triternatum, triplicato-ternatum, 80. tripinnatum (Sauvag.), sine impari, 81. do. cum impari.

zones only) a fertile plant bears an inflorescence, which comprises a sterile part (peduncle, flower stalk), branches within the inflorescence (if present), reduced leaf-like structures (bracts), and flowers or fruits – in addition to the vegetative parts.

In bromeliads inflorescences are constructed of spikes (flowers sessile) or racemes (flowers on a stalk) or compound structures of them (panicle) or reduced to 1-flowered spikes. The arrangement of the flowers along the axis (or rachis) is usually spirostichous (spirally arranged) or distichous (two rows, opposite to each other). Rarely organs are arranged polystichously (in rows above each other, seen from the top), like in the leaves of *Tillandsia pentasticha* Rauh & Wülfingh. or *T. tomekii* L. Hrom. This was confused frequently. Mostly spirostichous was meant when e.g., Smith & Downs wrote “polystichous”.

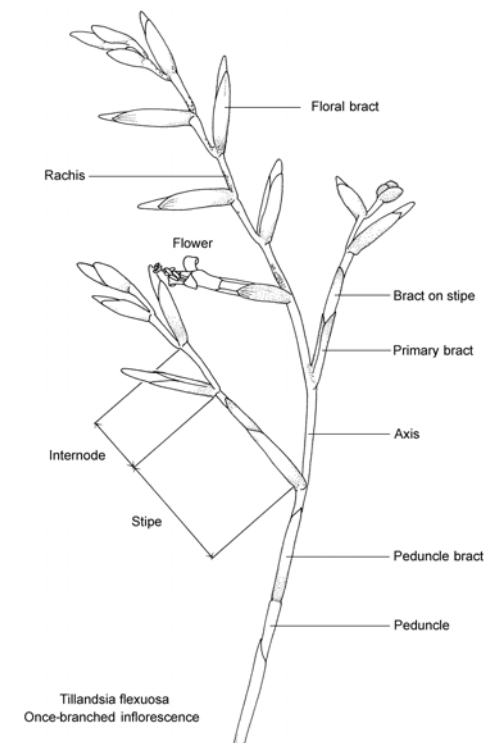


Figure 2. Parts of a bromeliad inflorescence. Drawing by E.J. Gouda.

A *scape* is the part of an inflorescence between a (more or less clearly visible) leaf rosette and the (clustered) flowers. The character of a scape is the absence of nodes and therefore, necessarily the absence of leaves and bracts. Well known examples are, e.g., onion, garlic, leek and their relatives (*Allium*), the African Lily (*Agapanthus*), Snowdrops (*Galanthus*), Daffodills (*Narcissus*), Knight's Star (*Hippeastrum*, traded under the wrong name “Amaryllis”), and Hyacinth (*Hyacinthus*).

**Word combinations with “...pinnate”** are terms used for the description of compound leaves. With pinnate (= feather-like, with feathers) an leaf-axis (rachis or rachis) with leaflets at both sides is described, no matter, if this axis is terminated with a terminal leaflet or not. Examples are:

**pinnate:** False Acacia or Black Locust (*Robinia pseudoacacia*), Vetches (*Vicia* spp.);

**bipinnate:** Male Fern (*Dryopteris filix-mas*);

**tripinnate:** Lady Fern (*Athyrium filix-femina*).

A further use of pinnate is to describe venation patterns, e.g., the leaf of the banana (*Musa*) or the Bird-of-Paradise Flower (*Strelitzia*) is pinnately veined.

The correct way to describe compound inflorescences is to count the order of the side branches. Bromeliad inflorescences are always a spike or a raceme (only main axis) or represent a compound inflorescence (panicle, with side branches). Examples:

(unbranched) spike/raceme (e.g., *Vriesea splendens*, *Tillandsia xiphioides*),

panicle with side branches 1st order (e.g., *Tillandsia grandis*, *T. oerstadiana*),  
panicle with side branches up to 2nd order (e.g., *Tillandsia extensa*, *T. samaiipatensis*).

**The term “imbricate”** includes that the described organs overlap each other clearly, other organs below these imbricate structures (e.g., the peduncle or rhachis) are completely covered and conclusions about their structure and look-alike are impossible without removing the imbricately arranged organs. Examples are e.g., the floral bracts in the fertile part of the inflorescence in *Vriesea splendens* and the cataphylls along the stolons of *Aechmea distichantha*.

