

# JOURNAL

OF THE BROMELIAD SOCIETY

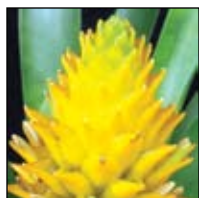
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### Covers

**Front**—*Aechmea mira*, a new species from Bahia Brazil photographed by Elton Leme, described on page 248.

**Back**—The beautiful rainforest at Rara Avis in Costa Rica, photographed by Ken Marks and described in his article concluding in this issue on page 278.

**Publication Information:** The Journal is published bimonthly by the Bromeliad Society International.

All scientific articles are peer reviewed, and author guidelines are available from the Editor. Authors are requested to declare any article they have already, or intend to, publish elsewhere.

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

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## Editorial

### In this Issue

#### Scientific

We start with a golden yellow guzmania from Panama, *Guzmania tenuifolia*, described by Harry Luther and Karen Norton. Elton Leme and Harry Luther introduce something of a taxonomic teaser with a new plant from Bahia, Brazil, which they have named "*Aechmea mira*." This interesting-looking plant (see front cover) has been fitted into *Aechmea*, where it barely fits the subgenus *Chevaliera*, but it also has significant similarities to *Neoregelia longispala* that grows nearby! Editorial speculation would be premature, but look for more investigation into the family history of this population!

Howard Frank and his team are continuing their search for an antidote to the on-going devastation of Florida's native bromeliads by the evil weevil *Metamasius callizonia*. On page 253 they report on two recent expeditions to Guatemala searching for a weevil-attacking parasite fly to destroy the Florida pest. These expeditions were unsuccessful, hampered in part by new 2006 USDA-APHIS regulations that significantly delay the return journey to Florida of parasite-fly larvae for testing.

Elton Leme introduces a further three *Cryptanthus* species from Minas Gerais in Brazil. *Cryptanthus lavrasensis*, *C. regius* and *C. tiradentesensis* are described in an article beginning on page 259.

#### Cultivation

On page 272 we have a paper delivered to the Australian Bromeliad Conference 14, held in September. Jack Koning came to Australia when his parents migrated from Holland in 1956, and started growing bromeliads in 1970. He has specialized in breeding *Vriesea* and *Cryptanthus* and his paper details some of his work with *Vriesea*, showing nice examples of his registered hybrids.

#### General Interest

Ken Marks concludes his trip to the bromeliads native to the Rara Avis ecosanctuary in Costa Rica, completing his report started in our previous issue. He brings us the first photo of *Ronnbergia bathenayi* published in the Journal, but more exciting was his discovery of the giant *Guzmania hollinense* previously thought to be endemic to Ecuador - see Harry Luther's formal description in BSI Journal 42(4), 1992: "A Giant New *Guzmania* from Amazonian Ecuador."

### 18th World Bromeliad Conference • Cairns 2008

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## Affiliates News

The San Diego Bromeliad Society is planning a package tour from Los Angeles to the World Bromeliad Conference in Cairns, Australia, in June 2008. This tour is open to anyone, not just their own members, and is a great opportunity for any bromeliad fanciers in the US. The tour leaves LA June 21 and returns June 29, 2008, with optional extended tours of Australia available. Contact the society through Jeff Sorenson at 914-631-4318, or email the travel agent keith@acaciatravel.com.

The Bromeliad Society of Queensland continues to thrive, and recently reported a membership of over 540. They work tirelessly to promote bromeliads, and at their November "Bromeliad Bonanza" sold 6,321 plants. Their bimonthly journal *Bromeliaceae*, currently edited by Ross Stenhouse, is packed with colour and information and is highly recommended (write P.O. Box 565, Fortitude Valley, QLD 4006, Australia or see [www.bromsqueensland.com](http://www.bromsqueensland.com)).

Registrations for WBC 2008 in Cairns have exceeded 250, and it promises to be a great event. Organizer Lynn Hudson is battling on, despite the occasional Negative Knockers who give her palpitations! Recent declines in the US\$ have impacted on Conference finances, so more fundraising is called for: any donations of nice raffle prizes will be most welcome at 47 Boden Street, Edge Hill QLD 4870, Australia.

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## A new Guzmania from Darien, Panama.

Harry E. Luther & Karen F. Norton<sup>1</sup>

**Abstract.** The new species *Guzmania teucamae* from the Sierra de Jungurudo, Darien Province, Panama is described, illustrated and compared to related species.

**Keywords:** Bromeliaceae, Guzmania, Panama, Darien, taxonomy.

The genus *Guzmania* with more than two hundred species is primarily Andean in distribution. Three dozen or so species recorded from Panama also contain a small subset of endemics (*G. darienensis*, *loraxiana*, *armeniaca*, *elvallensis*, etc.), that mostly have been described in the past decade and a half (Luther & Sieff 1994, 1997, Luther 2001). The beautiful new golden yellow guzmania from southwest Darien Province, described below, adds to this list.

*Guzmania teucamae* H. Luther & K. Norton, sp. nov. TYPE: Panama: Darien, Sierra de Jungurudo, slopes of Garra-Garra, 800 – 900 m, March 2003, C. Skotak, B. van Schie, R. Deroose, & H. Chavarria legit. Fl. in cult. June 2006, C. Skotak s.n. (holotype: PMA, isotypes: SEL).

A. *G. elvallensis* H. Luther, *cuisimilis*, *foliis rotundatis apiculatisque*, *bracteis florigeris longioribus flavissimis* (non *rubro-aurantiacis*) et *petalis flavis* (non *viridibus*) differt.

**Plant** flowering 35 – 45 cm tall. **Leaves** densely rosulate, erect to spreading, 20 – 32 cm long, 12 to 20 in number, thin coriaceous, nerved. **Leaf sheaths** elliptic, 6 – 8 x 3 – 5 cm, somewhat castaneous toward the base, subdensely brown punctate-lepidote especially adaxially; **leaf blades** lingulate, rounded to broadly acute, apiculate, 18 – 28 mm wide, pale punctate-lepidote, bright green with a few obscure darker green bands or mottled areas. **Scape** erect 28 – 32 cm x 5 mm, much exceeding the leaf rosette, sparsely brown punctate-lepidote. **Scape bracts** erect, tightly imbricate, elliptic, apiculate, green to yellow. **Inflorescence** erect, simple, ellipsoid to cylindric, 6 – 8 x 4 – 5 cm, 30 to 45-flowered; **floral bracts** broadly ovate, acute, 18 – 28 x 10 – 20 mm, tightly imbricate except for the spreading apex, thin coriaceous to chartaceous, very brittle when dried, slightly nerved, sparsely appressed-lepidote, bright golden yellow; **flowers** erect, subsessile, mostly concealed by the floral bracts, spreading at ca 30° from the axis at anthesis; **sepals** elliptic, acute, 17 – 18 mm long, thin coriaceous, nearly even, the adaxial pair carinate and connate for 4 – 5 mm, yellow green; **corolla** erect, exerted beyond the floral bract at anthesis; **petals** cucullate, lingulate, obtuse, 24 – 25 mm long, yellow tipped white or pale yellow-green.

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Figure 1. *Guzmania teucamae*, clonotype plant flowering at the Marie Selby Botanical Gardens. Photograph by Dr. Phil Nelson.

This new species differs from the similar *Guzmania ehvallsensis* (Luther 1996), by having more rounded apiculate leaf blades that are not at all reddish striate, longer (18 – 28 vs. 15 – 24 mm) bright yellow (vs. orange-red), somewhat spreading floral bracts and yellow (vs. green) petals. Both *G. teucamae* and *G. ehvallsensis* are so far known only from their type localities and are apparently narrow endemics of uncertain conservation status.

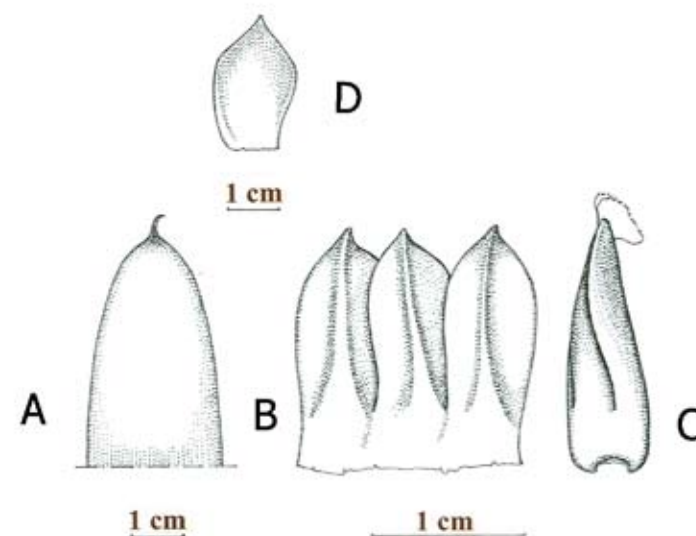


Figure 2. *Guzmania teucamae*. A. Leaf apex. B. Calyx. C. Spent flower. D. Floral bract. Illustration by Stig Dalström.

This showy species is dedicated, at the request of Chester Skotak, to Chief José Teucama of the Emberá/Wounaan, Puerto Indio, Darien, Panama.

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## A new giant *Aechmea* from Bahia, Brazil

Elton M. C. Leme & Harry E. Luther

*Aechmea* Ruiz & Pav. is the largest genus in the subfamily Bromelioideae with 243 species (Luther, 2006). Due to its well known morphological diversity together with a poor understanding of the correct delimitation of the species, and therefore its eight subgenera, *Aechmea* is one of taxonomy's most important challenges today, holding a universe of discordant elements, especially in the typical subgenus (Leme, 1997; Leme & Siqueira-Filho, 2006).

