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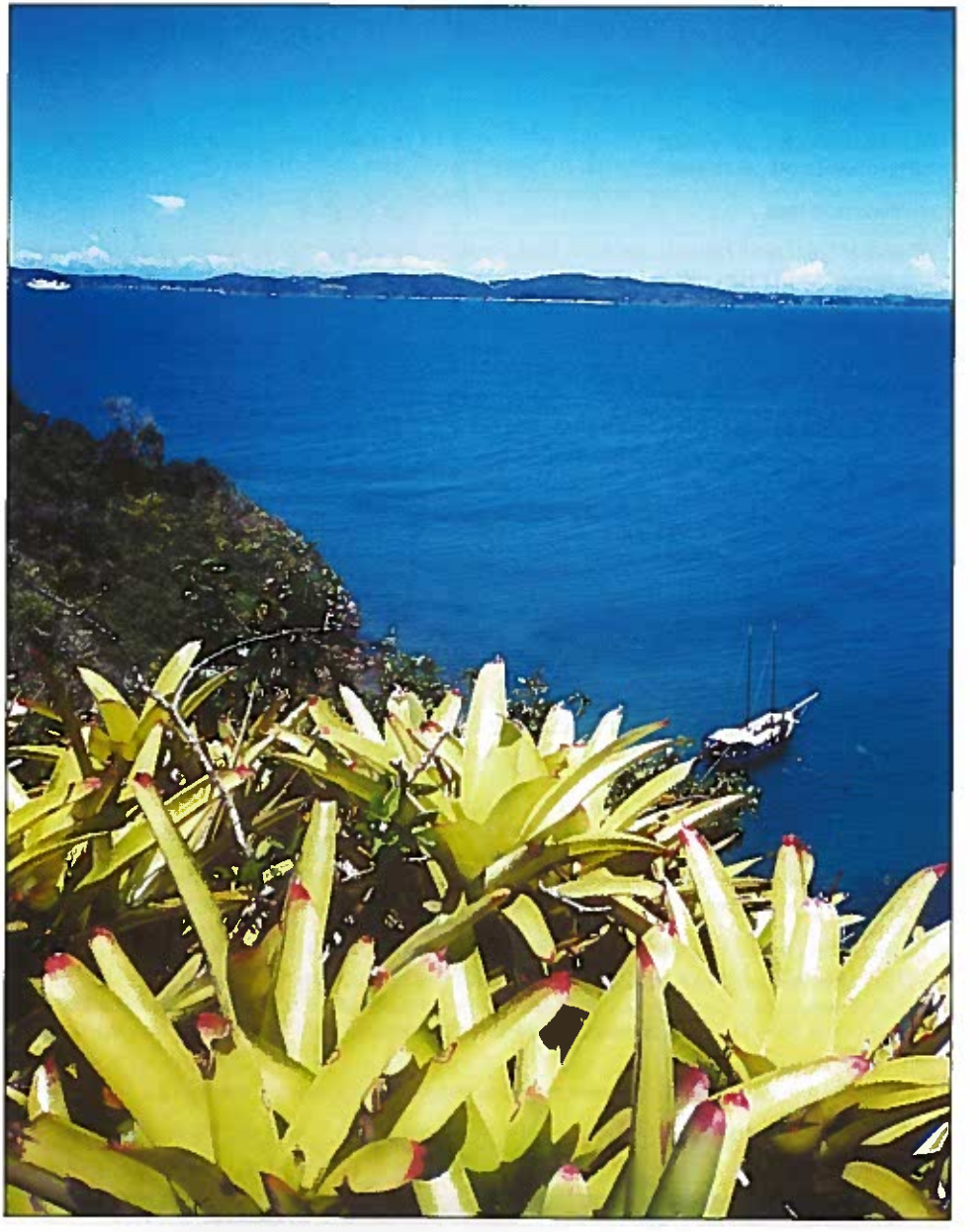

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Cover photographs. Two beautiful blue-sky scenes. Front: A spectacular view of the Brazilian coast in the distance from Ilha Feia, Rio de Janeiro. See the article on p. 147 for more scenery and to learn about bromeliads from this region. Back: An Andean Condor soars above a puya in Peru. See article in this issue by Leo Dijkgraaf.

