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Covers

Front— *Orthophytum roseum* Leme, a newly described species from Bahia State in Brazil (see page 66). Photo by Elton M.C. Leme.

Back— *Billbergia pyramidalis*, a long-time garden favourite. Photographed in habitat, Tresópolis Brazil, by Elton M.C. Leme.

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Editorial

The New Cultivar Registry - an update:

Work on the new BCR is progressing well, in preparation for being transferred to its new home in the public section of our BSI website, and we have received the following encouraging report:

"Yes, the Bromeliad Society International's Culivar Register (BCR for short) **http://botu07.bio.uu.nl/bcg/bcr/index.php** is being constantly updated and to let you know what happened recently you now have a 'What's new' button to press. For example did you know that Mulford Foster did not describe xQuesmea Lyman and thanks to Aussies and Marie Selby Botanical Gardens archives we now know what the plant looks like.

You will also note that we using a BCR watermark on our photos. This is there to deter those who copy your photos and claim them as their own and for commercial purposes. These photos remain under the ownership of the photographer who sent us copies in the first place
PRODUCTION CREW - Geoff, Derek, and Eric"

In This Issue

Scientific

Harry Luther and Karen Norton describe a rather nice new bromeliad, *Vriesea kentii*, named for Mr Jeffrey Kent who propagated it from seed he collected on a road-side in Peru in 1999. The stream of new species descriptions from Brazil continues with another three new orthophytums from Minas Gerais: *Orthophytum buranhense, O. erigens* and *O. roseum*. They are desribed by Elton Leme and André Paviotti Fontana (page 56). We conclude the scientific section with a thorough and well documented study of genetic diversity in *Tillandsia recurvata*, led by Sofia Solórzano.

Cultivation

Derek Butcher investigates another strange case, this time *Dyckia estevsii* which sometimes grows like a normal dyckia and other times pretends to be a fan palm. From Florida, Karen Andreas gets back to basics with some timely advice on when and how to remove offsets from your cultivated bromeliads.

General Interest

Len Colgan has kindly brought us some fascinating insights and conjectures (plus photographs!) from his travels in Ecuador. The focus in this section of his adventures is on *Tillandsia complanta* with its many forms and alliances with other tillandsia species. Of particular note is a wonderful plant thought to be a natural hybrid between *T. complanta* and *T. fendleri* (see page 93)

Our advertisement here last issue did indeed catch a letter!

"Dear Sir,

Just opened Jan/Feb. and while looking at Michael's add am inspired to send you a letter based on your comment next to his ad.

In 1973 a helicopter crashed on top of the Pam Am building in New York, which denied me access to the train station below and my home commute. While waiting for the station to reopen I purchased a plant from a street vendor.

To the present day—Three greenhouses in the back yard with favorites [Aechmea, Vriesia] ---but----I am 600 miles from the nearest fellow Tennessee member and 3 hours from anyone else so a trip to the beaches and Michael or Tropiflora are my only What is new or wow.! Without losing the teck stuff. What about just a page or two BY the supporting growers or a club member of new and in my case BIG plant for personal enjoyment?

Yours, 1685- Tom Lakers"

So how about it, members? Cultivar Registrar? Commercial Growers? -Ed.

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A New Grey Vriesea from Northern Peru.

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

This new species is a member of the "large-flowered grey Vriesea" group that is concentrated in the Northern Andes. It is an exceptionally beautiful species but not adapted to hot lowland conditions, i.e. Florida, Texas, or Singapore.

Vriesea kentii H. Luther & K. Norton, sp. nov. **Type**: Peru, Amazonas, Leimebamba-Chanchapoyas roadside, 1800 m, dry cloud forest, 1999, J. Kent legit; flowered in cultivation, 29 March 2009, J. Kent s.n. (Holotype: USM; Isotype: SEL).

A Vriesea pereziana (André) L.B. Smith cui affinis sed bracteis florigeris quasiglabra, petalis violaceus differt.

Figure 1. *Vriesea kentii*, flower detail.

Plant an epiphyte, 60 – 80 cm in diameter, 80 – 100 cm long with the inflorescence extended. ***Leaves*** laxly spreading in a dense rosette, 50 to 80 in number: ***leaf sheaths*** ovate to broadly elliptic, 8 – 10 x 6 – 9 cm, castaneous especially adaxially, densely brown punctate-lepidote especially adaxially; ***leaf blades*** narrow triangular, attenuate, 25 – 40 x 2 – 3 cm, moderately coriaceous, densely punctate-lepidote especially abaxially, grey to grey-green. ***Scape*** 12 – 20 cm x 3 – 6 mm, semi-erect to arcuate, glabrous, dull green tinged reddish; ***scape bracts*** broadly elliptic with a long, narrowly triangular blade, laxly imbricate, exposing much of the scape, densely lepidote, grey-green to pink. ***Inflorescence*** pendulous, 40 – 70 x 10 – 15 cm with 12 to 30 branches; ***primary bracts*** like the upper scape bracts but without the long blade, mostly apiculate, mostly shorter than the peduncles, grey-green to pink; ***branches*** spreading at ca 30° from the axis with an ebracteate 3 – 7 cm x 2 – 4 mm flattened peduncle that exceeds nearly all of the primary bracts; the fertile portion 4 – 8 x 1 – 2 cm, 4 to 10 flowered; ***floral bracts*** elliptic, acute, 20 – 26 x 8 – 10 mm nerved, variably carinate, tightly imbricate in life, spreading when dried, glabrous except for a few pale fimbriate trichomes at the very apex, bright magenta pink, somewhat glaucose. ***Flowers*** distichously arranged, 2 -- 4 mm pedicellate, opening during the day; ***sepals*** narrowly elliptic, acute, free, 17 – 19 mm long, carinate, nerved, glabrous, pale green; ***corolla*** semi-tubular, spreading at the apex, blue-violet to blue, paler proximally; ***petals*** ligulate, acute, 38 – 42 mm long with a pair of basal appendages; ***stamens & style*** exserted.

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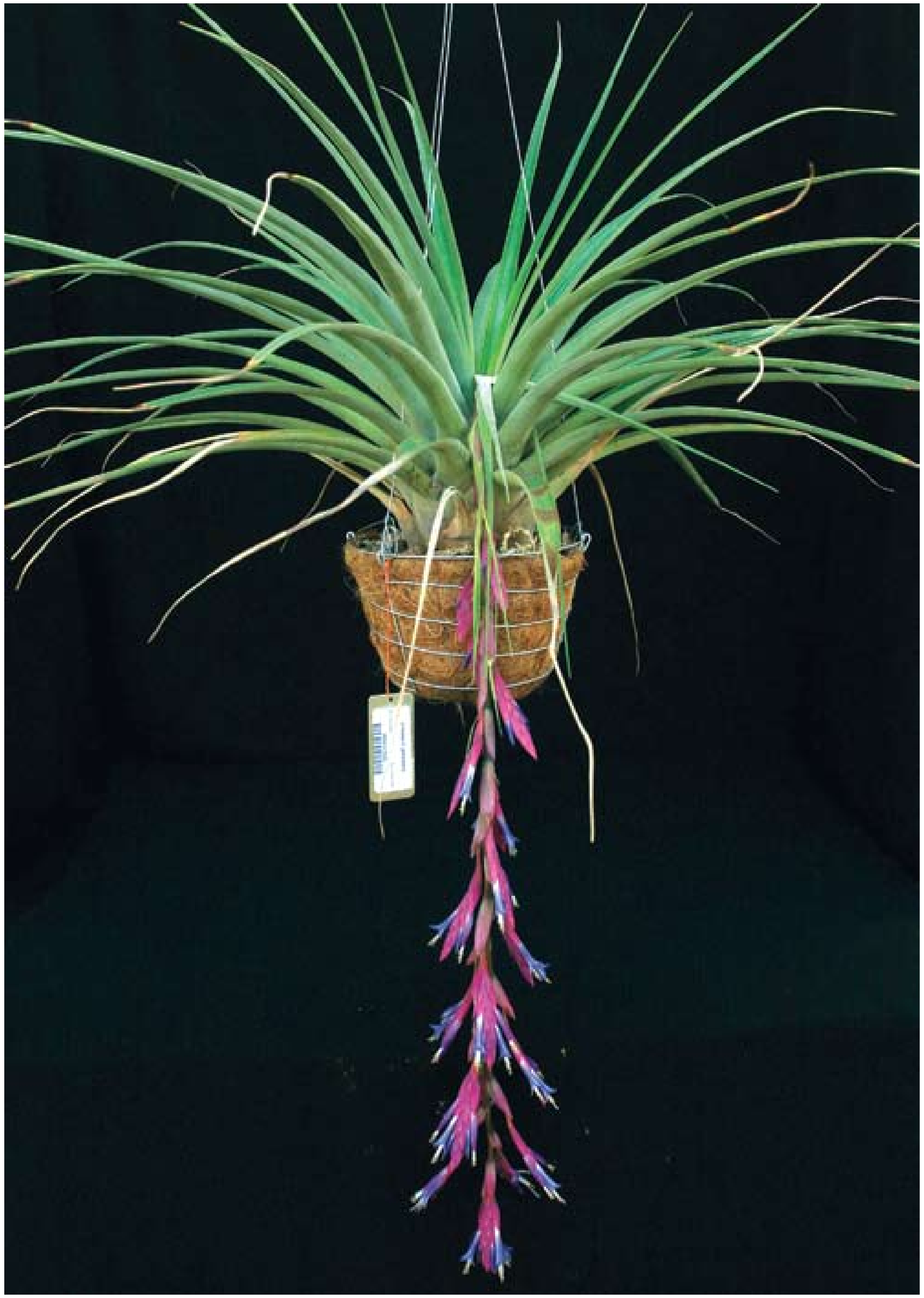

Figure 2. *Vriesea kentii*, flowering in cultivation

Paratypes: Peru. Ex hort J. Kent, from seed, 7 August 2007, D. Cathcart s.n. (SEL); Amazonas, Leimbamba-Chanchapoyas roadside, 1800m. 1999, J. Kent legit; flowered in cultivation SEL 2008-163 10 March 2008; H.E. Luther s.n. (SEL).