The unusual new species described below represents a perfect example of another discordant element of *Aechmea*. It is a putative member of subgenus *Chevaliera* (Gaudich. ex Beer) Baker, which was kept as a distinct genus by Smith & Kress (1989), Smith & Till (1998) and Manzanares (2002). In addition, this new species provides new insights into the relationship of the mysterious *Neoregelia* subgenus *Protoregelia* W. Till & Leme, which comprises a single gigantic species, *N. longisepala* E. Pereira & Leme (Leme & Till, 1998)

*Aechmea mira* Leme & H. Luther, sp. nov.

Inter generis species valde singularis, a speciebus omnibus planta robusta, inflorescentia dense bipinnata, ovoidea, bracteis primariis ramos cingentibus, stramineis, perdense albo-lepidotis, marginibus prope apicem undulatis, bracteis floriferis quam bracteas primarias similibus sed minoribus, sepalis perasymmetricis mucronatisque, petalis sublinearibus, basi distincte connatis, haud appendiculatis et ovulis obtusis differt

Type: Brazil, Bahia, Guaibim, terrestrial in Restinga forest, 6 December 1996, E. Leme 3722, H. E. Luther, D. Benzing & P. Nahoum, fl. cult. Febr. 2007. Holotype: HB. Isotype: RB.

**Plant** terrestrial, flowering ca. 65 cm tall. **Leaves** ca. 20 in number, rosulate, suberect-arcuate, coriaceous, forming a broadly crateriform rosette at base; **sheaths** narrowly elliptic, 28-29 x 10.5-12 mm, pale castaneous adaxially, pale green abaxially, densely and minutely lepidote on both sides; **blades** linear, some inconspicuously narrowed toward the base, 75-80 x 7-8 cm, green with sparse darker green spots, sparsely and inconspicuously white-lepidote adaxially, densely white-lepidote abaxially with trichomes not at all obscuring leaf color and sometimes forming sparse crossbands, apex acute and apiculate, margins densely (at apex) sparsely (toward the base) spinose; **spines** triangular, uncinat, antrorse, castaneous toward the apex, the basal ones 1.5-2.5 mm long, 15-25 mm apart, the upper ones ca. 1 mm long, 5-10 mm apart. **Scape** erect, rigid, ca. 25 cm long, ca. 1.8 cm in diameter, densely white-lanate, greenish;



Figure 1: Habit of *Aechmea mira* Leme & H. Luther, which flowered in cultivation. Photo by E. Leme.



**scape bracts** sublinear-lanceolate, acute and apiculate, 12-16 x 2.5-4.5 cm, soon paleaceous and drying anthesis enrolling the margins, thinly coriaceous toward the apex, membranaceous at base, entire, densely and minutely white-lepidote abaxially, glabrous adaxially, distinctly exceeding the internodes, erect to reflexed. **Inflorescence** ovoid, bipinnate in its basal 2/3 and simple at its apical 1/3, much shorter than the leaves, erect, ca. 15 cm, ca. 6.5 cm in diameter, rachis stout and concealed by the bracts, densely white-lanate; **primary bracts** oblong-ovate, obtuse to slightly emarginate and minutely apiculate, nerved, densely and conspicuously white-farinos-lepidote with trichomes obscuring its the color, stramineous, thin in texture toward the apex, erect or nearly so, ecarinate, entire, apical margins conspicuously undulate, concealing the branches but not the petals, 60 x 30-35 mm; **primary branches** ca. 16 in number, polystichously and densely arranged, nearly erect, concealed by the primary bracts, ca. 45 x 28 mm (excluding the petals), flabellate, pulvinate, 2 to 3-flowered, inspicuously stipitate; **floral bracts** those of the branches narrowly ovate, obtuse and minutely apiculate, rigid at base and thin in texture toward the apex, stramineous, nerved, entire, densely and conspicuously white-farinos-lepidote, trichomes concealing its color, about equaling to slightly exceeding the sepals, carinate, cymbiform, 37-42 x 16-20 mm, those of the simple part of the inflorescence resembling the primary bracts but suboblong and slightly dilated at its apical half, apex distinctly emarginated and minutely apiculate, distinctly exceeding the sepals and concealing the flowers except for the petals, ca. 50 x 25 mm. **Flowers** ca. 60 mm long (with extended petals), odorless, erect at anthesis, sessile, those of the simple part of the inflorescence densely and polystichously arranged, those of the fascicles distichously and densely to subdensely arranged; **sepals** obovate, strongly asymmetrical with the lateral membranaceous, rounded wing distinctly surpassing the midnerve, green, densely white-lepidote-farinos to glabrescent, ecarinate, thickly coriaceous mainly toward the base except for the membranaceous wing, 22-23 x 10-11 mm, connate at base for ca. 5 mm, apex mucronate, mucro ca. 1.2 mm long; **petals** sublinear, obtuse to slightly emarginate and minutely apiculate, ca. 45 x 8 mm, white except for the purple apex, suberect-recurved at anthesis, connate at base in a common tube with the filaments for 8-10 mm, without any appendages but bearing 2 conspicuous longitudinal callosities equaling the filaments; **filaments** ca. 32 x 2 mm long, slightly dilated toward apex, complanate, the antesealous ones connate at base for 8-10 mm and forming a common tube with the petals, the antepetalous ones adnate to the petals for ca. 21 mm; **anthers** ca. 12 mm long, dorsifixed slightly above the middle, base sagittate, apex subacute and apiculate; **pollen** broadly oblong-ellipsoid, apparently sulcate, exine psilate to microreticulate; **stigma** conduplicate-spiral, cylindrical, ca. 6 mm long, white, margins lacerate, papillose; **ovary** obovoid, subtrigynous, ca. 17 mm long, 10-11 mm in diameter, green, densely white-farinos-lepidote, trichomes concealing its color; epigynous tube crateriform, ca. 4 mm long; placentation apical; ovules obtuse. **Fruits** unknown.

The name chosen for *Aechmea mira* was inspired in the Latin word “mirus”, which highlights the “extraordinary” or “unique” morphological quality of this new

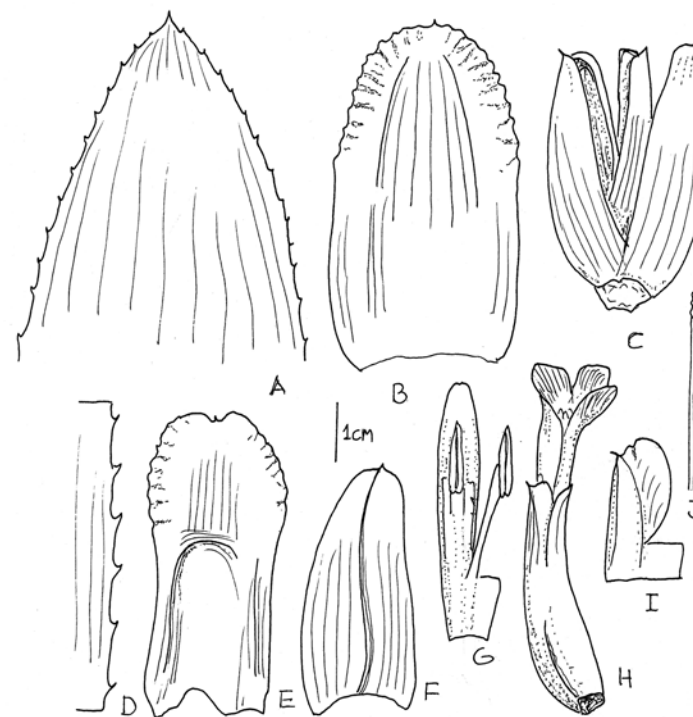


Figure 2: (A-J) *Aechmea mira* Leme & H. Luther: A) leaf apex; B) primary bracts; C) primary branch; D) basal marginal spines; E) floral bract of the apical simple part of the inflorescence; F) floral bract of the primary branch; G) petal; H) flower; I) sepal; J) style and stigma (drawing E. Leme).

species. It is difficult to decide on its closest affinity in *Aechmea*: It does resemble some members of subgenus *Chevaliera* due to its robust size, inflorescence densely flowered and densely white-lepidote except for the glabrous petals and the densely white-lanate rachis, petals distinctly connate at base, without any appendages but bearing well developed lateral callosities, besides the pollen apparently sulcate with psilate to microreticulate exine.

However, the most outstanding and discordant features of *Aechmea mira* when compared to the taxa included in *Chevaliera* are related to the inflorescence structure and the texture of the bracts: the numerous and densely arranged branches are flabellate (vs. strobilate), with distichously arranged flowers (vs. polystichous arranged flowers) and concealed by comparatively large thin-textured primary bracts (vs. branches never concealed by the comparatively inconspicuous thick-coriaceous primary bracts). Its floral bracts are similar to the primary bracts and distinctly exceed the sepals.

In addition, the above-mentioned discordant characteristics reveal a strong, but unexpected resemblance to *Neoregelia longisepala* E. Pereira & Penna, the single member of the *Neoregelia* subgenus *Protoregelia*. This large endemic species lives in



**Figure 3. Details of the inflorescence of *Aechmea mira* Leme & H. Luther (see front cover). Photo by E. Leme**

coastal Atlantic forest in the south region of Bahia State, while *Aechmea mira* grows nearby in sandy coastal-plain forests— both forming large clusters. Despite having a corymbose-capitate inflorescence deep in the center of the rosette, *N. longisepala* shares with *A. mira* numerous flabellate branches and thin-textured primary bracts and floral bracts which are comparatively large in size, densely white lepidote sepals, as well as the sulcate pollen. These features suggest the need of a deeper investigation in order to determine how much these species are really related, with potential implication in the re-evaluation of their future generic and subgeneric circumscription.