### Acknowledgements

The differing use of scientific terms in Bromeliaceae has been a problem for a number of years, but W. Till (WU) forced us to revise the situation and to publish the results. We thank him for his support. The preparation of this article involved numerous discussions and voluminous email exchanges with botanists working in various fields, whose opinions contributed substantially to the article. We are grateful to all those who took part.

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### Cultivation

### *Vriesea gravisiana* – the Terrible Twins!

#### Derek Butcher, Cultivar Registrar

Ever since I took over the Registrar's job I have pondered how the names "*Vriesea Gravisiana*" and "*Vriesea gravisiana*" can be in the Cultivar Register 1998 AND the binomial listing for species! I did have a botanical painting I had got from Gilbert Samyn of the Research Station at Melle in Belgium in the early 1990's. But it was a simple inflorescence not compound as in the description in Smith & Downs. As I had no way of checking this out it stayed in the too-hard basket. Some may say but nobody grows any plant with this name on the label – but you never know! Thanks to Leo Dijkgraaf from the Netherlands I now have scans of the articles concerned. 1890 was a bad year because *Vriesea gravisiana* was described in Belgium and in the same year in Germany a *Vriesea gravisiana* was described for a different plant.

I know that we had problems with two *Tillandsia mubrii* in the 1980's but it only took a few years to solve the problem. Here it has taken 117 years to find out that there was a problem! Let us look at the one with a simple inflorescence first because we are at least told it was a hybrid. The following is my translation from the French ( I have kept the French version in case anyone wants to check my translation!).

*Vriesea Gravisiana* (Hybr) Hort by J Closon in Revue de l'horticulture Belge et d'étrangere. vol.16 : 49. 1890

"In the last years of his life, the late Professor Éd. Morren, crossed *Vriesea psittacina* var. *Morreniana* Ed. Morr. with the pollen of *Vriesea Barilleti* Ed. Morr. a type species that had been introduced from the republic Ecuador. The seeds that resulted from this hybridization, were sowed and grown by M. J. Marechal, gardener in chief at the botanical institute of the Liege university. In the winter 1888-89, a certain number of these seedlings flowered: these were, for the most part, very beautiful plants that received the name of *Vriesea leodiense*. This winter, the remaining of the seedlings flowered. Among these, decorated with flowers was a very distinct plant constituting a novelty that was dedicated to Mr. Gravis, Director of the botanical institute of Liege and that got a certificate of merit at the last horticultural meeting at Gand. The plant, which Mr. Pannemaker has given us so good a reproduction, has an elegant shape with flowers well proportioned, where the colours red and yellow complement in the most pleasant way.

The scape is erect, robust, ending with a distichous spike, covered with flowers that are especially brought closer together as in all hybrids coming from *Vriesea psittacina* var. *morreniana* <sup>1</sup>. Its leaves, very shiny and with a charming nuance, are arranged like those of *Vriesea barilleti* in an elegant basket from where the inflorescence emerges. The bracts are in the shape of hull, are of a vivacity of colour that recalls that of *V. psittacina*. The flowers are a lively yellow and are arranged on an intense crimson rachis. his hybrid will be a big resource for the temperate greenhouse decoration as well as an ornament for apartments where all will enjoy this marvel. Let us add that flowering continues for several months; it is therefore in all ways a novelty of the future.