This species can be distinguished from *Vriesea pereziana* and its variety *canescens* (André) Gilmartin in having a much larger and more richly branched inflorescences, nearly glabrous floral bracts and blue to blue-violet (not green) petals. I suspect that the only Peruvian collection of *V. pereziana* var. *canescens* (Sagastegui 6001) at the University of Trujillo is actually a depauperate example of *V. kentii*; unfortunately I have not been able to examine this specimen beyond a poor photocopy. Otherwise, all collections of *V. pereziana* are from southern Colombia, and all collections of *V. kentii* are from northern Peru. This spectacular ornamental is named for its collector, Mr. Jeffrey Kent, La Vista, California, who grew a population of plants from field collected seed.

Acknowledgement to Dr. Phil Nelson for the photography.

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Studies on *Orthophytum* - Part XI: Three New Species from Bahia and Minas Gerais

Elton M. C. Leme & André Paviotti Fontana. Illustrations by E.M.C. Leme.

In the sequence of the studies on *Orthophytum*, three new species from the states of Bahia and Minas Gerais are described and illustrated: *Orthophytum buranhense* Leme & A. P. Fontana, from the Atlantic Forest domain, *O. erigens* Leme, from the "Campos Rupestres" of Chapada Diamantina region, both belonging to the complex of scapose inflorescences, and *O. roseum* Leme, also from the "Campos Rupestres" of the same region, which is related to the complex of sessile inflorescences, "subcomplex amoenum".

Orthophytum buranhense Leme & A. P. Fontana, sp. nov. **Type**: Brazil, Bahia, Guaratinga, road Buranhén to Santo Antonio do Jacinto, near the border with Minas Gerais, 363 m. elev., 16°35.08'S 40°09.43'W, 22 Apr. 2009, E. Leme 7775, L. Kollmann, A. P. Fontana & C. Esgario (Holotype: RB; Isotype: MBML).

> A O. lymanianum E. Pereira & Penna, cui affinis, sed laminis foliorum utrimque perdense lepidotis, lepidibus suberectis, marginibus prope basin perdense spinosis, inflorescentia breviora, bracteis primariis medianis altitudinem fasciculorum distincte superantibus, bracteis floriferis utrimque manifeste albo-lepidotis, sepalis dense albo-lepidotis et ovulis apiculatis differt; A O. lanuginosum Leme & Paula, affinis, sed foliis et fasciculis plus numerosis, bracteis floriferis utrimque manifeste albo-lepidotis minoribusque, floribus brevioribus et sepalis etiam petalis brevioribus differt; A O. magalhaesii L. B. Smith, affinis, sed foliis per anthesim plus numerosis, laminis foliorum utrimque perdense lepidotis, bracteis floriferis utrimque manifeste albo-lepidotis, sepalis dense albo-lepidotis et petalis viridibus differt.

Plant saxicolous, stemless, 32-60 cm high at anthesis, shoots on the inflorescence not observed. ***Leaves*** 15 to 18 in number, subspreading-arcuate to distinctly recurved, densely rosulate and forming a distinct rosette before the anthesis and afterwards; ***sheaths*** inconspicuous; ***blades*** narrowly triangular, long attenuate-caudate, 30-58 cm long, 3-4.5 cm wide at base, ca. 2 mm thick near the base, strongly coriaceous, distinctly channeled, green but the color completely obscured by a coarse and dense layer of cinereous-white trichomes abaxially and adaxially, trichomes with margins suberect, irregularly and shortly lacerate, giving a scurfy appearance to the blades, inconspicuously nerved abaxially, margins straight to slightly recurved, densely to subdensely spinose, spines narrowly triangular, flattened, straight to antrorse-uncinate, densely white-lepidote except for the castaneous glabrous apex, 2-4 mm long, 1.5-2.5 mm wide at base, 2-10 mm apart. ***Scape*** erect, densely cinereous-white-lanate, green but color completely obscured by the trichomes, 0.8-1.5 cm in diameter; ***scape bracts*** foliaceous and not distinguishable from the leaves, slightly reduced in size toward the apex, subspreading-arcuate to distinctly recurved. ***Inflorescence*** bipinnate to inconspicuously tripinnate at base, cylindrical, erect, 13-21 (-30) cm long, fascicles subdensely

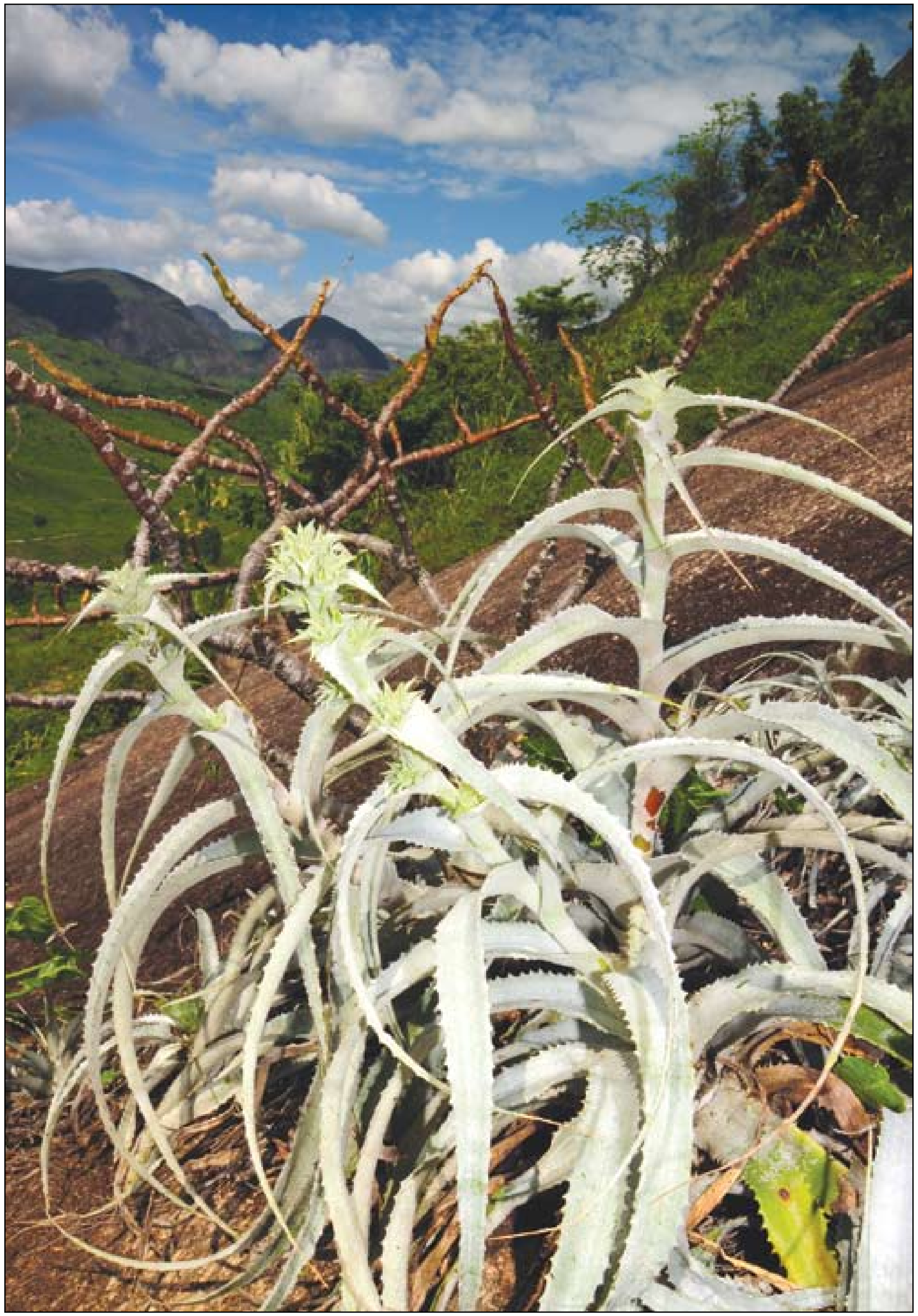

Figure 1. Habit of *Orthophytum buranhense* Leme & A. P. Fontana.