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## Searching in Guatemala for more parasitoids to use against *Metamasius callizona* in Florida

J. Howard Frank, Dennis Giardina, Tim Andrus, and José Monzón

*Metamasius callizona* is an invasive weevil native to Mexico and Guatemala, and is destroying Florida's native bromeliads (Frank and Thomas 2001, Frank and Cave 2005). A parasitoid fly (in earlier publications referred to as *Admontia* sp. and *Lixophaga* sp.) was initially detected by Ronald D. Cave in a closely related weevil at high altitudes in Honduras. It was formally described as *Lixamontia franki* (Wood and Cave 2006), family Tachinidae, and seems to attack only bromeliad-eating *Metamasius* weevil larvae. A culture of it is maintained in a quarantine facility at Ft. Pierce, Florida, supplemented by continuing importations from Honduras. It is ready for release in Florida as a biological control agent when all the required state and federal permits (applied for in December 2006) have been issued. The cost of collection and rearing in and shipment from Honduras has been funded for almost two years by the Florida Council of Bromeliad Societies to the Escuela Agrícola Panamericana, Zamorano, Honduras.

But what if *Lixadmontia franki* does not do the hoped-for job in Florida in suppressing *Metamasius callizona* populations? It has been seen to attack up to 60% of *M. quadrilineatus* larvae in the field in Honduras (Alvarez del Hierro and Cave 1999). It attacks *M. callizona* larvae in the laboratory at least as fervently as it does *M. quadrilineatus*. But we do not know how it will perform in the field in Florida; it is, after all, from high altitudes.

Several expeditions to Latin America have been conducted to guard against the possibility of failure of *Lixadmontia franki* in Florida. The most recently reported were expeditions to Belize, southern Mexico, and Guatemala to try to find additional



**Figure 1. *Metamasius quadrilineatus* lava.**

parasitoids of bromeliad-killing weevils, reported by Cave, Frank et al. (2003). Here we report on two more expeditions to Guatemala in 2005 and 2006. The participants were Howard Frank (entomologist, University of Florida), Dennis Giardina (manager, Fakahatchee Strand State Preserve, Florida Park Service), Tim Andrus (adventurer, Tallahassee, Florida) and José Monzón (entomologist and eco-tour guide, Guatemala City). The Florida participants paid José, who makes his living by leading eco-tours,



for his time and knowledge and help and use of his essential 4WD vehicle. José also helped to obtain the necessary Guatemalan collection and export permits. The 2005 expedition was to the Petén in northeastern Guatemala, and the 2006 expedition was to the Pacific slopes of Suchitepéquez in southern Guatemala. The general objective was to collect bromeliad-eating weevil larvae at low or moderate elevations. It was hoped that any parasitoids that might be reared from them could adapt to *Metamasius callizona* as a host in the climate of southern Florida.

### El Petén, 14-23 October 2005

Our intrepid adventurers arrived in Guatemala City on 14 October and were met by José. The necessary permits and maps and supplies were acquired that very afternoon ready for an early departure for the Petén the following day. We had submitted paperwork for the permits weeks in advance to make sure of them. Our first stop was at Universidad del Valle where we met Enio Cano (biologist in charge of collecting permits), Ana Lu McVean (botanist, knowledgeable about bromeliads) and Jack Schuster (entomologist who had built a national insect collection). We looked at specimens of *Metamasius* in the insect collection and quickly saw that the only specimens of *M. callizona* were from Izabal in the southeast. All had been collected at a light trap by José! They did not look like Florida specimens we had seen (which exactly resembled Mexican specimens one of us had seen and collected), but instead were bigger and glossier. Email correspondence about these specimens later ensued between Howard Frank and Bob Anderson (weevil expert at the Canadian National Museum); the outcome was that Bob is convinced that they belong to *M. callizona*, concluding that *M. callizona* specimens from southern Mexico and Guatemala represent only one species.

We set out very early the next morning in José's truck for the Petén. At about 150 km east we stopped to look at a few bromeliads growing on stunted trees and cactus beside Río Motagua in dry terrain. They were *Tillandsia paucifolia* and *T. xerographica*. When we prodded them, out jumped our first bromeliad-dwelling arthropod, a scorpion. We continued eastward to the crossing of Río Dulce, where we lunched, observing *Tillandsia utriculata* on riverside trees. After lunch we drove north toward the Petén, stopping only at an agricultural checkpoint where we had to declare the fruits we carried, until we arrived in the afternoon at Reserva Ixpanpajul (a commercial venture). Here we rented tents installed on a roofed concrete pad. Searches on the grounds of the reserve that afternoon failed to reveal any damaged bromeliads — in fact few bromeliads at all.

Our travels over the next two days took us to archaeological sites at Tikal and Yaxjá. We wandered the trails between the ruins and examined specimens of *Aechmea bracteata* and *A. tillandsioides*, *Catopsis sessiliflora*, *Tillandsia ?concolor*, *T. juncea*, *T. polystachya*, *T. schiedeana*, and *T. variabilis*. We saw no evidence of weevils, so we collected nothing. Then



Figure 2. *Metamasius quadrilineatus*.

and *T. polystachya*, but we found no evidence of weevils. After two nights there we returned to “civilisation.”

A late evening stop at the town of Flores to check email at an internet café led to worrying news: Hurricane Wilma, trashing the Mexican resort of Cancún, a few hundred miles away, was predicted next to aim with devastating force for Naples, Dennis's home town. Dennis and Tim took the earliest flight to Florida to arrive ahead of Wilma. Howard and José left the Petén and drove to Izabal, in the southeast, to try to find *Metamasius callizona*. Along the way, we stopped at pineapple fields and questioned growers; all answered they had not experienced damage by pest weevils. Arriving at the logging camp close to the Honduran border where José had previously light-trapped adult *M. callizona*, we first sought permission to look for bromeliads with weevils. The logging operation had trails cut by heavy equipment where José's 4WD truck became

began our biggest adventure. We drove northwest for several hours on unpaved roads requiring 4WD, and paid for a boat ride along Río Pedro from Paso Caballos to Estación Biológica las Guacamayas in Reserva de la Biósfera Maya. The main language from Paso Caballos onward is Mayan, which none of us can speak. We were finally off the beaten track, and it was wonderful, with jaguar paw prints in the mud along a jungle trail, crocodiles in the river, a coati mundi hanging around the palm-thatched, wood-fired kitchen, choruses from howler monkeys, and *Anopheles* mosquitoes biting at night. So where were the bromeliads? Not deep in the jungle, not at least where we could reach them — they were concentrated along the river banks. So we borrowed a heavy rowboat, and the four of us rowed it along the banks, first downstream and then back upstream. We soon realized we had to take care approaching the banks because many trees had hornet nests. It would not be a good idea to dive into the water to escape hornet attack because of the crocodiles. So we were careful, and we examined many *Androlepis skinneri*, *Catopsis berteroniana* and *C. moreniana*, *Tillandsia balbisiana*, *T. bulbosa*, *T. limbata*,





Figure 3. *Metamasius rugipectus*



Figure 4. *Metamasius dimidiatipennis*

essential. Several hours were spent searching for large felled trees loaded with bromeliads, without success. Bromeliads seen were terrestrial *Pitcairnia imbricata*, and a few fallen epiphytic *Tillandsia anceps*, *T. leiboldiana*, and *T. punctulata*, but no weevil adult or larva was found.

Perhaps to save the occasion, José next offered a visit to a high altitude oak forest in Sierra de las Minas, in Departamento de Zacapa, north of the town of Santa Cruz. This also took 4WD as we ascended a trail rutted by large trucks carrying marble from a mine. Alongside it we saw *Bromelia* sp., *Hechtia guatemalensis*, *Catopsis* sp., *Tillandsia fasciculata* var. *clavispica* (abundant at 1400 m), *T. ionantha*, *T. ? makeyana*, *T. polystachya*, *T. punctulata*, *T. recurvata*, *T. seleriana*, *T. usneoides*, and *T. utriculata*. That highest elevation (1400 m) was where we saw our first and only weevils of the trip. They were adults and larvae of *M. quadrilineatus* and were in fallen *T. fasciculata* in a seepage area which, lower down, became a stream. Fallen plants in surrounding drier areas were drier and contained no weevils.

Howard's last evening in Guatemala was spent packing. The collected weevils in individual plastic vials went into an insulated box which was to receive ice packs the following morning before pickup in Guatemala City by a commercial courier service. José arranged for this pickup. Such commercial shipment was required by our USDA-APHIS permit. The shipment was required to be sent for inspection to a USDA facility

in Maryland before forwarding to the Ft. Pierce, Florida quarantine facility. It took five days for this urgent shipment to arrive in Ft. Pierce. Ron Cave, who unpacked the specimens under the watch of the Quarantine Officer, reported the presence of the pupa of a parasitoid fly which looked just like that of *Lixamontia franki*, and appeared healthy. However, for one reason or another, it failed to produce an adult fly. Perhaps it became overheated during its five-day journey from Guatemala.

#### Suchitepéquez, 1-10 November 2006

Our intrepid adventurers arrived in Guatemala City on 1 November and were met by José. Again we got permits (applied for in advance by email) and supplies that very day and were gone from the city the next morning. By mid-afternoon, we had arrived at the coffee plantation (Los Tarrales) of the Berge family on the southern slopes of Volcan Atitlán in Departamento de Suchitepéquez. They made us welcome, first in little cabins on stilts in the woods, later in rooms with a nearby kitchen and bathroom with hot water, all rentable. Andy Burge is a lifetime member of BSI and was sympathetic to our cause. He even let us roam his private garden and shadehouses in search of weevils in his bromeliad collection.