FEATURE ARTICLES

BROMELIAD SOCIETY EVENTS, BUSINESS AND NEWS

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Bromeliaceae of Ilha Feia, Armação dos Búzios, Rio de Janeiro, Brazil

Cláudio Coelho de Paula[1] & Renato Ramos da Silva[2]
Photographs by the Authors

The Brazilian coast is 9200 km long with similar geological characteristics along its border. Silveira (1964) divided the coast it into 5 distinct sectors: the Amazon equatorial coast, the northeastern cave formations, the western coast or east coast (from Bahia de Todos os Santos in Bahia state, to Campos in Rio de Janeiro state), the southeastern crystalline steep slopes, and the southern coast (Araújo 2000). Based on data compiled on the Brazilian western coastal lowlands, Martin & Suguio (1998) concluded that a section had been formed by successive sedimentation-deposition processes during and soon after the glacial period and rise of the seas during the interglacial periods. This process was described in an eight-phase model of transgression and receding of the sea level.

The Rio de Janeiro state coastline lies at the transition between two large coastal regions: Rio Grande do Sul coastal lowlands and the coastal lowlands at the mouth of Rio Doce, Espírito Santo. Thus, its Restinga (sand bank vegetation) displays a great floristic and vegetation formation diversity. Due to its proximity to research centers in southeastern Brazil, the Rio de Janeiro State's coastal flora is one of the best assessed in this country (Araujo 2000).

Restingas do not all have the same structural layers (Araujo 2000), and this difference often determines which bromeliads colonize the area. The presence of large populations of *Bromelia antiacantha* Bertol. is common near the beaches mixed with predominantly herbaceous, low-growing and salt-loving vegetation. Rock-loving bromeliads, such as *Tillandsia neglecta* Pereira, are found in the coastal massifs of Arraial do Cabo, Rio de Janeiro. Furthest from the ocean, with forest formations of 8 to 12 m tall trees, a large number of terrestrial bromeliads are found, especially of the genera *Nidularium* and *Billbergia*. Epiphytic species numbers increase near the Atlantic rainforest (Leme & Marigo 1993).

Of the 46 bromeliad species cited by Leme (1985) from the Cabo Frio and Arraial do Cabo regions, 16 were of the subfamily Tillandsioideae and 30 Bromelioideae; none were of subfamily Pitcairnioideae (Leme & Marigo 1993). Based on the floristic analysis of the Rio de Janeiro restinga species compiled by Araujo (2000), of the 55 bromeliad species, 41 belonged to the subfamily Bromelioideae, 13 were Tillandsioideae, and 1 was subfamily Pitcairnioideae (*Dyckia pseudococcinea* L.B. Sm.).

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The Armação dos Búzios peninsula delimits the Região dos Lagos, which also comprises the municipality of Cabo Frio and extends until Baia de Guanabara (Araujo 2000). In these areas, coastal sandy lowlands, alluvial deposits, lagoons and hills predominate (Araujo 2000). According to Barbiére (1975) the distance from the Serra do Mar, where clouds are concentrated forming rain, the presence of the great Araruama Lagoon and the low sea water temperature along the coast result in a characteristic aridity along the Búzios Peninsula (Araujo 2000). The process of expansion and contraction of the Brazilian biomass during the cooling and warming processes of the Earth through the Pleistocene epoch, has allowed the development of a vegetation which is structurally similar to that of the Caatinga (Ab'saber 1977).

Considering the importance of the floristic diversity of this unique restinga, we carried out an assessment of the Bromeliaceae of Ilha Feia (FIGURE 1), the largest and most densely vegetated island in Armação dos Búzios peninsula, Rio de Janeiro state (FIGURE 2).