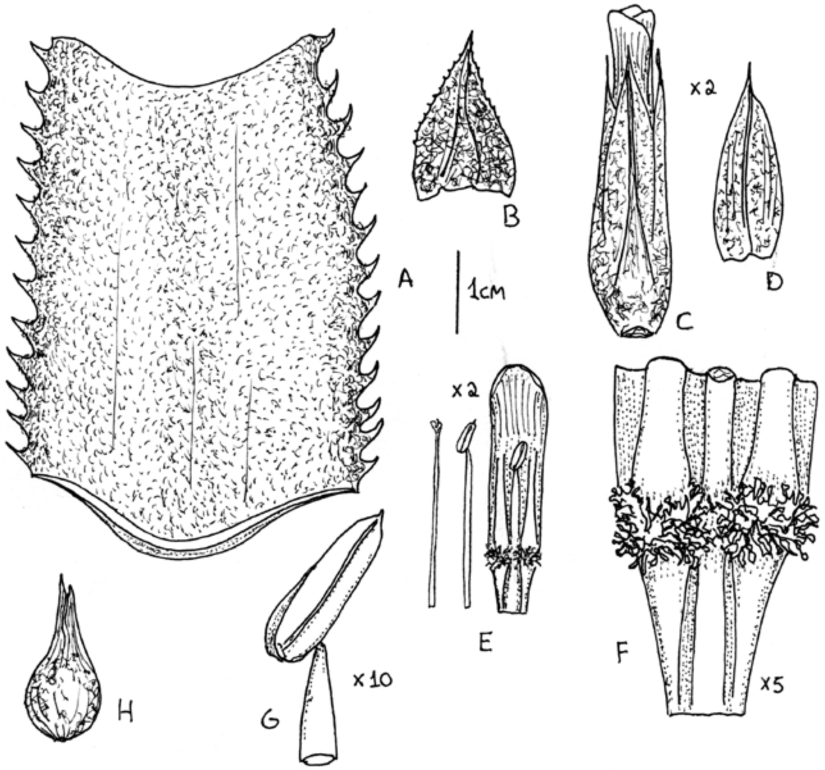

Figure 2. *Orthophytum buranhense* Leme & A. P. Fontana: A) basal portion of the leaf blade; B) floral bract; C) flower; D) sepal; E) petal, antesepalous filament and anther, and style; F) details of the petal appendages; G) anther; H) fruit.

(toward the base) to densely (near the apex) arranged, 1-3 cm apart, bearing 3 to 5 fascicles densely aggregated at extreme apex, rachis 0.6-1.3 cm in diameter, straight or nearly so, smooth, terete, densely cinereous-white-lanate with trichomes obscuring its green color; ***primary bracts*** subspreading-recurved (basal ones) to distinctly reflexed (the upper ones), canaliculate, the basal ones foliaceous and resembling the upper scape bracts, many times longer than the fascicles, the median ones subfoliaceous, 4 to 7 times longer than the fascicles, the upper ones reduced in size toward the inflorescence apex, slightly shorter to 3 times longer than the fascicles, triangular to ovate, acuminate-caudate, 3-7 x 2 cm, strongly coriaceous, distinctly exceeding to shorter than the fascicles, densely cinereous-white-lepidote on both sides, green but color completely obscured by the trichomes, nerved abaxially, laxly (toward the apex) to densely (near the base) spinose, spines triangular, 1-2 mm long, 0.5-1 mm wide at base, the basal ones 1-2 mm apart, retrorse-uncinate to spreading; ***fascicles*** 10 to 16 in number, polystichously disposed, suberect, sessile, subglobose-capitate to subcylindric in late anthesis, strobilate, densely rosulate, 2.5-5 cm long, 2.5-3 cm in diameter (including the floral bracts), 10 to 30-flowered; ***floral bracts*** ovate, acuminate and apiculate, pungent, coriaceous, the basal ones carinate the upper ones slightly if at all carinate toward the apex, v-shaped, slightly exceeding the sepals but strongly recurved toward

Figure 3. Details of the flowers of Orthophytum buranhense Leme & A. P. Fontana.

the apex and exposing them, green, finely nerved, coarsely and densely cinereous-white-lepidote on both sides, 19-20 x 11-14 mm, margins densely spinulose, spines 0.5-0.7 mm long. ***Flowers*** ca. 20 mm long (with extended petals), sessile, densely arranged, odorless; ***sepals*** symmetrical or nearly so, ovate, 12-13 x 4-5 mm, free, entire, green, rigid, densely and coarsely white-floccose-lepidote except for the glabrous margins, apex acuminate-caudate, pungent, the adaxial ones carinate with keels decurrent on the ovary, the abaxial obtusely carinate; ***petals*** narrowly sublinear-spatulate, rounded and inconspicuously cucullate, ca. 15 x 3-3.5 mm, free, erect at anthesis or nearly so, green except for the paler green apical margins, bearing 2 densely and prevailing downwardly-oriented, fimbriate-lacerate appendages 3-4 mm above the base, as well as 2 conspicuous longitudinal callosities nearly equaling the anthers; ***filaments*** terete,

Figure 4. General view of the habitat of *Orthophytum buranhense* at Buranhén, county of Guaratinga, Bahia.

greenish-white, the antepetalous ones 7-8 mm long, adnate to the petals for 4-5 mm, the antesepalous ones ca. 10 mm long, free; ***anthers*** ca. 2 mm long, base sagittate, apex acute and apiculate, dorsifixed at 1/3 of its length above the base; ***stigma*** conduplicate, ca. 1 mm in diameter, whitish, blades broadly ovate, suberect, scaloped; ***ovary*** ca. 4 mm long, ca. 5 mm in diameter at apex, subtrigonous, densely white-floccose-lepidote mainly toward the apex, greenish; epigynous tube inconspicuous; placentation apical; ovules apiculate. ***Fruits*** globose, ca. 9 x 8 mm, green.

Paratype: Brazil, Bahia, Guaratinga, road Buranhén to Santo Antonio do Jacinto, near the border with Minas Gerais State, 363 m. elev., 16º35.08’S 40º09.43’W, 22 Apr. 2009, E. Leme 7778, L. Kollmann, A. P. Fontana & C. Esgario (RB); ibid., 407 m. elev. 16º35’04.1”S 40º09’27.9”W, 22 Apr. 2009, A. P. Fontana 5900, E. Leme, L. Kollmann & C. Esgario (MBML); Minas Gerais, Santa Maria do Salto, road to Santo Antonio do Jacinto, Piauí, 483 m. elev., 16º22.79’S 40º11.27’W, 25 Apr. 2010, E. Leme 8255 & L. Kollmann (RB).

Orthophytum buranhense is an attractive new species due to the showy cinereous-white color of its leaves and inflorescence (except for the petals), the first ever observed for a member of this genus. It is a typical member of the “scapose complex”, “disjunctum subcomplex” and the closest relative is *O. lymanianum*. However, this new species can by distinguished from it by the leaf blades that are densely and coarsely cinereous-white-lepidote (vs. glabrous or glabrescent adaxially), trichomes with suberect blades (vs. trichomes strongly adpressed and forming a membrane), leaf blades with densely spinose basal margins (vs. subdensely to laxly spinose near the base), a comparatively shorter inflorescence [13-21(-30) cm vs. ca. 30 cm long], median primary bracts distinctly exceeding the fascicles (vs. about equaling the fascicles), , floral bracts distinctly cinereous-white-lepidote on both sides (vs. glabrous at least adaxially), densely cinereous-white-lepidote sepals (vs. glabrescent) and by the apiculate ovules.

This new species may also be related to *Orthophytum lanuginosum* (see figures 17 & 18 in Leme & Paula, 2005), being distinguished from it by more numerous leaves (15 to 18 vs. 5 to 7 in number), the numerous fascicles (10 to 16 vs. 5 to 6 in number), smaller (19-20 x 11-14 mm vs. 20-30 x 11-20 mm) and cinereous-white-lepidote floral bracts with trichomes completely obscuring its color (vs. reddish-bronze colored toward the apex with trichomes not at all obscuring its color), shorter flowers (ca. 20 mm vs. ca. 30 mm long), shorter sepals (12-13 mm vs. 17-20 mm long), and shorter petals (ca. 15 mm vs. 23-26 mm long).

When compared to *Orthophytum magalhaesii*, this new species differs by the following features: leaves more numerous at anthesis (15 to 18 vs. 3 to 9 in number), leaf blades densely and coarsely cinereous-white-lepidote on both sides with trichomes completely obscuring leaf color (vs. sublanate with unifilamentous to multifilamentous trichomes not completely obsturing blades color), floral bracts densely cinereous-white lepidote on both sides (vs. glabrous or nearly so), densely white-lepidote sepals (vs. inconspicuously and sparsely white-lepidote to glabrous sepals) and by the green petals (vs. white with a greenish central-apical portion).

Orthophytum buranhense grows on shallow organic material accumulated in crevices and depressions in very steep and dark granitic surfaces in the domain of the Atlantic Forest in southern Bahia and adjacent areas of Minas Gerais. It forms dense, sometimes large groups of plants, mostly full exposed to sunlight, strikingly contrasting the cinereous-white color of their leaves and bracts with the very dark rock surface.

Orthophytum erigens Leme, sp. nov. **Type**: Brazil, State of Bahia, Seabra, Sept. 1994, E. E. Pereira E-417, fl. cult. May 2009, E. Leme 2705. (Holotype: RB; Isotypes: HB, SEL).

> A O. leprosum (Mez) Mez, Leme, cui affinis, sed planta subduplo breviore, foliis subtus apicem versus glabris, fasciculis distincte minoribus, bracteis floriferis altitudinem sepalorum brevioribus vel aequantibus, modice recurvatis et sepalis glabris vel fere differt; a O. falconii Leme, cui proxima, sed laminis foliorum longioribus, subtus apicem versus glabris, bracteis floriferis et sepalis viridibus differt; a O. alvimii W. Weber, affinis, sed laminis foliorum manifeste brevioribus, bracteis floriferis minoribus, floribus brevioribus, et sepalis petalisque brevioribus differt.