Our first full day of exploration was spent on Pacific slopes to the west, in the Departamento de Retalhuleu. A visit to a coffee plantation (Buenos Aires), near to Parque Arqueológico Abaj Takalik, revealed a few tiny weevil larvae in fallen *Tillandsia paucifolia*. We judged them too young and small to be parasitized. Hours spent driving roads in the agricultural lowlands toward the sea were unproductive—there were few trees and fewer bromeliads. For the rest of the stay, we concentrated on Los Tarrales, where the altitude ranges upward from about 600 m. Coffee here is grown with the benefit of shade from large forest trees, and those trees support epiphytic bromeliads. First we searched the ground under large trees at track edges alongside blocks of coffee trees. We were fairly quickly rewarded by the finding of three adult *Metamasius dimidiatipennis* (Fig. 4) in fallen *T. polystachya*. Then we found a few *Metamasius* larvae in that same bromeliad and *T. flabellata*. Within a day or two we thought we had searched all the fallen plants on the plantation. There were lots of plants growing in the trees, but it took a 20-ft wooden ladder, plus a 15-ft bamboo pole, plus Dennis's climbing skills to get to them. This so greatly increased our collections of weevil larvae that by our final day we had accumulated more than 60 larvae packed individually in plastic vials. The 2006 operating rules of our USDA-APHIS permit to bring those larvae to quarantine in Florida required that we turn them over to a commercial courier service in Guatemala City to deliver them to inspection at Miami airport, and then to deliver them to quarantine at Ft. Pierce. The courier service managed to take a full 11 days to deliver this urgent shipment of living insects that had been protected (for a day or two) with ice packs to chill the contents. It was only because weevil larvae are fairly tough that any arrived alive. All those that did arrive alive eventually produced adults of *Metamasius rugipectus* (Fig. 3); none produced any parasitoid.

## Conclusion

We added a little to our knowledge of *Metamasius* distribution and host plants in Guatemala. All three of the weevil species we collected had been found in Alta Verapaz or Baja Verapaz in 2000 by Barbra Larson (Cave et al. 2003) albeit in different host plants. Our find of fly larvae in *M. quadrilineatus* larvae in Sierra de las Minas was preceded by Barbra's find of the same parasitoid in the same host near Cobán in Alta Verapaz, and indeed she predicted (Cave et al. 2003) that it would be found in Sierra de las Minas. It is the same host-parasitoid relationship that was detected by Ron Cave in Honduras in 1994. Thus far, no parasitoid has been detected in bromeliad-eating *Metamasius* larvae at elevations lower than about 1300-1400 m.

We are dismayed by the USDA-APHIS regulations which, apparently influenced by the Department of Homeland Security to reduce risk of terrorism, forced us to ship collected specimens by commercial courier. If we had been allowed to carry the packaged materials aboard our return airline flights (as we could until regulations were changed after September 2001), mortality of the weevils (and any insect parasitoids they contained) would have been less.

## Acknowledgments

We thank Jack Schuster (Guatemala City) for help and hospitality. We thank Al Muzzell (Gainesville), Bruce Holst and Harry Luther (Marie Selby Botanical Gardens) for help in identification of bromeliads from our photographs.

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## Three Subtle New *Cryptanthus* Species from Espinhaço Range, Minas Gerais, Brazil

Elton M. C. Leme. Illustrations by the author.



Figure 1: *Cryptanthus lavrasensis* (Leme 6112), clonotype plant that flowered in cultivation.

*Hoplocryptanthus* Mez is a subgenus of *Cryptanthus* Otto & A. Dietr., which can be distinguished from the typical subgenus by some important features. The plants usually have strongly perfumed flowers which are perfect, with petals broadly spatulate or obovate, length up to three times the width of the lobes, which may be almost orbicular. The stigma is compact, simple-erect, with short, wide blades; or the stigmatic blades are slenderly tubular and conduplicate at extreme apex. The fruits have more numerous and smaller seeds. Species of *Hoplocryptanthus* usually grow in higher altitudes (i.e., above ca. 500 m elev.) when compared to the typical cryptan-



thus, and have a more restricted geographical distribution, being found only in wet sites in the Atlantic Forest of Espírito Santo State and in wet to drier conditions in the “Campos Rupestres” of the Espinhaço range of Minas Gerais State. Also, these species are morphologically more similar to the species of *Orthophytum* Beer than the remaining typical *cryptanthus*.

In the Espinhaço range of Minas Gerais State, the most commonly seen *Hoplocryptanthus* member is *Cryptanthus schwackeanus* Mez. However, recent field collections in different and sometimes isolated mountains of the Espinhaço range have revealed some new taxa closely related to *C. schwackeanus*, but distinguishable by a set of subtle morphological characteristics, including the three species described below.



Figure 2. Population of *Cryptanthus lavrasensis* in its habitat.

***Cryptanthus lavrasensis*** Leme, sp. nov. Type: Minas Gerais, Ouro Preto, Lavras Novas, ca. 1 km from the city, 1,300 m elev., 29 Nov. 2003, leg. E. Leme 6112 & R. Leme, fl. cult. Oct. 2004. Holotype: HB.

Species nova a *C. schwackeanus* Mez, cui proxima, sed laminis foliorum longioribus latoribusque, inflorescentia simplicissima, bracteis floriferis folia similibus, floribus longioribus, distincte pedicellatis, petalis 7-13 mm connatis differt.

**Plant** terrestrial in a very humid soil along a stream, stemless, ca. 10 cm long, 15-20 cm in diameter, propagating by short axillary offshoots around inflorescence

base and forming dense populations. **Leaves** ca. 15 in number, suberect-arcuate to ascending toward apex, forming a subdense, round and slightly secund rosette; **sheaths** suborbicular, ca. 3 x 3.3 cm, densely and minutely spinulose at apex, greenish-white, glabrous toward base, densely and coarsely white-lepidote and strongly corrugate at apex; blades narrowly triangular, apex slenderly acuminate-caudate, 15-18 x 2-2.3 cm, not narrowed toward base, strongly coriaceous but without any thicker central zone, strongly canaliculate, green, densely and coarsely white-lepidote abaxially with trichomes obscuring leaf color, adaxially densely white-lepidote toward base and glabrous toward apex, margins straight, subdensely spinulose; **spines** 1-1.5 mm long, 3-8 mm apart, the basal ones subspreading to slightly retrorse, the upper ones slightly antrorse-uncinate. **Inflorescence** simple, ca. 6 cm long, ca. 2.5 cm in diameter, sessile but elongate; floral bracts foliaceous, distinctly exceeding the flowers; flowers 35-40 mm long (with extended petals), fragrant, distinctly pedicellate, pedicels terete to slightly complanate, 3-5 x 1.5-3 mm; sepals ovate-lanceolate, apex acuminate and recurved, 10-15 x 3-3.5 mm, connate for 3-5 mm, pale green, ecarinate, glabrous, nerved, thin in texture, entire or remotely and sparsely denticulate; **petals** subspatulate, apex acute, 25-33 x 8.5-9 mm, white, distinctly exceeding the stamens, connate for 7-13 mm in a common tube with the filaments and style, bearing 2 well developed lateral callosities ca. 15 mm above the base; **filaments** ca. 19 mm long, terete, white, adnate to the petals and style and forming a common tube 7-13 mm long; **anthers** ca. 2 mm long, fixed near the base, base sagittate, apex apiculate; **pollen** ellipsoid, sulcate, exine perforate to insulate; **stigma** conduplicate, white, the styler lobes suberect, ca. 2 mm long, the extreme apex with scalloped margins. **Ovary** broadly ellipsoid to subglobose in outline, 7 x 5-6 mm, subtrigonal, greenish, glabrous; epigynous tube lacking; placentation central; ovules obtuse. **Fruits** much enlarged from the ovary, subglobose, ca. 11 x 10 mm, greenish-white.

*Cryptanthus lavrasensis* can be distinguished from *C. schwackeanus* by the longer and broader leaf blades (15-18 x 2-2.3 cm vs. 4-11 x 0.7-1.3 cm), simple inflorescence (vs. bipinnate at base), floral bracts resembling the leaves (vs. bracteiform), flowers longer (35-40 mm vs. 25-35 mm long) and distinctly pedicellate (vs. sessile), and by the higher connate petals (connate for 7-13 mm vs. 2-4 mm).

The name of this species is a reference to the locality where it was found growing in open, herbaceous vegetation of the “Campos Rupestres”, about 1,300 m elevation, sharing its habitat with other bromeliad species, like *Dyckia bracteata* (Wittm.) Mez.. Contrary to *Cryptanthus schwackeanus* which thrives scattered with sparsely distributed individuals, *C. lavrasensis* forms dense and large clusters on wet soil along streams, and the leaves are sometimes unilaterally secund curved.



Figure 3: *Cryptanthus regius* (Leme 6372) clonotype plant that flowered in cultivation.

*Cryptanthus regius* Leme, sp. nov. Type: Minas Gerais, Tiradentes em direção a São João Del Rey, Serra de São José, near Marco Zero da Estrada Real, ca. 1,000 m elev., 26 Jul. 2004, E. Leme 6372, fl. cult. 2006. Holotype: HB.

Species nova a *C. schwackeanus* Mez affinis, sed foliis plus numerosis, laminis foliorum longioribus latioribusque, floribus fasciculorum plus numerosis, sepalis longioribus et petalis haud callosis differt.