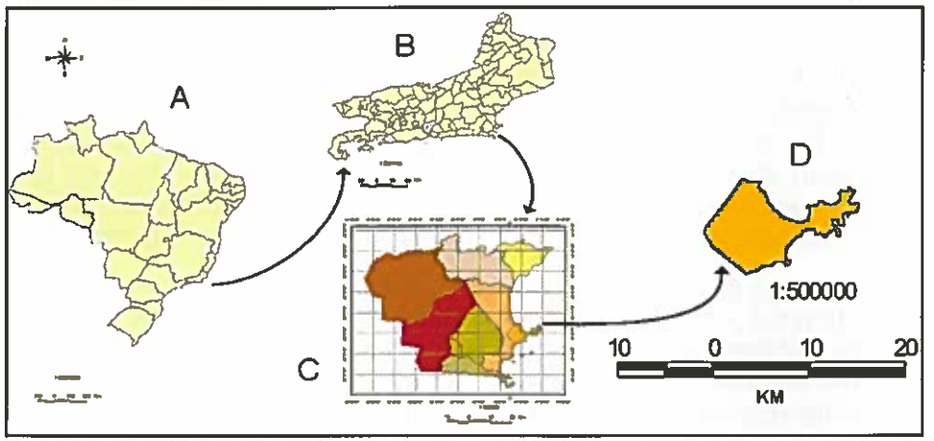

Figure 1. Brazil. A. States of Brazil. B. Rio de Janeiro and its municipalities. C. Region of Cabo Frio. D. Municipality of Armação dos Búzios and Ilha Feia.

Figure 2. *Neoregelia cruenta* on Ilha Feia near the coast of the Armação dos Búzios municipality (in the background). A population of *Neoregelia cruenta* can be seen in the foreground.

The Area

Precipitation in the region of Cabo Frio is lower than that of the other southeastern coastline regions. Data from the Cabo Frio weather station show an annual precipitation of 823 mm, average temperature of 23° C, and relative humidity of 83%. According to Barbiére (1975) climate in the region of Cabo Frio can be classified as a variation of a semi arid climate, "Bsh" of Koeppen (Araujo 2000).

Two basic types of vegetation can be found at Ilha Feia (FIGURE 3): rocky wild coasts, and coastal lowland forests with 7 to 8 m tall trees at places where the soil is deeper (FIGURE 4). The vegetation in this area has been disturbed by the presence of a goat pasture (uncovered soil in part of the island).

Despite some regular disturbances caused by tourism and goat pasture, Ilha Feia is a well-preserved area.

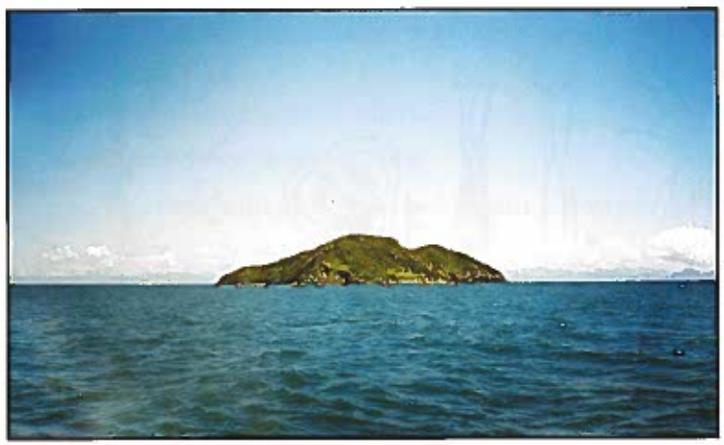

Figure 3. View of Ilha Feia.

Figure 4. Partial view of Ilha Feia showing a small beach on the left, coastal lowland forests, and rocky wild coast.

Exploration

We conducted two inventory trips to the island, one in March and the other in May 2002. Bromeliad vouchers prepared consisted of one inflorescence and one leaf per species found in the major trails, rocky wild coasts and in the woods. Vegetative samples of sterile species were gathered to grow to maturity in the greenhouse of the Bromeliad Conservation and Research Unit (UPCB - UFV). All material was collected by *Claudio Coelho de Paula and Renato Ramos da Silva* and deposited at the VIC Herbarium, taking into account the individuals' environmental characteristics, recorded in the identification forms. Representative voucher specimens are listed under each species below. The material was identified through specialized taxonomic keys, comparison with other specimens, and the help of experts. Drawings of the plants were made, showing pertinent habit and reproductive characters to facilitate species recognition.