Plant terrestrial, long-caulescent, 43-55 cm high, propagating by rhizomes 3-7 cm long, 0.8-1 cm in diameter, main stem without distinction from the scape, dark red, densely white-lanate, 1-1.5 cm in diameter. ***Leaves*** indistinguishable from the scape bracts, forming a lax rosette before anthesis but rosette soon disappearing due to the early elongation of the stem and absent at anthesis; ***sheaths*** inconspicuous; ***blades*** narrowly lanceolate, acuminate, ending in an acicular and pungent spine, 11-18 cm long, 2.2-3.3 cm wide at base, suberect-recurved to subspreading, coriaceous, canaliculate, densely and coarsely adpressed white-lepidote near the base and glabrous toward the apex on both sides, but adaxially sometimes completely glabrous, abaxially nerved, greenish-red to dark red, margins laxly spinose, spines subtriangular, complanate, distinctly antrorse-uncinate, 1.5-2.5 mm long, 1-2 mm wide at base, 7-15 mm apart. ***Scape*** not distinguishable from the main elongate stem, 0.6-1 cm in diameter, densely white-lanate to glabrescent with age, dark reddish near the base and greenish toward the apex; ***scape bracts*** not distinguishable from the leaves, spreading to reflexed and gradually reduced in size upwardly. ***Inflorescence*** bipinnate, cylindrical, erect, 6-15 cm long, fascicles laxly (toward the base) to densely (near the apex) arranged, 1-3.5 cm apart, bearing 4 to 6 fascicles densely aggregated at extreme apex, rachis ca. 0.6 cm in diameter, straight to slightly flexuous, smooth, terete, densely white-lanate to glabrescent, greenish; ***primary bracts*** subspreading (basal ones) to distinctly reflexed (the upper ones), canaliculate, the basal ones subfoliaceous and resembling the upper scape bracts, 4 to 6 times longer than the fascicles, the upper ones reduced in size toward the inflorescence apex, slightly exceeding to 3 times longer than the fascicles, ovate-triangular, acuminate and ending in a long acicular, pungent spine, 2-4.5 x 1.5 cm, coriaceous, subdensely white-lepidote at base on both sides and glabrous toward the apex, greenish-red near the base to bronze colored toward the apex, nerved abaxially, laxly spinose, spines triangular, 1.5-2 mm long, ca. 1 mm wide at base, the basal ones 3-10 mm apart, antrorse (upper ones) to retrorse (basal ones) uncinate; ***fascicles*** 7 to 11 in number, polystichously arranged, suberect, sessile, globose-capitate, strobilate, densely rosulate, 12-15 mm long (excluding the petals), 14-17 mm in diameter, 7 to 12-flowered; ***floral bracts*** broadly triangular-ovate, acuminate, slightly carinate toward the apex, equaling to slightly shorter than the sepals, but recurved and distinctly exposing them, green, nerved, inconspicuously and sparsely white-lepidote but soon

Figure 5. Habit of *Orthophytum erigens* Leme, flowering in cultivation.

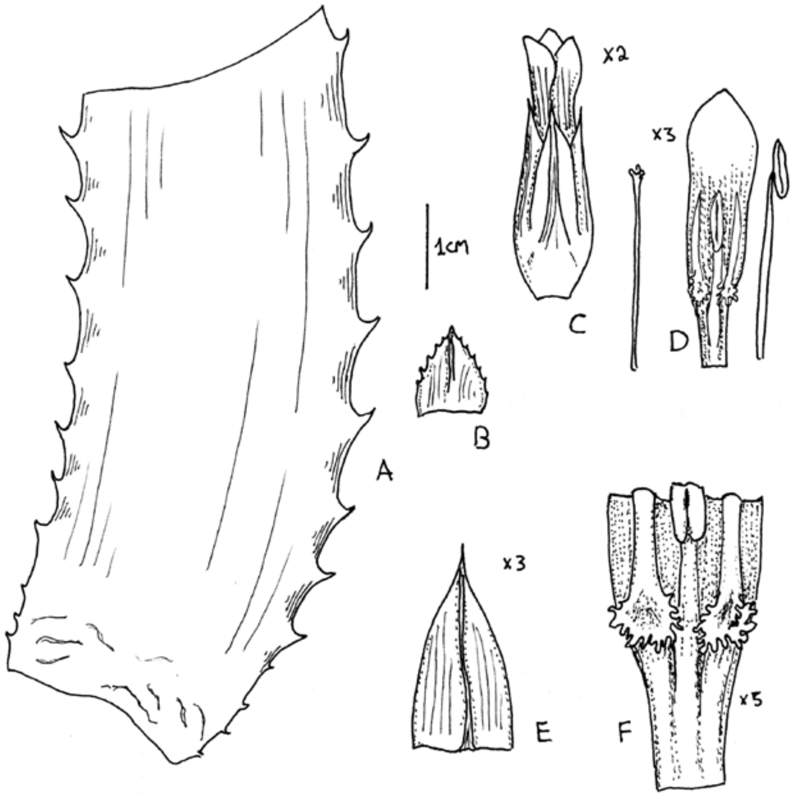

Figure 6. *Orthophytum erigens* Leme: A) basal portion of the leaf blade; B) floral bract; C) flower; D) petal, antesepalous filament and anther, and style; E) sepal; F) details of the petal appendages.

glabrous, 10-13 x 8-10 mm, subdensely spinulose, spines irregularly curved, 0.5-1 mm long. ***Flowers*** 16-17 mm long (including the petals), sessile, densely arranged, odorless; ***sepals*** ovate-lanceolate, apex acuminate-caudate, ca. 8 x 4 mm, free, entire, green, glabrous or nearly so, the adaxial ones carinate with keels decurrent on the ovary, the abaxial one ecarinate; ***petals*** sublinear-spatulate, obtuse to subagute and minutely apiculate, 11-12 x 3 mm, free, erect at anthesis except for the suberect apex, the basal 2/3 greenish and the apical 1/3 white, bearing 2 digitate-lacerate to irregularly scalloped appendages ca. 3.5 mm above the base, as well as 2 conspicuous longitudinal callosities about equaling the anthers; ***filaments*** terete, greenish toward the apex, the antepetalous ones ca. 5 mm long, adnate to the petals for ca. 3 mm, the antesepalous ones ca. 7 mm long, free; ***anthers*** ca. 2.5 mm long, base obtuse and apex distinctly apiculate, fixed near the middle; ***pollen*** sulcate, ellipsoidal, reticulate to microreticulate toward polar areas, lumina polygonal, muri thickened; ***stigma*** simple-erect, white, lobes obovate, suberect-recurved; ***ovary*** ca. 3 mm long, ca. 4 mm wide at apex, subtrigonous, greenish, inconspicuously white-lanate to glabrous; epigynous tube inconspicuous; placentation apical; ***ovules*** obtuse to obtusely apiculate. ***Fruits*** unknown.

Figure 7. Details of the flowers of *Orthophytum erigens* Leme flowering in cultivation.

The establishment of *Orthophytum erigens* as a new species is not an easy task since the closest relatives are imperfectly known (except for *O. falconii*). In the "scapose inflorescence" complex, it belongs to the " leprosum subcomplex ", because their leaves neither form a rosette at anthesis (due to the early elongation of the stem and scape), nor can be distinguished from the scape bracts.

The closest relative, *Orthophytum leprosum*, is only known from the lectotype specimen (Pohl 5229) designated by Smith (1955) and available at herbarium of the Museum of Natural History in Vienna (W; photo examined), Austria (Till, 1994), and by two specimens (Glaziou 14035) also cited in the protologue (Mez, 1891-1892) and deposited in the herbarium of Paris Museum, France (specimens examined). In both cases, the basal portion of the specimens is unknown and it is not possible to determine if this species ever forms a leaf rosette at anthesis. Even so, comparing *O. erigens* with it, the new species can be differentiated by its apparently smaller size when in bloom (43-55 cm vs. 90-100 cm high), leaves glabrous toward the apex abaxially (vs. abaxially densely white-lepidote throughout), fascicles distinctly smaller (12-15 x 14-17 mm vs. 17-20 x 25-35 mm), floral bracts slightly shorter to equaling the sepals (vs. equaling to distinctly exceeding the sepals), moderately recurved (vs. strongly recurved), and by the glabrous sepals (vs. sepals barbate-lanate at apex).

This new species can be also compared morphologically to *Orthophytum falconii*, differing by the longer leaf blades (11-18 cm vs. 8-13 cm long) that are glabrous toward the apex abaxially (vs. densely white-lepidote abaxially), and by the green floral bracts and sepals (vs. red). Finally, another possible relative is the mysterious *O. alvimii*, but *O. erigens* differs from it by the distinctly shorter leaf blades (11-18 cm vs. ca. 60 cm long), smaller floral bracts (10-13 x 8-10 mm vs. ca. 18 x 11 mm), shorter flowers (16-17 mm vs. ca. 25 mm long), sepals (ca. 8 mm vs. ca. 15 mm long) and petals (11-12 mm vs. ca. 20 mm long).

The name chosen for this new species is based on the Latin word "erigens, tis", meaning something that arise erect from the ground, portraying the typical, prominent erect habit of *Orthophytum erigens*, which is a terrestrial species forming large group of plants in the "Campos Rupestres", Cerrado domain, of the Chapada Diamantina region.

Orthophytum roseum Leme, sp. nov. **Type:** Brazil, Bahia State, Chapada Diamantina, Palmeira, near Caeté-Açu, Riachinho, leg. R. de Oliveira s. n., fl. cult. Febr. 2008, E. Leme 3439 (Holotype: HB; Isotype: RB).

A O. burle-marxii L. B. Sm. & Read, cui affinis, laminis foliorum basi angustioribus (1.3-1.5 cm vs. 1.5-2.5 cm wide), marginibus spinis brevioribus (0.5-1 mm vs. 1-2 mm long), bracteis floriferis roseis (vs. rubris), sepalis minoribus (11-12 x 3.5-4 mm vs. 17-20 x 4-6 mm), roseis (vs. rubris), petalis etiam minoribus (15-16 x 4 vs. 18-25 x 6 mm long), antheris brevioribus (ca. 3 mm vs. 4.5 mm long) differt.