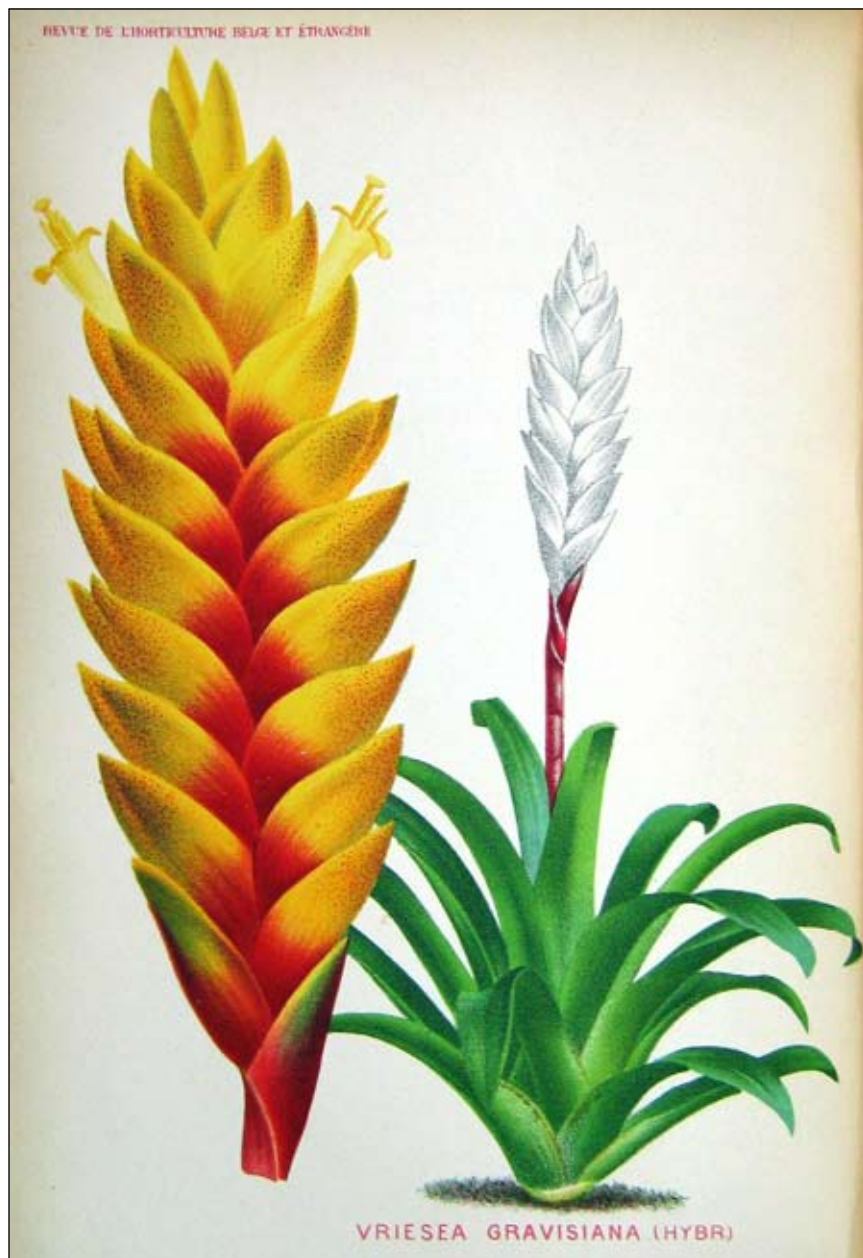


Figure 1. *Vriesea Gravisiana* (Morren) - painting from *Revue de l'horticulture Belge et d'étrangere*. vol.16 : 49. 1890

<sup>1</sup>Botanists know that the closeness of the bracts is a clear cut character of *V. psittacina* var. *moreniana*, a character that comes from the effective hybridization that has the help of *Vriesea brachystachis*?

Let us now look at the supposed species that even Lyman Smith suggests is a hybrid too!

*Vriesea gravisiana* Wittm. n. sp. *Gartenflora* 39: 494-5. figs 81, 82. 1890

“Plant large, 1,25-1,50 m. high, including the inflorescence: Leaf-rosette 1 m diameter; Leaves about 50, broad straplike; not very wide at the base, the end abrupt with a short bent over tip, the sheath dark purple brown, almost black brown, the blade light grey green, unclear darker green fenestrated, both sides smooth and shiny, ca. 50cm long, in the middle about 6 cm wide.

The inflorescence, after discussion with Herr. Prof. Dr. Gravis, has four regions: 1. the bottom, about 60cm long, green, with stem of spiralling scape bracts without flowers, 2. a green, spirally arranged scape bract area, from whose axils spikes originate, (it is its 4-7 existing at the different examples), 3. a region with only small scape bracts, without flowers and finally 4. an end Spike that is similar the the lateral spikes. Spikes distichous, about 14 – 28 flowered, somewhat flat. Floral bracts wide boat shaped, blunt keeled, with bent over tip 3,5 cm. long, always 1.5cm wide. Calyx a little longer than the floral bracts, triangular-cylindric, narrow above. Sepals (extended) ovate-lanceolate, tipped, yellow. Petals a little longer than the sepals, yellow. Stamens protruding. Pollen yellow, ovary cone shaped.