**Plant** saxicolous, stemless, ca. 6 cm long, ca. 30 cm in diameter, propagating by short basal rhizomes. **Leaves** 15 to 18 in number, suberect to spreading, forming a subdense to lax, open round rosette; **sheaths** suborbicular, 1.5 x 2.3 cm, pale green, densely white-lepidote toward the apex and distinctly corrugate abaxially, glabrous adaxially, densely spinulose toward apex, greenish; **blades** narrowly triangular, long acuminate-caudate, 14-17 x 1.4-1.9 cm, green except for sometimes the dark red margins, thinly coriaceous or nearly so, not succulent and without any thicker median channel, from plain to canaliculate with a U-shaped channel mainly under water stress, upper and lower sides slightly contrasting, abaxially densely white-lepidote, trichomes partially obscuring leaf color, nerved, adaxially glabrous or nearly so, bearing conspicuous longitudinal nerves, margins subdensely to densely spinose; **spines** narrowly triangular, prevailing slightly antrorse-uncinate, dark red, 0.5-1.5 mm long, 2-6 mm apart. **Inflorescence** distinctly bipinnate, many flowered; primary bracts foliaceous; **fascicles** the basal ones 3 to 4-flowered, flabellate, slightly complanate, 18-20 x 10-11 mm (excluding the petals), basal peduncle ca. 5 x 4 mm, white-lanate; **floral bracts** triangular, acuminate, 8-9 x 7 mm, membranaceous, greenish-hyaline, entire, carinate, nerved, densely and coarsely white-lepidote at apex with fimbriate trichomes, white-lanate at base, slightly exceeding the ovary to equaling the middle of the sepals; **flowers**

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Figure 4: Flower detail of *Cryptanthus regius* (Leme 6372) that flowered in cultivation.

29-30 mm long (with extended petals), sessile, strongly fragrant; *sepals* oblong-ovate to elliptic, acute and distinctly apiculate, 8-9.5 x 2.5-3 mm, subequally connate at base for ca. 3 mm, entire, glabrous, green; *petals* spatulate, apex broadly acute, 23-24 x 7-8 mm, very narrow toward base, connate at base for 2-2.5 mm in a common tube with the filaments and style, suberect to subspreading at anthesis, distinctly exceeding the stamens, white, without any distinct callosities; *filaments* white, terete, the antesepalous ones 14-16 mm long, the antepetalous ones 13-14 mm long, both adnate for 2-2.5 mm in a common tube with petals and style; *anthers* 2-3 mm long, fixed at 1/3 of its length above the base, base distinctly setaceous-sagittate, apex obtuse; pollen narrowly ellipsoid, sulcate, exine perforate to insulate, muri thickened; stigma conduplicate, white, stylar lobes terete, suberect, ca. 1.5 mm long, linear, terete, apex obtuse, at apex margins inconspicuously papillose. *Ovary* ca. 6 x 4 mm, trigonous, greenish, glabrous; epigynous lacking; placentation apical; ovules obtuse. *Fruits* unknown.

Paratypes: Minas Gerais, Tiradentes toward São João Del Rey, Serra de São José, near Marco Zero da Estrada Real, ca. 1,000 m elev., 26 Jul. 2004, E. Leme 6370, fl. cult. 2006 (HB); ibidem, E. Leme 6373, fl. cult. 2006 (HB).

*Cryptanthus regius* differs from *C. schwackeanus* by the rosette with more numerous leaves (15 to 18 vs. 10 to 15 in number), leaf blades longer and broader (14-17 x 1.4-1.9 cm vs. 4-11 x 0.7-1.3 cm), basal fascicles with more flowers (to 4 vs. to 2), sepals longer (8-9.5 mm vs. 6-7 mm), and by the petals without any callosities.

*Cryptanthus regius* saxicolous on rock outcrops of the “Campos Rupestres” of Serra de São José, near the “Marco Zero” of the “Estrada Real”, near the boarder of Ti-



radentes and São João Del Rey. The “Estrada Real” is a historical route created in 17th century by the Portuguese Crown to explore gold and other natural resources, and so it inspired the name of this new species, which was encountered very close it.

The known populations of *Cryptanthus regius* may partially overlap the occurrence area of the new taxon described below, although plants of both species were not found growing side by side.



Figure 5: Flower detail of *Cryptanthus tiradentesensis* (Leme 5819) cflonotype plant that flowered in cultivation.

*Cryptanthus tiradentesensis* Leme, sp. nov. Type: Minas Gerais. Tiradentes, Serra de São José, vertente sul, Caminho dos Escravos, ca. 1,200 m elev., 23 July 2003, E. Leme 5819. Holotype: HB.

Species nova a *C. schwackeanus* Mez, affinis, foliis utrinque dense vel subdense et grosse albo-lepidotis, laminis foliorum marginibus spinis minoribus, sepalis longioribus, petalis haud callosis differt; a *C. caracensis* Leme & Gross, cui proxima, sed laminis foliorum brevioribus angustioribusque, bracteis floriferis duplo vel triplo angustioribus, altitudinem sepalorum distincte brevioribus, floribus minoribus, petalis base breviter connatis differt.

**Plant** saxicolous or rupicolous, stemless, 3-5 cm long, 18-28 cm in diameter, propagating by short basal rhizomes. **Leaves** 13-18 in number, suberect to nearly spreading, forming a lax, open round rosette; sheaths suborbicular, 1.5 x 1.7 cm, densely and coarsely white-lepidote toward the apex, densely spinulose toward apex, greenish; **blades** narrowly triangular, long acuminate, 9-15 x 0.9-1.1 cm, green except for the



Figure 6: *Cryptanthus tiradentesensis* (Leme 5819) in its natural habitat at the summit of Serra de São José, facing Tiradentes city

dark red margins, coriaceous or nearly so, nerved mainly abaxially, canaliculate, adaxially subdensely to densely white-lepidote, trichomes to obscuring leaf color, abaxially densely and coarsely white-lepidote, trichomes obscuring leaf color, margins with spines acicular, dark red, 0.5-1.5 mm long, 2-7 mm apart, the basal ones spreading densely arranged ca. 2-3 mm apart, the upper ones strongly antrorse-uncinate, subdensely to laxly arranged 5-7 mm apart. **Inflorescence** distinctly bipinnate, with 14 to 20 flowers; **primary bracts** foliaceous; **fascicles** the basal ones 2 to 4-flowered, flabellate, complanate, 7-10 mm wide, basal peduncle ca. 3 x 3 mm; **floral bracts** ovate-triangular, acuminate, ca. 9 x 4 mm, membranaceous, greenish except for the hyaline margins, obscurely and irregularly spinulose toward apex, spines uncinat, carinate, nerved, sparsely and coarsely white-lepidote toward apex to glabrescent, slightly exceeding the ovary; **flowers** 24-26 mm long (with extended petals), sessile or nearly so with a inconspicuous pedicel ca. 1 mm long, fragrant; **sepals** narrowly ovate-lanceolate, acuminate, 8-10 x 2 mm, subequally connate at base for 3-4 mm, entire, sparsely to subdensely and coarsely white-lepidote, green; **petals** spatulate, apex acute to obtuse and slightly



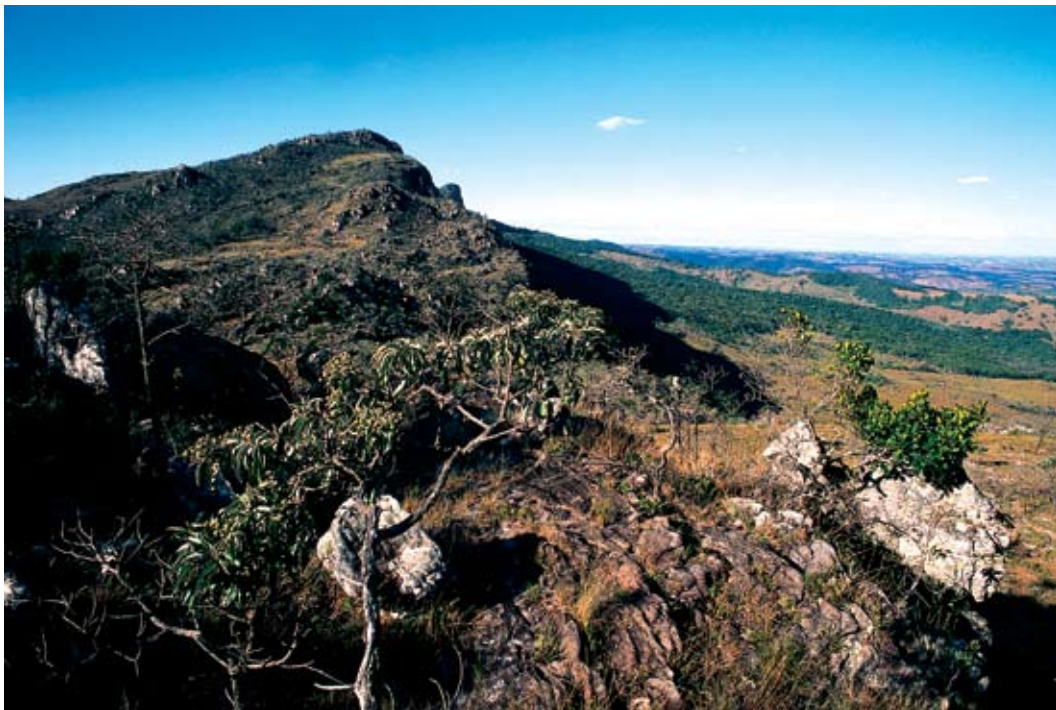


Figure 7: General aspect of “Campos Rupestres” vegetation at the summit of Serra de São José, facing Tiradentes city.

if at all cucullate, 20-21 x 6-7 mm, very narrow toward base, connate at base for 1-2 mm in a common tube with the filaments and style, suberect at anthesis, distinctly exceeding the stamens, white, without callosities; **filaments** ca. 13 mm long, adnate for 1-2 mm to the common tube with petals and style; **anthers** 2-3 mm long, fixed near the base, base sagittate, apex apiculate; **pollen** narrowly ellipsoid, sulcate, exine irregularly microreticulate, appearing corrugate, muri thickened; **stigma** conduplicate, white, stylar lobes terete, suberect to subspreading, ca. 2 mm long, linear, apex obtuse, at apex margins inconspicuously papillose. **Ovary** ca. 4 x 2.5 mm, trigonous, greenish; epigynous lacking; placentation apical; **ovules** obtuse. **Fruits** unknown.