Plant saxicolous, stemless, propagating by short basal shoots. ***Leaves*** ca. 36 in number, spreading, coriaceous, forming a dense round rosette; ***sheaths*** inconspicuous but broader than the blades, very densely spinulose, inconspicuously and sparsely punctulate-lepidote, greenish-white toward the base; ***blades*** narrowly sublinear-triangular, long acuminate-caudate, 25-40 cm long, 1.3-1.5 cm wide at base, not at all canaliculate, ca. 2 mm thick near the base, green throughout before anthesis and rose at base at anthesis, opaque, abaxially densely and coarsely white-lepidote with trichomes slightly obscuring leaf color, adaxially subdensely to sparsely and inconspicuously white-lepidote, margins densely to sparsely spinulose, spines subtriangular-uncinate, antrorse, yellowish, 0.5-1 mm long, 2-7 mm apart. ***Inflorescence*** bipinnate in its outer portion, simple in its central portion, subumbellate, sessile, densely many-flowered, ca. 4 cm in diameter; ***primary bracts*** the outer ones foliaceous, rose near the base and green toward the apex, the inner ones narrowly subtriangular, ca. 40 x 18 mm, distinctly exceeding the fascicles, suberect, reddish-rose and inconspicuously white-lepidote toward the apex and whitish-green and glabrous at base, margins densely to sparsely and inconspicuously spinulose, spines to 0.5 mm in length; ***fascicles*** ca. 14

Figure 8. Habit of *Orthophytum roseum* Leme flowering in cultivation.

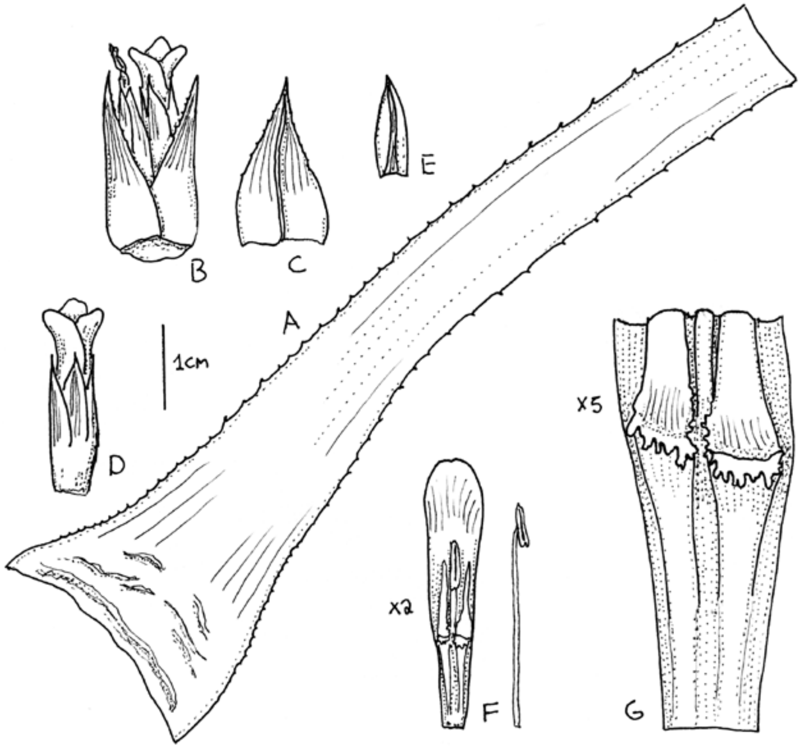

Figure 9. *Orthophytum roseum* Leme: A) basal portion of the leaf; B) basal fascicles; C) floral bract; D) flower; E) sepal; F) petal, antesepalous filament and anther; G) details of the petal appendages.

in number, flabellate, complanate, shortly pedunculate, 23 x 11-15 mm (excluding the petals), 2- to 3-flowered; ***floral bracts*** triangular, rose toward the apex, inconspicuously and sparsely pilose-glandulose, triangular, acuminate, those of the fascicles distinctly carinate, margins densely and inconspicuously spinulose, ca. 20 x 10 mm, about equaling the sepals, thinly coriaceous toward apex and membranous near the base, erect; ***Flowers*** 21-24 mm long (including the petals), sessile, densely arranged, odorless; ***sepals*** subsymmetrical, narrowly lanceolate, acuminate-apiculate, 11-12 x 3.5-4 mm, free, entire, rose, inconspicuously and sparsely pilose-glandulose, the posterior ones alate-carinate, the anterior one carinate at least at base; ***petals*** narrowly subspatulate, apex rounded and slightly emarginated to remotely apiculate, 15-16 x 4 mm, free, white, at anthesis erect except for the subspreading distal portion, bearing 2 laminate, cupulate, obtuse, irregularly crenulate, upwardly to downwardly oriented appendages 5-6 mm above the base, as well as 2 conspicuous longitudinal callosities slightly shorter than the anthers; ***filaments*** terete, white, the antepetalous ca. 7 mm long, adnate to the petals for 5-6 mm, the antesepalous ones ca. 11 mm long, free; ***anthers*** ca. 3 mm long, base obtuse, apex obtuse and minutely apiculate, fixed at 1/3 of its length above the base; ***stigma*** conduplicate, blades ca. 1 mm long, erect, margins remotely crenulate; ***ovary*** ca. 6 mm long, ca. 4.5 mm in diameter at apex, trigonous, greenish-white, glabrous; ***epigynous tube*** crateriform, ca. 1 mm long; ***placentation*** median to apical; ***ovules*** obtuse. ***Fruits*** unknown.

Figure 10. Details of the inflorescence and flowers of *Orthophytum roseum* Leme flowering in cultivation.

Orthophytum roseum is closely related to **O. burle-marxii,** differing by narrower leaf blades (1.3-1.5 cm vs. 1.5-2.5 cm wide) and shorter marginal spines (0.5-1 mm vs. 1-2 mm long). The adaxial surface of the leaf blades of *O. roseum* is subdensely to sparsely and inconspicuously white-lepidote and the floral bracts are rose, as well as the sepals, inspiring its name. In contrast, the photographs provided in the protologue of *O. burle-marxii* show a densely lepidote-leafed specimen with the basal portion of the inner leaves and the primary bracts bright red, as well as the floral bracts and sepals (Smith & Read, 1979). Other differences of the new species are the smaller sepals (11-12 x 3.5-4 mm vs. 17-20 x 4-6 mm), petals (15-16 x 4 mm vs. 18-25 x 6 mm long), and anthers (ca. 3 mm vs. ca. 4.5 mm long).

This new species was found growing as a rupicolous in vertical sandstones rocks, along rivers, in the “Campos Rupestres” of Caeté-Açu, Palmeiras, in more or less shaded places. It is quite prolific vegetatively, forming dense clumps, which is also observed in cultivation.

Acknowledgments

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Low Genetic Diversity in *Tillandsia recurvata* (*Bromeliaceae*), the Most Ubiquitous Epiphyte Species of the Semiarid and Arid Zones of North America.

Sofia Solórzano, Sandra J. Solís & Patricia Dávila.[1]

Abstract

Tillandsia recurvata L. is the most ubiquitous epiphyte species in the American arid and semi-arid regions. In the Zapotitlán valley of Mexico this epiphyte shows the highest population density on the legume trees of *Prosopis laevigata* and *Parkinsonia praecox*. In the present study, we compared the genetic diversity of *T. recurvata* collected from these two host-tree species. We sampled 90 bromeliads of 90 different trees of *P. laevigata* and *P. praecox* found on the alluvial terraces of the Zapotitlán valley. We amplified five microsatellite regions using a PCR technique. Our study found no genetic differentiation between populations established on *P. laevigata* and *P. praecox*. Unexpectedly the lowest genetic diversity and a highest inbreeding coefficient were found in bromeliads collected on *P. laevigata*. The population genetic diversity of *T. recurvata* in Zapotitlán valley estimated in this study is low, but higher than the one described from the northern Mexican arid regions, and consequently our results do not support a non-complete autogamous breeding system for *T. recurvata* as was suggested.

Resumen

Tillandsia recurvata L. es la epifita más abundante de las regiones áridas y semiáridas de América. En el valle de Zapotitlán, México, esta epifita muestra las densidades poblacionales más altas sobre los árboles de leguminosas de *Prosopis laevigata* y de *Parkinsonia praecox*. En este estudio, se contrastó la diversidad genética *T. recurvata* de poblaciones colectadas sobre estos hospederos. Se muestrearon 90 bromelias de 90 árboles diferentes que crecen en un mezquital de una terraza aluvial del Valle de Zapotitlán. Se amplificaron cinco regiones microsatélite usando la técnica de PCR. Este estudio no encontró diferenciación genética entre las poblaciones que crecen en *P. laevigata* y en *P. praecox*. Contrario a lo esperado se encontró la diversidad genética más baja y el coeficiente de endogamia más alta en las bromelias que crecen sobre *P. laevigata*. La diversidad genética de *T. recurvata* en el valle de Zapotitlán fue baja, pero es más alta que la que se describió para las poblaciones de la región árida del norte de México, en consecuencia nuestros resultados no apoyan la idea de que *T. recurvata* es una especie de reproducción autógama completa como fue sugerido.

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Figure 1. A clump of *Tillandsia recurvata* in bloom. Photo by O. Tellez.

Introduction

Tillandsia recurvata (*Bromeliaceae*) is the most ubiquitous obligate epiphyte species (figure 1) of the arid and semiarid regions of North America (Benzing and Renfrow 1971, Soltis et al. 1987, Benzing 1990), whereas in the South American deserts, it is considered as a rare species (Pinto et al. 2006). In some areas, the high biomass load of this epiphyte eventually kills some branches or complete host-trees, for this reason the species has been considered a hemiparasite or structural parasite (Montaña et al. 1997).