Figure 2. *Vriesea gravisiana* (Wittmack) drawing.

On 22 March this year I received information about this plant from Herr Prof. Dr. Gravis who wrote to me from Luttich that he had three good examples of it in flower. On the 26. April I received a plant named by the deceased Professor Ed. Morren, as *Vriesea lubbersiana* in honor of the ‘Chief Gardener’, at the botanical garden in Brussels and present Secretary of the Federation of the Societes d’Horticulture de Belgique, Mr. Lubbers. Also this Spring a plant was being grown under this name in Luttich. It cannot have this name because there is already in Baker’s Handbook of Bromeliaceae, page 219, a *Vriesea lubbersii* Morr. (*Tillandsia lubbersii* Baker), described as being much smaller and with white flowers. This plant is now called *Vriesea gravisiana* in honour of Herr. Prof. Dr. Gravis.

In the same year in this Journal in Part 12 page 326 a similar but shorter plant was described and called *Vriesea* X *Kitteliana* from Mr. Kittel who crossed *V. barilletii* ♂ with X *Saundersii* ♀ (Butcher’s note – this is the reverse of that recorded on page 326 and also *Saundersii* has become a hybrid). It differs by the dark brown leaf-sheaths, the more straplike leaves, the long spike-less part the inflorescence, or if you wish, the long stem of the end spike”

The fact that this species is compared with a hybrid prompted me to look at the drawing of *Vriesea* x *Kitteliana* and the plants are very similar indeed. Both seem to be linked to Luttich. Amendments will be made to the Cultivar Register for ‘Gravisiana’ (Morren) and ‘Gravisiana’ (Wittmack) with these latest facts. If anyone has a *Vriesea* with “Gravisiana” on the label, especially in Europe, please let me know!



## Fertiliser Notes

Andrew Flower, BSI Editor.



**A.** 2-year old *Tillandsia australis* seedling, 2-3 weeks after solid fertiliser accidentally applied to outer leaf sheaths. **B.** same seedling 5 months later. **C.** Another *T. australis* seedling from same tray, also 5 months later and showing healthy growth despite a minor splash of fertiliser in an outside leaf. The pots are 8 cm (3¼ in) across.

Last year I followed up on some advice given to our local epiphytic plant society by a chap who spent 30 years in charge of the very successful sub-tropical Fernery at the 52 hectare Pukekura Park in New Plymouth (NZ). The Fernery grows a wide range of epiphytes, including pot-grown bromeliads, orchids and epiphytic. Their experience has shown that pot grown epiphytic bromeliads do not like fertilisers containing chloride

To provide potassium, chloride in the form of potassium chloride is used in many commercial solid fertilisers, and the recommendation is to avoid these – try and stick to those which use only potassium nitrate. In New Zealand we found ‘Nitrophoska Perfekt’ (available worldwide) — the only solid fertiliser with potassium nitrate and no chloride. ‘Nitrophoska Blue’ is marketed here with the claim it has potassium nitrate alone, but I checked with the manufacturers and they said it actually contains some potassium chloride as well.

Our trials with ‘Nitrophoska Perfekt’ on our potted bromeliads had conflicting results! Many seedlings grew really well, others died off! In the damaged seedlings we had got fertiliser into the outer leaf sheaths, a mistake to be carefully avoided. Some of the seedlings that only got a small amount of fertiliser in their leaves did survive, but most died off. We now apply the fertiliser with a teaspoon to avoid getting it on the plant, and results have been fine.

*Neoregelia* ‘Fireball’

Derek Butcher, Cultivar Registrar



*Neoregelia* ‘Greenball’ MSBG1998-0121A.

*Neoregelia* ‘Fireball’ clump. Photo by Geoff Lawn.

Interestingly this plant has been rarely written about in the Journal. Everyone knows what this neoregelia looks like, or believe they do. They also know that it has had a cultivar name for about 40 years even though it is clearly a species and needs a species name.

Perhaps because it has not been formally described there have been name problems in the past. For example in J. Brom. Soc 23(5): 166, 192. (1973) we have it linked to a ‘known in the trade as’ *Neoregelia schultesiana* and Hawaii. The name “*Neoregelia schultesiana*” persists today in Europe even though the name has never been published and is clearly a *nomen nudum*! Another example from Australia in the late 1960’s, a plant seems to have been imported from Ralph Davis as *Neoregelia* ‘Rio Red’. This is not mentioned by Nat DeLeon in an article in the Florida Council of Bromeliad Societies Newsletter in 1987. Luckily this name and plant seems to have disappeared!