Paratype: Minas Gerais. Tiradentes, Serra de São José, Jul. 2001, B. R. Silva s. n., fl. cult. E. Leme 5240 (HB); Serra de São José, vertente sul, Caminho dos Escravos, ca. 1,200 m elev., 23 July 2003, E. Leme 5825 (HB); São João Del Rey divisa com Tiradentes, Serra de São José, ca. 700 m elev., 30 Nov. 2003, E. Leme 6117 & R. Leme (HB);

*Cryptanthus tiradentesensis* differs from *C. schwackeanus* by the leaves densely to subdensely and coarsely white-lepidote on both sides (vs. adaxially glabrous), sepals longer (8-10 mm vs. 6-7 mm long), and by the petals without any callosities. It is also similar to *C. caracensis*, but can be distinguished from it by the leaves shorter and narrower (9-15 x 0.9-1.1 cm vs. 15-35 x 1.3-1.9 cm), floral bracts twice to three times narrower (ca. 4 mm vs. 8-14 mm wide) and distinctly shorter than the sepals (vs. about equal-

ing the sepals), smaller flowers (24-26 mm vs. 30 mm long), and by the petals shorter connate at base (1-2 mm vs. 5-7 mm).

*Cryptanthus tiradentesensis* is a saxicolous species of the “Campos Rupestres”, growing among rock outcrops partially shaded by shrubs or on almost bare full exposed rock surfaces, from 700 to 1,200 m elevation, along the borders of Serra de São José, which faces the historical city of Tiradentes that inspired its name. The area is rich of rupicolous bromeliad species, revealing some interesting taxa like *Aechmea disticantha* Lem., *A. nudicaulis* (L.) Griseb., and *Dyckia argentea* Mez to name a few.

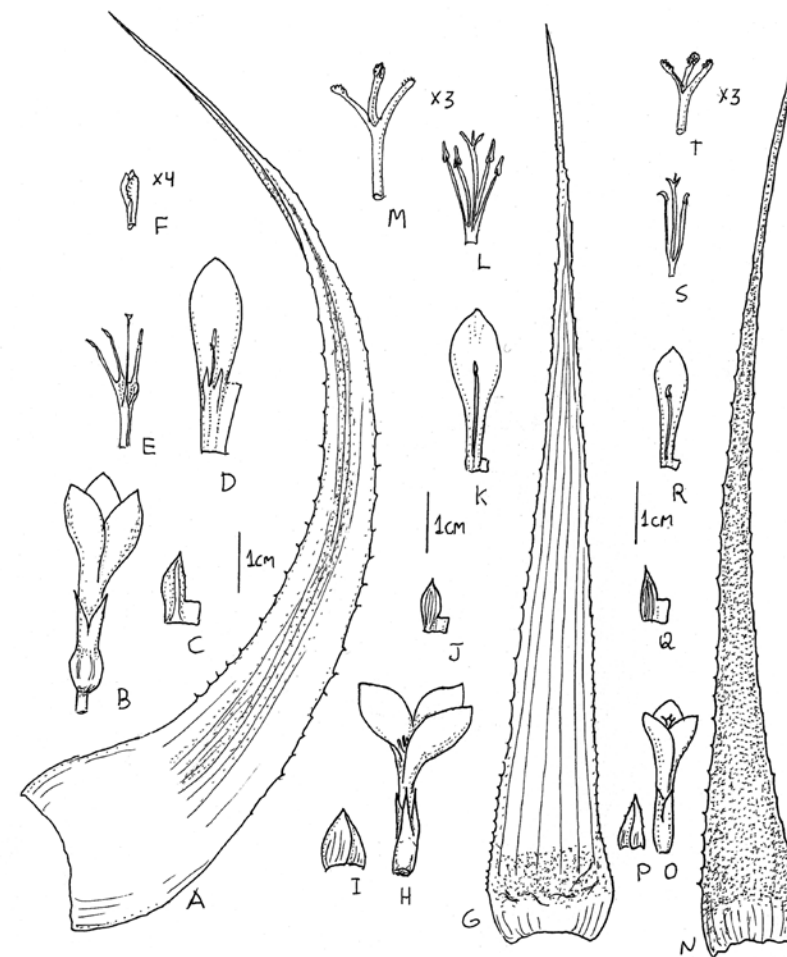


Figure 8. *Cryptanthus lavrasensis* Leme (A-F): A) adaxial leaf surface; B) flower; C) sepal; D) petal; E) stamens and pistil; F) stigma blades. *Cryptanthus regius* Leme (G-M): G) adaxial leaf surface; H) flower; I) floral bract; J) sepal; K) petal; L) stamens and pistil; M) stigma blades. *Cryptanthus tiradentesensis* Leme (N-T): N) adaxial leaf surface; O) flower; P) floral bract; Q) sepal; R) petal; S) stamens and pistil; T) stigma blades.



## My Vriesea Hybridizing

Jack Koning<sup>1</sup>

Years ago I embarked on breeding vrieseas, starting with *Vriesea fosteriana* and *V. gigantea*. I soon acquired a *V. fenestralis* and a second plant of *V. gigantea* that was quite yellow in the centre. I crossed the two *V. gigantea* and one seedling outshone the others, having a very pale centre. This I called *V. 'White Centre'* and this was ultimately crossed with *V. fosteriana* 'White Bands' to make, among others *V. 'Milky Way'*.

*Vriesea fosteriana* 'White Bands' is a line-bred species of my making –

**Point 1.** If you want better parents, this is what you may have to do, however prior to this I crossed *V. gigantea* with *V. fosteriana* 'Rubra'. This cross produced a great range of plants, each one looked like a champion when small but when they grew larger, a lot of them lost a lot of colour—pity! I gave away and sold a number of them and have since redone the cross.

**Point 2.** Vriesea seedlings need to be about 30cm across to really stabilize and show potential. Of course the first lesson I had to learn is that foliage vrieseas (group 2 for my reference) all flower at night. Second lesson was that storing the pollen for any length of time is guaranteed to create failure. [see note on pollen storage page 274 - Ed.] The best time to pollinate is between 10.00pm and 2.00am.

**Point 3.** Yes you guessed it, you are going to miss out on a bit of sleep. Pollen is ripe when it looks like yellow flour. The stigma is properly receptive after 10.00pm when it has a small sticky blob on it. Generally after 4.00am you are too late—you may still get seed but not much and of poor quality.

If you do not wish to self-pollinate them, you can remove the unripe pollen as soon as flowers open from 6.00pm onwards. Tools you need: a magnifying glass, 10X is best; small nail scissors and patience. Tag the flowers you have pollinated—name of parents and date; tie the small tag on securely. Use plenty of pollen!

**Point 4.** Write down in a diary everything you do and the results and the failures. Your memory is not that good – trust me!

You will discover as I did, that vrieseas are not in a hurry. Your seed pod can take up to 9 months to ripen. It will be dark brown and dry looking. When it is just starting to split, harvest it. Put it in a container (glass jar) it will split all the way and then you can sow it. Sow the seed as fresh as possible. It is very important to sterilize your mix, Peat Moss or Coco Peat works well. Place it in trays and sprinkle the seed on top and keep it moist. Algae control – I use 1-3 ml of pool 'Alginox' [active ingredient 0.15% Benzalkonium chloride – Ed.] to 1 litre of water and mist the mix and seed thoroughly. Cover with a clear lid or glass sheet.

<sup>1</sup> 2-7 Gordon Street., Pt. Macquarie NSW 2444, Australia.



*Vriesea 'Snows of Kosciusko'* ( *V. 'The Daintree'* X *V. 'Milky Way'* ).



*Vriesea 'Rainbow Beach'* ( *V. 'The Daintree'* X *V. 'Milky Way'* ).





**Vriesea 'Daintree Forest'** (*V. gigantea* sp. X *V. fosteriana* 'Rubra').

Plant characteristics – what is dominant? What is recessive? What does what?

*Vriesea fosteriana*: dominant for narrow leaves, scribbly patterns, hardiness, ease of growth.

Recessive for colour unless the right parent is used.

*Vriesea gigantea*: dominant for broad leaves, green-gold colours, hardiness, reduces size of hybrids. Recessive for accepting red colour, branched spikes.

*Vriesea gigantea* var. *siedeliana*: dominant for narrow leaves, good colours. Prone to scale, fungal attack, leaf die back, ph sensitive.

*Vriesea hieroglyphica*: dominant for green colours, good patterns, few pups. Prone to brittle leaves, ph sensitive, slow growth, lower leaf dieback.

*Vriesea fenestralis*: dominant for green colours, soft patterns accepting size. Prone to ph sensitive, cold intolerance, will accept red colour in spike.