In the central Mexican semiarid region of the Zapotitlán Valley it was documented that the highest population density of *Tillandsia recurvata* is found on the legume trees of *Prosopis laevigata*, followed by the trees of *Parkinsonia praecox*, and on the shrubs of *Acacia bilimekii* (Rzedowski 1978, Bernal et al. 2005). Occasionally, *T. recurvata* is found on *Beaucarnea gracilis*, and even on some columnar cacti as *Cephalocereus columna-trajani* and *Neobuxbaumia tetetzo* (García-Suárez et al. 2003).

The differential population density of epiphytes on different host plant species has also been documented in other Tillandsia species. For example, the Mexican endemic bromeliad *Tillandsia achyrostachys* var. *achyrostachys* grows on 16 different host tree species, although the highest population density is found on *Bursera copallifera* (González-Astorga et al. 2004). Another common example, in southern United States is *T. usneoides* which preferentially occurs on *Quercus virginiana* and *Celtis* spp (Callaway et al. 2002).

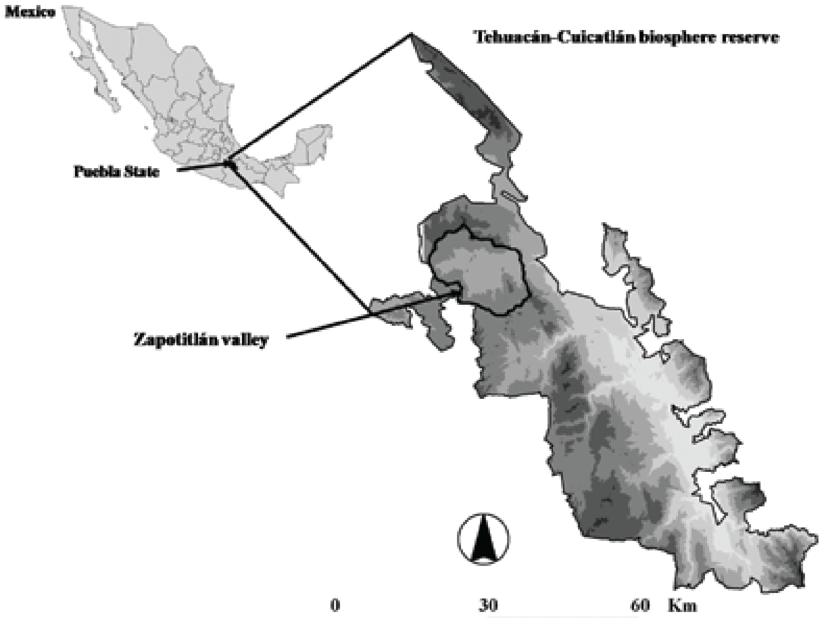

Figure 2. Location of the Zapotitlán valley (closed in the black polygon) at the northern of the Tehuacán-Cuicatlán biosphere reserve.

This differential population density observed on the different host species motivated us to explore whether it has any consequence in the population genetic attributes of *Tillandsia recurvata*. It is known that the genetic diversity in plants is influenced by their life history traits and breeding system (Loveless and Hamrick 1984, Bawa and Hadley 1991). Knowledge of pollination biology and seed dispersion for Tillandsia is fragmentary and scarce (Ramírez et al. 2008). *T. recurvata* has had some study done, and Soltis et al. (1987), based on its floral morphology, proposed that it is an autogamous species , with a wind seed dispersion mechanism. To date there have not been any field or experimental studies that this proposal. It should be noted that other Tillandsia species have been documented for self- compatibility and incompatibility, and vegetative reproduction is also present in this genus (Ramírez et al. 2008).

Only two population genetics studies are available for *Tillandsia recurvata*. The first one was carried out using 19 allozyme s loci in the northern Mexican populations, where a genetic diversity of zero was estimated (Soltis et al. 1987). In contrast, the other study carried out with a population from the Zapotitlán Valley of central Mexico, using only three microsatellite loci (Ramírez-Padilla, 2008), found an observed heterozygosis of 0.67 and an excess of heterozygotes as endogamy coefficient showed (FIS = -0.028). In addition, a genetic study available for the Mexican endemic *T. achyrostachys* found a low genetic diversity from 16 allozyme loci used (González-Astorga et al. 2004).

Figure 3. Overview of the study area with a vegetation type classified as Mesquite bush. Photo by U. Guzmán.

In the present study, we evaluated the genetic diversity of *Tillandsia recurvata* on two host-tree species (*Prosopis laevigata* and *Parkinsonia praecox*). Based on population genetics theory predicts (Hedrick 2005), we expected to find higher genetic diversity values in the bromeliads populations established on *P. laevigata*, than those on *P. praecox*, because *P. laevigata* has lower population densities. We used microsatellite markers, short DNA sequences repeated in tandem with a typical length of 1-6 nucleotides scattered through the genome (Beebee and Rowe 2008). These molecular markers are appropriate for population genetic analyses because they detect high levels of plant polymorphism (Agarwal et al. 2008), can identify heterozygous individuals (Jarne and Lagoda 1996) and require small tissue samples (Jarne and Lagoda 1996; Agarwal et al. 2008).

Study site: This study was carried out in two localities located at the Zapotitlán valley in (14° 12' N, 92° 24' W). The bromeliad samples were collected from *Prosopis. laevigata* trees found in the alluvial terraces and from a close vegetation patch composed by *Parkinsonia praecox*. This valley is located in the southern portion of the Mexican State of Puebla, which is part of the Tehuacán-Cuicatlán biosphere reserve (figure 2). This reserve is in a semi-arid region of Mexico, and part of the Mexican xerophytic province (Rzedowski 1978). The Zapotitlán valley has an annual mean precipitation of 400 mm, with an average annual temperature of 21°C (Rzedowski 1978). In the mesquite bush the dominant trees are *P. laevigata*, *P. praecox* and some cacti species such as *Mytillocactus geometrizans* (figure 3), *Pachycereus marginatus* and *Stenocereus pruinosus* (Valiente-Banuet et al. 2000).

Figure 4. *Tillandsia recurvata* on the hard bark of the host-tree *Prosopis laevigata*. Photo by. O. Tellez.

Methodology: In total, we collected 90 samples of *Tillandsia recurvata*, each one taken from a different tree. Samples were collected from 60 *Prosopis laevigata* trees (figure 4) and 30 *Parkinsonia praecox* trees (figure 5). We collected bromeliad samples in all of the trees found in the study sites. We established as a *T. recurvata* population all clumps found among trees of each two species, and it is important to point out that this epiphyte was the only species found in all trees sampled. The populations of these two tree species are geographically separated by about 5 km so we considered the *T. recurvata* to be two different bromeliad populations.

Each bromeliad was wrapped individually in aluminum paper and stored in liquid nitrogen. The material was transported to the laboratory and maintained at -80 °C.

Genetic analyses: Total genomic DNA was isolated from 90 individuals of *Tillandsia recurvata*, using the DNeasy Plant Mini Kit (QIAGEN), according to the manufacturer's recommendations.

Figure 5. *Tillandsia recurvata* on the green trunk of *Parkinsonia praecox* a tree with photosynthetic branches and trunk. Photo by. O. Tellez.

In order to find microsatellite regions in *Tillandsia recurvata*, we tested five primers (Table 1) previously designed for *T. fasciculata* and *Guzmania monostachya* (Boneh et al. 2003). These primer pairs were assayed in individual PCR reactions containing 10 µM of each primer, 100 µM of dNTPs mix, 2.0 mM of MgCl2, 40mM Tris-HCl pH 8.3, 40 mM of KCl, 100X BSA, 2 U Taq (Invitrogen) and 10-20 ng of total genomic DNA. The PCR cycles consisted of an initial denaturation at 94 °C for 2 min; 30 cycles consisting of denaturation at 94 °C for 10 s, annealing 51-58 °C for 10 s, and extension at 72 ° C for 10 s; a final extension at 72 °C for 5 min. PCR products were run on 1.5% agarose gels with the inclusion of a 100 bp ladder size standard (Invitrogen). The forward primers were fluorescently labelled with fluorochromes HEX and FAM (Table 1). The electrophoretic reactions with fluorescent primers were performed on ABI sequencers, and ROX 500 (Applied Biosystems) was added as a standard size. Fragment analyses were performed using GENESCAN V (Applied Biosystems).

The genetic diversity analyses considered the 90 samples as a single bromeliad population as well as they divided by the host-tree species. We used Arlequin V3.1 program (Excoffier et al. 2006) to estimate the observed (HO = number of heterozygotes at a locus / total number of individuals surveyed) as the expected heterozygosity (HE = 1 – Σ(pi)2, pi = allele frequency) and its standard errors following Nei's equations (1987). In addition, the allelic diversity was estimated (AD = total number of alleles found / total loci analyzed, Frankham et al. 2002). This software analyzes deviations from Hardy-Weinberg equilibrium following the procedure developed by Guo and Thompson (1992), based on the exact Fisher test. This program also computes the linkage equilibrium between each pair of loci based on a likelihood-ratio test (Slatkin and Excoffier 1996). In addition, a Bonferroni test correction was carried out, in order to test the significance of multiple comparisons of Hardy Weinberg and linkage equilibrium tests following the procedure described in Sokal and Rohlf (2003).

In order to describe the genetic structure, we estimated the gene flow between populations (Nm = 1 - FST / 2FST, Wright 1951) and the genetic differentiation index (RST) adjusted for microsatellite data (Michalakis and Excoffier 1996). The inbreeding coefficient (FIS = HE - HO / HE, Nei 1977) was estimated for epiphytes from each host tree species. We compared the FIS index estimated in each population based on t test (Sokal and Rohlf 2003). In addition the total inbreeding coefficient for species T. recurvata was also calculated (FIT = FIS + [(FST) (1- FIS]), using the F indices modified from Wright (Nei 1977).