The identity of ‘Fireball’ today could well be confused by the fact that in the last 40 years it has featured in some 150 registered hybrids and no doubt umpteen unregistered ones. This situation helps to confirm my view that many of the so-called variegated ‘Fireball’ in circulation are really hybrids of ‘Fireball’. Don’t forget to check for the bright blue tipped petals when they reluctantly appear.

There seems to be light at the end of the tunnel because ‘Fireball’ has been found in the wild and we know how reluctant taxonomists are to name a plant without habitat details. In 1992 a ‘green form’ of Fireball’ was found in Espirito Santo, Brazil and this was sold by Tropiflora, Florida under #4393 as *Neoregelia* ‘Fireball’ Green. This can also be linked to the plant referred to in the next paragraph.

In 1998 Marie Selby Botanic Gardens obtained from Elton Leme a plant that Harry Luther maintains is very close to 'Fireball' but is predominantly green until flowering when it reddens in the centre as we expect for many neoregelias. It will be registered as a cultivar as 'Greenball'. However, if you do acquire this plant I suggest you keep the number SEL1998-0121 and/or Leme 2038 on the label so you can link this clone with any new species name to be published in the future.



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## Caloosahatchee Bromeliad Society Show 2007

Carolyn Schoenau. Photographs by Larry Giroux



*Cryptanthus 'Eruption'* arrangement by Larry Giroux won Best of Show Artistic.

The 2007 CBS Show was characterized by unusual genera, species and hybrids. Several new members participated for their first time. We had nearly forty more entries than in 2005, with much of the credit due to Workshops presented by Betty Ann Prevatt, Eleanor Kinzie and participation by other member BSI judges. We encouraged mini 6 inch cube Artistic Arrangements for the first time and had several exceptional entries. An unusual number of Decorative Containers were displayed with all but one receiving Blue or AM ribbons.

Mulford B. Foster Best of Show Horticulture was won by Michael Kiehl of Venice, Florida, with a spectacular *Neoregelia* (*carolinae* x 'Hannibal Lector') x 'Norman Bates'. Morris Henry Hobbs Best of Show Artistic was won by Larry Giroux, North Fort Myers, Florida with *Cryptanthus* 'Eruption'. The Photographer for the show was Larry Giroux. This show included a Members Choice Plant of a beautiful Dyckia.



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Michael Kiehl won Best of Show with *Neoregelia* (*carolinae* x 'Hannibal Lector') x 'Norman Bates'.

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I would also like to acknowledge a group of Eastern District Judges who have recently completed the requirements to become Master Judges: George Aldrich, Irene Aldrich, Dr. Terrie Bert, Carol Breen, Dr. Larry Giroux, Dianne Molnar, Moyna Prince, Virginia Schrenker, Bob Stickney and John Welsh.

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## Pennsylvania Horticulture Society

### 2008 Philadelphia Flower Show

The Philadelphia Flower Show was held February 28 through March 9, 2008. I was contacted by my nephew, Steven Bessellieu, a member of the Men's Garden Club of Philadelphia, that the central feature of this year's show, "Jazz it Up" would be BROMELIADS! Of course, that was of great interest to me! The central feature consisted of 6 islands of bromeliads, included 13 varieties, totaling 1600 bromeliads. Steven's club exhibit, "Muddy Bogs Juke Joint", featuring dozens of Tillandsias, won "Best of Show" for their class.

Knowing my love for bromeliads and my involvement in the Bromeliad Society International, Steven thought this would be of interest to BSI and all the folks in the bromeliad world. I spoke with President Joyce Brehm to see if BSI could give them a special commendation award for the outstanding display of bromeliads at their show.

Upon her approval, a certificate of commendation, along with a crystal plate with a Vriesea etched on it, was presented to them and was proudly displayed in one of the "bromeliad islands" in the central feature. Usually when we see this many bromeliads in one location, it is at a bromeliad society event or a commercial grower's greenhouse. So we are proud of the recognition that bromeliads received at this prestigious event. I hope some of you got to attend, but if you want to attend via internet, go to the PHS website, [www.pennsylvaniahorticulturesociety.org](http://www.pennsylvaniahorticulturesociety.org) click on "Philadelphia Flower Show", click on "Flower Show Photo Archive" and click on the Thursday 2/28, Saturday 3/1 and Sunday 3/2 dates to view pictures of the bromeliad exhibits.