*Vriesea platynema* var. *variegata*: dominant for herringbone patterns, pale centres, hardiness, dark leaf tips, red in flower spike. Prone to scale attack.

*Vriesea platynema* var. *rosea*: as above but better colours, pink centres in plants, broad leaves.

*Vriesea fosteriana* var. *siedeliana* 'Rubra': dominant for patterns, red colour, broad leaves, hardiness, lots of pups. Prone to centre rot.

There are other traits but these are the main ones. This list is not complete but are the main ones we use.

*V. splendens* & *V. glutinosa* will make plants cold sensitive but impart red spikes and red leaf colours, however they flower in the day time making it a bit more difficult to breed with group 2 plants. *Vriesea ospinae* var. *gruberi* seems difficult to produce results and to this stage



**Vriesea 'Kakadu'** (*V. fenestralis*. X *V. fosteriana*).

I cannot comment, as my seedlings/hybrids from this are far too small.

I do not recommend using two cold sensitive plants to make a cross as they can become difficult to grow both as seedlings and as adults eg. leaf tip dieback when cold becomes a big problem.

Traits - When *Vriesea fenestralis* is crossed with *V. hieroglyphica*, *V. fosteriana* or *V. platynema* var. *variegata* the bulk of plants will reveal the *V. fenestralis* influence, including the small red dots under the leaves, but the plants will all be larger than the parents and all with tall flower spikes. Using *V. gigantea* var. *siedeliana* with either *V. fosteriana* or *V. platynema* will produce almost identically coloured plants. It takes two generations of *V. fosteriana* to overrule one generation of *V. gigantea*, whereas two generations will overrule two to three generations of *V. fosteriana*. However one generation of *V. gigantea* var. *siedeliana* will overrule just about anything. Whether you cross *Vriesea fosteriana* with *V. hieroglyphica* (= *V. 'Montazuma's Gem'*) or the reverse (= *V. 'Patrice'*) the results are almost identical, showing the dominance of *V. hieroglyphica*.

*V. fosteriana* colouring is recessive in general but crossed with *V. gigantea* var. *siedeliana* it becomes dominant, just as it does when crossed with the plain leafed but bronze coloured *V. 'Redondo Beach'* (= *V. 'Maroon Shadow'*). Why do I desire to have a strong *V. gigantea* influence? I prefer green patterned plants with pale centres such as my *V. 'Milky Way'* or *V. 'Snows of Kosciusko'* but if you prefer broad leafed compact plants, use *V. gigantea* but not the *siedeliana* variety.



As shown, it is important to take note of the genetic traits when breeding foliage vrieseas. As it all takes time, give yourself every chance of success, but also do some experiments on a small scale. I have listed the parent species and what they are dominant for, or prone to, when using them to produce hybrids. Some traits cannot be easily bred out e.g. the underleaf spots of *Vriesea fenestralis* will appear time and again. The pointed spoon-shaped leaf tip of *V. gigantea* var. *siedeliana* remains in the hybrids along with the narrow leaves. In time you learn to recognize the parental traits in the hybrid leaf patterns, leaf shapes, the flower spike distinctions, markings and colours.

The pollen parent will influence colour and the pod parent influences shape and size of the plant, and cold sensitive plants are dominant in that trait. The strongest growing types should be mated with the cold sensitive and difficult growing plants to give them some hardiness. Ultimately I wish to put the flower spike of *Vriesea* 'Natasha' or *V. 'Barbara'* on a plant that looks like *V. 'Patrice'* or *V. hieroglyphica*. It can be done, it just takes time. The vrieseas of group one, the day-flowering green leafed plants do not easily cross breed with group two, the foliage vrieseas. Group three, *V. splendens*, *V. glutinosa* etc. more easily cross breed with group one than group two but you will eventually have some success. Be aware that one year a plant will be very fertile, the next year less fertile. The problems appears to me to be more climatic than anything else.

Of the vriesea hybrids I have made, these are my favourites: 'Milky Way', 'Kakadu', 'Montazumas Gem', 'Snows of Koscuisko', 'Rainbow Beach', 'Daintree Forest'. These notes are not a complete reference but I hope my findings will assist you when breeding vrieseas. Have a definite aim in your desired final product rather than because you have two plants in flower at the same time! I wish you every success, as along with any pitfalls and problems you may encounter hybridizing vrieseas is a very enjoyable hobby.

### How to Store Pollen

Pollen can be stored successfully, in my experience at least for six months. This is of value in hybridising, and it is of vital importance to our ability to propagate self-sterile individual species plants from seed. To do this in cultivation we often need to obtain plants from different populations of the same species, i.e., from different locations in the wild. But then plants from different populations of the same species can often flower days or even months apart.

The basic principle for storing pollen is to keep it dry and cool<sup>1</sup>. To keep dry, wrap the pollen in grease-proof paper or tinfoil and place in a small glass (not plastic) sealed container with a drying agent: calcium chloride is used in labs, I use silica gell crystals (they are blue when dry, pink when saturated-then dry them again in an oven) available from Chemists/Drugstores. Then put the pollen jar inside a larger glass jar with more drying agent and keep in the dairy compartment of your fridge (3-5°C). - Ed.

<sup>1</sup> Beadle, Don, 1992. "Pollen preservation; or, build your own bromeliad." J. Brom. Soc. 42(1) 29-30  
Flower, Andrew, 1995 "Pollen stretching" J. Brom. Soc. 45(3) 129-130

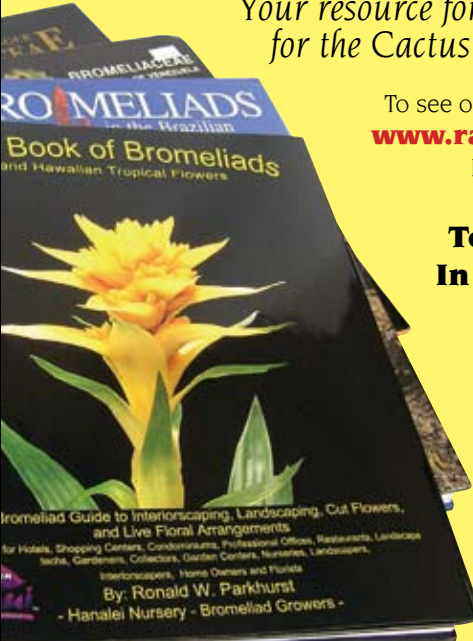

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E mail is [Robbrnrl@aol.com](mailto:Robbrnrl@aol.com) I can furnish more pictures upon request.



## Rara Avis Part 2

### Ken Marks

Under a misty mantle of clouds that continuously condensed into a steady stream of drizzle, we arrived at our new rainforest home and found it true to its name. We were a little over four hours (yet only 15 kilometers) from our start in Las Horquetas but we were now a world away. After a quick orientation we were shown to our rooms in the Waterfall Lodge. The honeymoon couple had chosen the even more secluded and romantic River-edge Cabin, an additional 10-minute hike from the main facilities. Being on their honeymoon we rarely saw the couple again during their stay. By chance we had arrived at the lodge during an off week (between two large groups) and had the place all to ourselves.

After a late lunch we were eager for our first hike through the lush (and very damp) rainforest that enveloped us. Our first venture was a relatively short hike which terminated at a great vantage point looking out on the nearby waterfall. Along the way our guide began to introduce us to the plants and animals that we would soon become familiar with: palms, ferns, and buttress-rooted canopy giants; epiphytic aroids, orchids, and bromeliads; butterflies, spiders, and the ubiquitous leaf-cutter ants.

With no electricity in the rooms we could not sequester ourselves in air-conditioned comfort behind closed windows and doors. Yet instead of languishing in sultry oppression, the altitude of about 700 meters provided comfortable temperatures. With a symphony of rainforest sounds unblocked by our large screen windows it seemed a shame to squander the magical ambiance by sleeping, but sleep we did, and well. Since electricity was provided by generator for only a couple of hours each evening at the communal building a half minute's walk from our rooms, we quickly adjusted to a schedule of waking at dawn and turning in as soon as it was dark. While the accommodations were rustic we were by no means "roughing it". We had hot water (provided by propane cylinders which were carted up with all the other supplies by tractor). The food: simple, fresh, and bountiful, was served family-style around long tables. We only had to endure two "hardships" - the previous group had consumed all but two beers and we had to be diligent about getting our digital camera and laptop batteries recharged during the small window when electricity was available.

Our schedule remained pretty straightforward for the next few days as we spent the better part of each morning and afternoon hiking the trails and taking pictures. Trails were continuously maintained by sawing the trunks of fallen trees into what they called "cookies" and placing them like stepping stones along the trails. Frequent rains plus rich volcanic soil equals mud - lots of slippery, sucking mud. Many times the cookie trail became submerged under puddles of muddy water. Other times the

older cookies crumbled having been recycled back into the forest's ecosystem by the relentless work of fungi and wood-boring insects. The reason for the rubber boots was pretty obvious. Since we had come during the "dry season" we inquired if this amount of precipitation was normal. We were informed that the concept of a dry season only applies at lower elevations. In the rainforest there is little seasonal change in either temperature or precipitation. Occasionally the misty clouds might part and it could get sunny and steamy for a couple of days but mostly conditions remained overcast and wet.

### Epiphyte Heaven

I have been to several rainforests and seen many epiphytes during my travels but the rainforest around Rara Avis was unparalleled and simply magical. Even while struggling to keep the rain away from my camera gear and dealing with fogging lenses I still managed to take over 1200 images in the four days we were there. Digital photography has allowed amateur photographers to shoot subject-rich locations like this without the photo-processing budget of a National Geographic assignment.



*Ronnbergia hathewayi* L.B. Smith, at Rara Avis.