Results: Based on the analysis of 90 samples of *Tillandsia recurvata*, 12 alleles for the five microsatellite loci were found, and we estimated a mean HO of 0.42 ± 0.079 S.D and a mean HE of 0.82 ± 0.042. The mean allele number was relatively high (NA = 9.5 ± 0.70). The total inbreeding coefficient estimated for T. recurvata was relatively low (FIT = 0.25).

The bromeliad population collected from *Prosopis laevigata* showed lower genetic diversity than those from *Parkinsonia praecox* (Table 1). In the bromeliads of *P. laevigata* the mean observed heterozygosity (HO = 0.34 ± 0.09 SD) was lower than the expected heterozygosity (HE = 0.79 ± 0.05), and the mean allelic diversity was of NA = 9.33 ± 0.94. According to the Bonferroni test, all loci were found in Hardy-Weinberg disequilibrium (P values < 0.05). In this bromeliad population a mean inbreeding coefficient showed a deficiency of heterozygotes (FIS = 0.57 ± 0.11 SD). In contrast, the bromeliad's population from *P. praecox* showed a mean observed heterozygosity (HO = 0.59 ± 0.06 SD) lower than the mean expected heterozygosity (HE = 0.86 ± 0.02). On the Bonferroni test all loci were in Hardy-Weinberg disequilibrium (P values < 0.05). The mean allelic diversity was of NA = 9.7 ± 0.5, and the mean inbreeding population coefficient (FIS = 0.31 ± 0.07), showed a deficiency of heterozygotes. The Bonferroni test found that all loci were in linkage equilibrium in the bromeliad populations collected in both *P. laevigata* and *P. praecox*.

Locus name	Primer sequence (5'-3')	Ta (ºC)	N_A	a*P. laevigata* H_O	a*P. laevigata* H_E	*P. praecox* H_O	*P. praecox* H_E
CT5	F-HEX: AATGAGTTTCAGTTTTAGAAGC R: CCAAGAAAAGAACGGATCA	51	10	0.47	0.86	0.67	0.88
e6	F-FAM: AAACTATGGATTCCCCAACT R: CGGTTCCTCCTTAGTCTTTT	54	9	0.30	0.76	0.53	0.84
e19	F-FAM TCTTACTGCTCTCCATTGGT R: ATTTTTGGTGTTGCAGATGT	52	3	0.0004	0.03	0.00	0.35
e6b	F-HEX: CGTACGAAGGTAAGCACAA R: CCGTTGAAGAGGTTAGAGG	51	2	0.00	0.45	0.00	0.28
p2p19	F-HEX: ATGCTGCCCACTGAAGATTT R: TCCGTCCAAGGTTTATTTGC	51	11	0.25	0.75	0.57	0.85

Table 1. Locus name, sequence and flurochrome the primers used to amplify microsatellite regions in *Tillandsia recurvata*. The Ta is the alignment temperature adjusted to this study species. The column NA represents the mean allele number by locus for the species. The mean observed (HO) and expected (HE) gene diversity are showed according to the host tree species were the bromeliads were collected.

The gene flow between populations established in the two host-tree species was high (Nm = 16) and consequently they are not genetically differentiated (Rst = 0.03, P = 0.09).

Discussion and conclusions: Although our results found a low genetic diversity of *Tillandsia recurvata*, these do not support the idea that it is an autogamous species, as it was suggested by Soltis et al. (1987). These authors based this idea from the zero genetic diversity found in the populations studied with allozymes markers. In contrast, the study of Ramirez-Padilla (2008) carried out with microsatellite markers found a relatively high observed genetic diversity (HO = 0.67), and an excess of heterozygotes (FIS = -0.028). The zero genetic diversity found by Soltis et al. (1987) was probably caused by the molecular technique used (allozymes), since it detects lower genetic variation than microsatellite markers (Agarwal et al. 2008). In addition, the sampling method used could affect the genetic diversity results found between Soltis et al (1987) and our study. We collected each plant from a different host tree (i.e. 90 bromeliads of 90 different host trees) in contrast Soltis et al. (1987) collected 243 plants, but only from seven different host plants. Hence, it is highly probable that the clumps collected by Soltis et al (1987) represented closest relatives because the vegetative reproduction is most frequent that the sexual reproduction in this epiphyte.

The three population genetic studies carried out with *Tillandsia recurvata* do not show a clear trend about the genetic diversity contained in this species so it is not possible to infer a possible pattern in population genetic diversity for this species.

In addition, the genetic knowledge available for the epiphytes is scarce, though this life form represents about 10% of the world vascular flora (Madison 1977). Among other vascular epiphytic species that have received attention are the orchids, which have been analyzed mainly with isoenzymes (e.g. Ackerman and Ward 1999, Avila and Oyama 2007) and recently with microsatellites (e.g. Jacquemyn et al. 2009, Rodrigues and Kumar 2009). Other vascular epiphyte species have been studied with some other molecular marker, as the Brazilian herbaceous *Monstera adansonii* var. *klotzschiana*, which used two AFLPs markers (Andrade et al. 2007). All these studies found low levels of genetic diversity, similarly to the results of our study.

We found an unexpected lower genetic diversity in the bromeliads on *Prosopis laevigata* than those on *Parkinsonia praecox*. However, the former host species has a higher population density than in *P. praecox* and according to genetic population theory, the highest genetic diversity must be associated with the largest population size (Hedrick 2005). Probably, this unexpected result could be explained by processes occurred after seed germination or vegetative reproduction and human management type by the local communities.

Our study found that there is gene flow between the bromeliad populations established between the two tree species and they have different genetic diversity when are analyzed according to the tree species used. These results suggest that future ecologic studies would consider a metapopulation focus to define the populations of this bromeliad, as we as to search selective process after germination of the seeds that could be occurring according to the tree species used as phorophyte.

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Dyckia estevesii revisited

Derek Butcher[1]

Figure 1. *Dyckia estevesii* distichous form.

In J Brom Soc 37: 120-2. 1987 Werner Rauh introduced us to a startling distichous leaved Dyckia but in the same year he gave a more reasoned account regarding its origins in German in Trop. Subtrop. Pflanz. 60: 16-21. 1987. In the German edition he was aware that a spirostichous leaved version was in existence which produced seedlings where some became distichous as they matured. He considered that this spirostichous plant was a hybrid and yet we know that seed from a hybrid produces a hybrid not a species!

And so this fact has been left unresolved for 22 years!

2009 has been a vintage year for me regarding Dyckia because I stumbled across a 'Dyckia blog' compiled by a Constantino Gastaldi from Santa Catarina in Brazil. Ever since the 1980's I had become more and more disillusioned with the Dyckia situation. All that seemed to be happening was importation to the USA of species and unregistered hybridising being made mainly in California. I was interested in seed from species and over the years we did get some satisfaction through Heidelberg in Germany. No one in Brazil seemed interested in this complex genus where the only real record was Smith & Downs 1974.

It appears that the sale of Dyckia plants is prohibited in some States of Brazil and the few keen collectors of Dyckia in Brazil get by, by swapping, with no incentive to grow species from seed and thus reduce the problem of extractivism. Prohibition is easy and Governments can be seen as doing something for conservation. But is it the right option where prohibition can set up a black market but education on the reasons for conservation should be the way to go Extractivism only occurs when the indigenous population sees interest being paid to a particular plant, be it plant collector or scientific review. Plants are offered for sale assuming there is a market. Even when the market is non-existent the damage has been done. Extractivism to the exporter must still apply because collected plants are still getting to the USA and S E Asia. Not Australia because of our import laws, weed control (Dyckia is considered a possible weed), gas treatment etc. I have always believed that originating from high ideals CITES is now a system for lawyers run by lawyers and in any event does not cover the fact that in plant life, nature is so wasteful in seed production. The irony of the official Brazilian attitude is that Dyckia occur in rupestral fields and water sheds where they are in direct competition with 'farming'. Farming is on the increase because of increase in human population! And human population and employment increases where big farming projects are implemented. As Oscar Ribeiro points out in fcbs.org under 'Conservation', this is an area neglected by Brazilian authorities.

Figure 2. *Dyckia estevesii spirostichous* form.

Such are the problems faced but we can be assured that because of a keen but small group of specialised plant lovers in Brazil that Dyckia will not go completely down the gurgler. [Aussie slang for being wasted ie., going down the drain-Ed]

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Figure 3. *Dyckia estevesii* seedlings.

Species plants are being grown from seed and *Dyckia estevesii* is but one.

To my mind, the published form of *Dyckia estevesii* can be likened to the monstrose crested forms of cactus where the meristem only divides distichously. I also have a feeling that the term triploid may well be applied. If this is the case then it may be a blessing in disguise because it may be the reason why hybridists in the USA have been unable to weaken its unique qualities by hybridising with it. So far, the Brazilians feel that the only seed they can get with man's intervention is from the spirostichous form.

Experiments are continuing especially in ascertaining some sort of ratio of seedlings that turn out to be either spirostichous or distichous leaved.

In the meantime I leave it to some Brazilian taxonomist to correct the present anomaly regarding the true identity of *Dyckia estevesii*.