### Where to Find Them

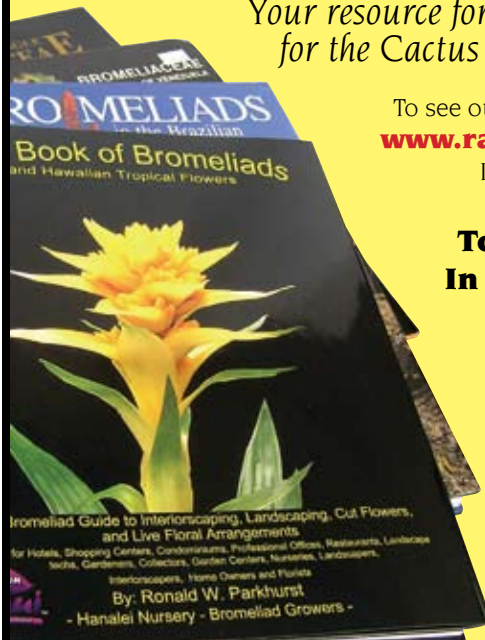
Some of the plants illustrated in this issue are available from Michaels Bromeliads (see their ad. on page 130):

*Aechmea bromeliifolia* var. *rubra*, *Neoregelia* 'Fireball' and *Neoregelia* 'Green-ball'

Michaels ship worldwide - tell them you are a member and they will give you 10% discount on the above plants.

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## EVENTS CALENDAR

## Australia

September 11-14, 2008. Central Coast Bromeliad Society Spring Show, Kariong

September 13-14, 2008. Illawarra Bromeliad Society Spring Show, Uniting Church Hall, Russell Street, Corrimal. 9.00am-4.00pm.

October 11-12, 2008. Bromeliad Society of Australia Spring Show, Burwood

October 25-26, 2008. Bromeliad Society of NSW Spring Show, Concord.

April 10-13, 2009, XV Australian Bromeliad Conference, Adelaide. Contact toll-free 1800 888 228 or [tillands@senet.com.au](mailto:tillands@senet.com.au)

## United States of America

August 2-3, 2008. South Bay Bromeliad Associates Bromeliad Show and Plant Sale. Rainforest Flora Nursery, 19121 Hawthorne Blvd, Torrance CA. Sat. noon-4:30, Sun 10:00am to 4:30pm. Plant sales & judged BSI Show. Contact Bryan Chan (818) 366-1858, [bcbromel@aol.com](mailto:bcbromel@aol.com)

August 16-17, 2008. Seminole Bromeliad & Tropical Plant Society Fall Plant Sale. Sanford Garden Club, 17-92 at Fairmont Drive, Sanford. Contact (407) 366-4860.

August 29-30, 2008. Florida Council of Bromeliad Societies 2008 Extravaganza, hosted by the Bromeliad Guild of Tampa Bay. Contact Tom Wolfe (813) 961-1475 or [bromeliadsociety@juno.com](mailto:bromeliadsociety@juno.com)

October 11-12, 2008 Bromeliad Guild of Tampa Bay, University of South Florida. Fall Sale. 4202 East Fowler Ave., Tampa.

July 26 - August 1, 2010. BSI World Conference to be held at the Astor Crowne Plaza in New Orleans.

## A Warm Welcome to New Members

Julie Akyol, Orlando, Florida	Steve Morgan, Batehaven, Australia
Rod Allen, Austinmer, Australia	Jeanne Palazzo, Terrytown, LA
Phylis Baumer, Orlando, Florida	Gwenthlyn Parkinson, Ningi, Australia
Noema Cano Flores, Callao, Peru	Peter Rheumer, Vermont, Australia
Carolyn Hedberg, Hilo, Hawaii	USP- Instituto Biociencias, Brazil
Janet & Steve Hoyer, Kuranda, Australia	Juan E Velazquez, Manati, PR
Eva Heuser, Clemente, CA	Douglas Wallace, Brisbane, Australia
Barry Langridge, Dandenong, Australia	

We hope you enjoy your membership with us, welcome aboard!

## 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.

## OFFICERS

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