There were seemingly endless varieties of aroids, ferns, fungi, and bizarrely-beautiful rainforest flowers. Many of these showy flowers and fruits belonged to the Rubiaceae (coffee) family. Besides being the source of the beloved breakfast drink and many commonly-cultivated garden plants such as gardenias, pentas and ixoras, it turns out that this family is huge, containing over 10,000 species in about 600 genera. While each and every interesting plant seemed to be vying for its share of time in front of my lens, it should come as no surprise that the bromeliad species garnered some special attention. The majority of the bromeliads that we spotted were in the Pitcairnioideae and Tillandsioideae subfamilies. The only representatives of the Bromelioideae subfamily that we found were *Aechmea pubescens* and *Ronnbergia hathewayi* both conveniently in bloom at the time.

The pitcairnioids were limited to the type genus Pitcairnia. We found *Pitcairnia atrorubens* past bloom and with seed and *P. arcuata* in flower. There was another pitcairnia with a distinctly different leaf shape from the other two species but it was





*Racinaea contorta* (mez) M.A. Spencer & L.B. Smith, at Rara Avis.

not in flower. According to the biodiversity species list at the lodge, *P. valerii* seems to have been recorded here so this may be the name of this other species. *P. arcuata* was interesting in that the species starts out as a terrestrial but climbs vine-like into the

lower canopy with the inflorescence often displaying overhead.

The tillandsioids were the most numerous in species and most diverse in genera. One of the first species I spotted (on the tractor ride up) was *Racinaea contorta*. With its pseudo-bulb shape and twisted and spotted foliage it is a very distinctive and attractive species. Rainforest racinaeas have about the same life expectancy as vampires when exposed to the hot and sunny days in south Florida so I've never tried growing (killing) them. It was nice to see them thriving in the habitat where they belong.

The genus *Tillandsia* was represented by a small clump of *T. bulbosa* found on a tree in the clearing around the lodge and several *T. anceps* spotted along the trails. There were several guzmanias including a vibrant red form of *Guzmania zabnii* and also the attractive *G. donnell-smithii* which was at the peak of its bloom while we were there. *Vriesea monstrum* was spotted on several trails with bloomed-out inflorescences that stretched well over half a meter in length. Werauhias were probably the best represented genus with the very distinctive *Werauhia gladioliflora* and *W. kupperiana* being fairly common. *W. triflora* and *W. vittata* were also recorded along with a number of other unidentified werauhias.

The biggest (literally) surprise came while hiking on a trail that climbed up to the border of Braulio Carrillo National Park to which the Rara Avis reserve abuts. The trail was propitiously named Bromelia and we did see quite a variety of its namesake along the way. When we came up to a large clump of plants with corrugated leaves roughly two meters tall I was stumped. They looked like some giant pitcairnia species but closer inspection proved that there were no spines on the edges of the leaves even near the base where they sequestered small pools of water. There were no flowers evident but I did find an old and well-decomposed inflorescence. The three-sided seed capsule with tufted seeds indicated that this was indeed a bromeliad. Our guide mentioned that a previous group of scientists had reported at least one unidentified brome-



*Guzmania donnell-smithii* Mez ex Donnell Smith, at Rara Avis.

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*Guzmania hollinensis* H. Luther, at Rara Avis.

liad in this area and she thought that this terrestrial giant might be one of them.

On the last day at Rara Avis we were hiking on the Morpho trail, which connects to the Bromelia trail, when I spotted more of the mystery bromeliad – this time with flowers. I was able to get close to one of the flowering plants and pull its 2.5 meter inflorescence down to eye level to get a good look at it (and some photos for identification). The cream-colored petals added little interest to the overall green coloration of the flower spike. This species is unlikely to take the cut-flower market by storm anytime soon. The tall, ribbed foliage, however, might make this an interesting landscaping plant in environments where it would grow well.

### Mystery Solved

When I returned to Florida I quickly sent some images of this mystery plant to Harry Luther at the Mulford B. Foster Bromeliad Identification Center at Marie Selby Botanical Gardens in Sarasota, Florida. Harry has been an invaluable resource in attaching names to mystery plants. While Harry prefers to have a blooming sample in hand to make his diagnosis, he has been able to determine the species if the plant is distinctive and the relevant characteristics are shown in the image. It did not take Harry long to solve this mystery as it was a species he had described – *Guzmania hollinense*.

In 1988 Harry collected his species in Napo, Ecuador. He found it growing abundantly near streams and flooded areas as a terrestrial or low epiphyte. While the clusters that I saw in Costa Rica were always green, Harry reported that some of the Ecuadorian plants had “strikingly bronzy red foliage”. This did not appear to be due to sun exposure but seemed to be a distinct color form of the species. The species

was formally described several years later in the BSI Journal V42(4):168-169. Harry knew this species well but was surprised that I found it in Costa Rica. It was originally thought to be endemic to Ecuador. A single specimen was later collected in Dept. Amazonas, Peru, but all others have come from Ecuador. Finding it in Costa Rica, some 1400 km (900 miles) to the northwest, was quite a range extension for this species. I am currently trying to arrange to have a herbarium specimen collected for this rainforest giant to formally document its new range.

### Conclusion

Costa Rica is a wonderful travel destination. It should be on everybody's short list of places to see. From active volcanoes to tiny poison-dart frogs there is something guaranteed to delight any nature-loving traveler. A visit to the rainforest should be part of the itinerary of all bromeliad enthusiasts who visit Costa Rica. For those who don't mind being bounced and jiggled for a few hours to reach this remote Eden I would heartily recommend spending a few days exploring rainforest reserve at Rara Avis. Who knows what other unexpected discoveries may be found there? More information can be found at their website: [www.rara-avis.com](http://www.rara-avis.com).



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## CALL FOR NOMINATIONS FOR BSI DIRECTORS, 2009-2011 TERM

### Theresa M. Bert

Each year, the BSI Nominations Chair asks BSI members to nominate BSI Board of Directors representatives from their respective regions. If more nominations are made than are open positions for a region, the BSI members in that region are asked to vote on the nominees. The first important step is to nominate people for the directors' open positions. Below is the list of open positions for the 2009-2011 three-year term. Several positions are open, particularly in Australia and Florida. If you are a member of a district with an open position, please help your district by finding a willing person to nominate for your district's open position(s). Instructions regarding who can be nominated and how to nominate follow.

The regions for which director vacancies occur and the number of directors needed are as follows:

|            |             |               |             |
|------------|-------------|---------------|-------------|
| Australia  | 2 directors | Florida       | 3 directors |
| California | 1 director  | International | 1 director  |

Nominations to serve on the BSI Board of Directors for the three-year 2009-2011 term will open January 1, 2008. Serving on the BSI Board is both fun and interesting. The Board makes decisions that influence the direction and activities of the BSI. Board meetings are held annually, usually sometime during the northern hemisphere summer. Board members are expected to attend these meetings and do so at their own expense. The cost need not be prohibitive because Board members can share hotel rooms. One of the Board's activities is to cosponsor and actively participate in the semiannual world conferences. All BSI members are encouraged to participate in the nomination and election process for Board members.

Who may nominate? Any voting member of the BSI who resides in a region for which there is an opening may nominate a candidate for an opening in that region.

Who may be nominated? A nominee must have the following credentials: (1) be a voting member of BSI and have been a voting member for the three consecutive years prior to nomination; (2) reside in the region for which he/she has been nominated; (3) not have served two consecutive terms as a director immediately preceding nomination; (4) agree to being nominated; and (5) agree to serve as a director if elected and to remain a member of the BSI for the duration of his/her term.

Procedure for nominating: (1) obtain the consent of the prospective nominee and verify compliance with the qualification criteria; (2) mail or email nominations to the chairman of the Nominations Committee between January 1, 2008 and March 15, 2008, inclusive. (Nominations must reach the Chair of the Nominations Committee by March 18, 2008.) Nominations by telephone will be accepted through March 15, 2008 but must be confirmed in writing within two weeks; (3) supply with each nomination the full name, address and telephone number of the nominee, the position for which the nomination is being made, the local society affiliation, and a brief "bromeliad biography" of the nominee.

Please mail nominations to:

Larry Giroux  
BSI Nominations Chair  
3836 Hidden Acres Circle N  
North Fort Myers, Florida 33903  
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or email to: [nominations@bsi.org](mailto:nominations@bsi.org)



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• seideliana.

*Pitcairnia* aureobrunea • xanthocalyx.

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## EVENTS CALENDAR

## Australia

November 10-11, 2007. Bromeliad Society of Queensland "Bromeliad Bonanza" at Mt Coot-tha Gardens Auditorium. Contact Bob Reilly, tel. 3870-8029.

June 24-29, 2008, BSI World Conference in Cairns (Australia.) Enquiries to Lynn Hudson, 47 Boden Street, Edge Hill QLD 4870 or lynnne@ledanet.com.au

April 2009, Australian Bromeliad Conference 15, Adelaide, South Australia.

## New Zealand

February 23-24, 2008. Bromeliad Society of NZ Fiesta 2008, Competitive Show & Sale. Mt. Eden War Memorial Hall. Contact Alan Cliffe (09) 479-1451

## United States of America

November 30-Dec. 2, 2007. Caloosahatchee Bromeliad Society Sale and Show. Terry Park, 3410 Palm Beach Blvd (SR80), Fort Myers. Contact Steve Hoppin at SteveandLarry@comcast.net or 239-997-2237.

May 3, 2008. Greater New Orleans Bromeliad Society annual BSI affiliated Show & Sale, Lakeside Shopping Mall. Contact Bonnie Boutwell 985 727 4602

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



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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.

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