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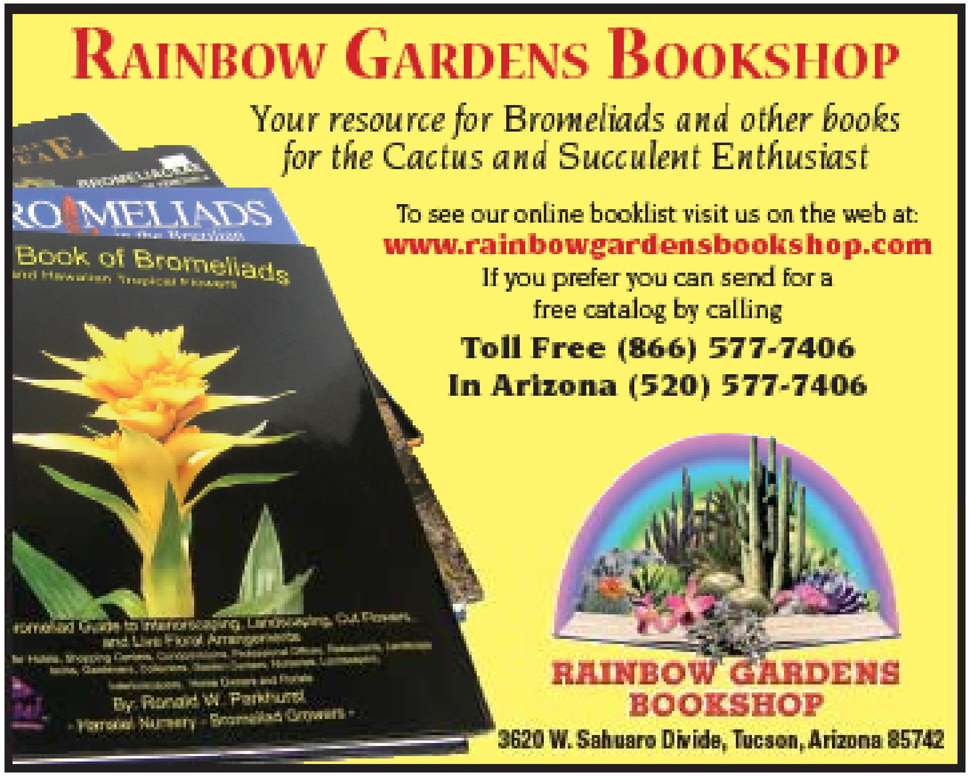

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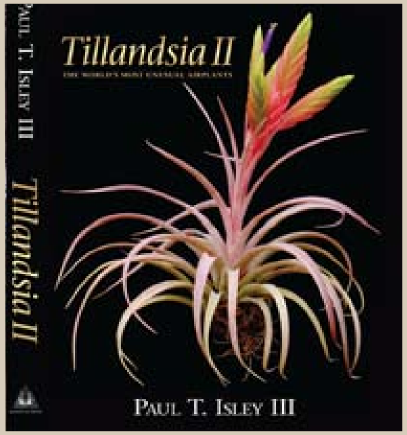

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Bromeliad Basics: Removing Offsets

Karen Andreas[1]

Bromeliads reproduce by setting seeds and also by growing offsets, also known as pups, often from the base of or from between the leaves of the mother plant. Removing pups generally is easy to do.

The decision on whether or not to remove pups depends on the growth habit of the bromeliad. Neoregelias generally need room to achieve a round, symmetrical appearance, and so those pups should be removed. There are Neoregelias, however, that are the exception to this rule. Neoregelias that have "stoloniferous" growth such as 'Fireball' can be allowed to grow into clumps. Stolons are woody stems that send the offset out and away from the mother as opposed to the offset growing close to her base. Other bromeliads that have upright, tank-type growth may be allowed to grow in clusters. These include Aechmea, Billbergia, Guzmania and some Vrieseas. While you can let these grow into clusters, often removing the pups will stimulate the mother plant to produce more. Sooner or later, however, you will need to thin the clump to provide better air circulation and room for the increasing growth as the pups pup.

A general rule of thumb is to remove the offset when it is half to two-thirds the size of the mother plant. If your goal is to produce as many pups as possible, you can remove them at a smaller size, but leaving them until they get a little larger increases their viability. Remove the pup by using sharp clippers and cutting it as close to the base of the mother plant as possible. If the mother bromeliad is in a pot, you may have to remove it from the pot to get a clean cut. If it is in the ground, you may need to dig some of the soil away from the base so you can see what you are doing and make a good cut. Once the pup has been removed from the mother, you can let the cut end harden in the air before replanting. This gives the cut tissue time to toughen up before putting it in soil or mounting it. Dip the cut end in a rooting hormone to promote root growth and also to provide protection against fungus. Pot the newly liberated pup in a medium that drains well. You may need to stake it until it gets established in its new home. This also would be the time to mount a bromeliad. A new pup is likely to attach itself more easily to the mounting material than a mature bromeliad.

Cryptanthus pups are the easiest offsets to remove. Once the Cryptanthus pup gets large enough, hold the pup and gently tug. If it is ready to be removed, it will release from the mother plant. If it resists, try again in a few days. Once you separate it from the mother, you may remove the small leaves at the base of the pup, dip the end in Root Tone and plant in a well draining potting mix.

Although most bromeliads bloom only once in their lives, their pups ensure that they live on in our collections – and provide extras for us to share!

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The Wanton *Tillandsia complanata*

Len Colgan

Figure 1: *Tillandsia complanata*, near Papallacta.

Tillandsia complanata is widespread from Costa Rica to Bolivia, and also occurs in the West Indies and northern Brazil. It is one of the most prolific bromeliad species throughout Ecuador, arguably surpassed only by *Guzmania monostachia*. When I travelled around Ecuador, photographing bromeliads in habitat, I encountered this species in countless locations and, perhaps surprisingly, in several somewhat different forms. There were small fragile plants with thin leaves no more than 15cm long. There were large robust plants with leaves easily 50cm long. In general, they formed green rosettes but, as the official description states, often "spotted, streaked, or diffused with dark

Figure 2. *Tillandsia complanata* (?) Cuenca - Gualaquiza.

purple especially toward the base". *T. complanata* has multiple decurved thin flower spikes emanating laterally from the axils of the leaves. The inflorescences are simple, lanceolate, usually 6-9cm long and about 1-2cm wide. The floral bracts are reddish and the petals purplish. One uncommon property is that the same plant repeatedly flowers in the same way throughout its life without off-setting.

Because of its proliferation, and having already taken a few photographs of *Tillandsia complanata*, I usually turned my attention to more spectacular species. However, upon returning home to South Australia, I became interested in some of the plants in my pictures and wished I had examined them in more detail while in their habitat. For example, I lackadaisically assumed that the large red-leaved plants growing between Cuenca and Gualaquiza were merely a superior form of *T. complanata*. But now I have some lingering doubts. Are those inflorescences simple and complanate?

Unfortunately, I was totally unaware of the existence of *Tillandsia* x *complachroma*, a natural hybrid between *T. complanata* and *T. ionochroma*, described by Werner Rauh in the JBS, Vol 27, No 1, pp15-21, January-February, 1977. Rauh's expedition found this plant between Papallacta and Baeza, which are 34km apart, east of Quito. It was grow-

Figure 3: *T. ionochroma* (foreground) and *T. complanata*(?), west of Cuenca.

Figure 4: *Tillandsia ionochroma* and *T. complanata*, east of Papallacta

ing at 2,800m in destroyed cloud forest, and fitted exactly between the two parents. It also produced several axillary arching inflorescences like *T. complanata*, but did not have simple spikes. Instead, the spikes of *T.* x *complachroma* were bipinnate, narrow cylindric. The leaves were green with violet spots.

I realise there would be some variability in such a natural hybrid, and I knew that I had photographed at least two plants that were definitely hybrids with *Tillandsia complanata* as one parent. Hence, I re-examined my pictures. Figure 3 was taken west of Cuenca, perhaps 300km from the type location of *T.* x *complachroma*. At the time, I assumed it was *T. complanata* growing below the *T. ionochroma*, the real target of the picture. However, it does not really match Rauh's original picture of *T.* x *complachroma*. But, then again, it does not look like a pure *T. complanata* either.

Figure 5: Natural hybrid involving *Tillandsia complanata*, west of Baeza

At my first stop along the road from Papallacta to Baeza there were many *Tillandsia ionochroma* and countless *T. complanata*. Is this Rauh's location of *T. complachroma*? Unaware of any reason to investigate further, I took only the photograph in Figure 4. Even though a couple of the lower plants have coloration in the leaves similar to the *T. ionochroma* above, the inflorescences seem to be complanate. But what about other plants on other trees?

Approaching Baeza, I wandered around an area containing a truly wonderful array of bromeliads, a photographer's paradise. I took a picture of a plant that was obviously a natural hybrid involving *T. complanata*, but with so many other bromeliad species (tillandsia, guzmania, racinaea and grey vriesea) in the vicinity, rather reprehensively I made no effort to consider the other parent. But, I do not recall any *T. ionochroma* in an extended area, and the inflorescences are quite different to Rauh's picture. Could this be a hybrid with, say, T. *maculata* or similar?

Figure 6: Natural hybrid of *Tillandsia complanata and T. stenoura*, 1998, south of Saraguro. Photo by Elizabeth Patterson.

Figure 7: *Tillandsia complanata* x *T. fendleri*

Complementary to the previous discussion is the most joyous sight involving bromeliads that I have come across in my travels in Ecuador. Not far from the road south of Vilcabamba toward the Peruvian border, was a flowering bromeliad that is most certainly a natural hybrid of *Tillandsia complanata* and *T. fendleri* (Figure 7). Contrary to the norm, I rate this hybrid as more appealing than either parent.

Finally, I must thank Elizabeth Patterson for her photograph of a natural hybrid of *Tillandsia complanata* and *T. stenoura*, taken in 1998 south of Saraguro.

The author would be most appreciative of any comments regarding this article and the plants shown therein. He can be contacted via len.colgan@unisa.edu.au

EVENTS CALENDAR

Australia

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

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

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

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

United States of America

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

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

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