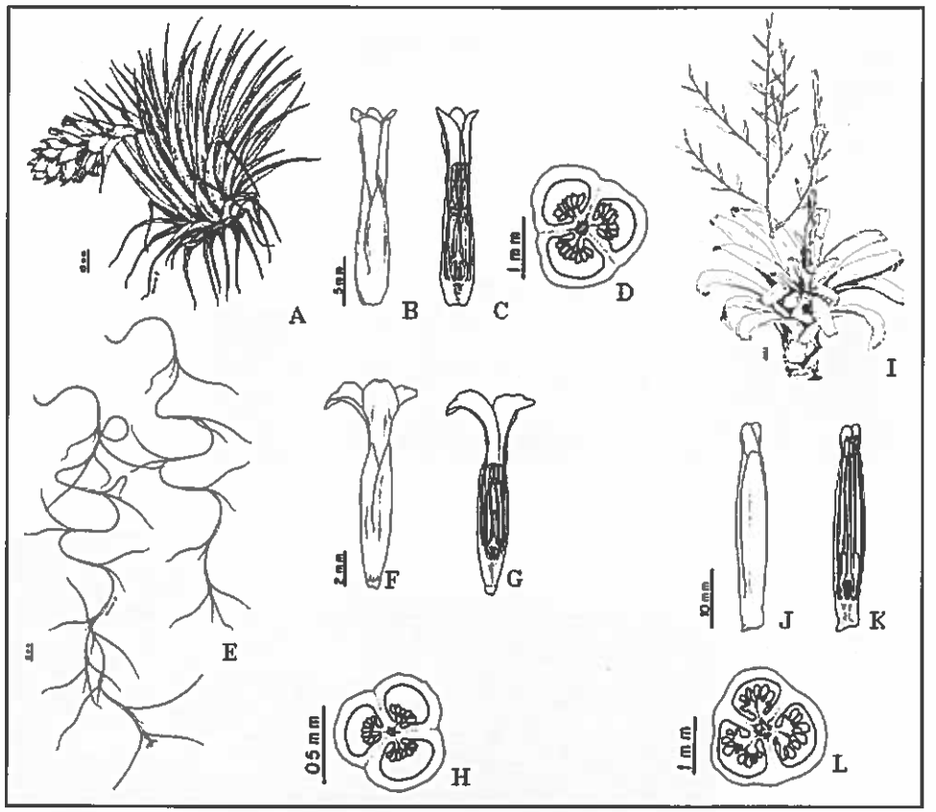

Figure 5. A-D, *Tillandsia stricta* var *stricta*: A. Habit. B. Flower. C. Longitudinal section of flower. D. Transversal section of ovary. E-H, *Tillandsia usneoides*: E. Habit. F. Flower. G. Longitudinal section of the flower. H. Transverse section of the ovary. I-L, *Vriesea procera* var *procera*: I. Habit. J. Flower. K. Longitudinal section of the flower. L. Transversal section of the ovary.

Bromeliads of Ilha Feia

Nine Bromeliaceae species were identified at Ilha Feia, three of the subfamily Tillandsioideae (FIGURE 5) and six of the Bromelioideae subfamily (FIGURE 6). The subfamily Tillandsioideae is represented by the genera *Tillandsia* and *Vriesea*, while the subfamily Bromelioideae is represented by the genera *Billbergia*, *Bromelia*, *Neoregelia*, and *Quesnelia*.

Identification Key

1- Leaves without spines; ovary superior

2- Inflorescence branched; petal appendages present — *Vriesea procera* var. *procera*

2'- Inflorescence unbranched; petal appendages absent

3- Plants forming rosulate clumps; inflorescence many-flowered — *Tillandsia stricta* var. *stricta*

3'- Plants forming masses with long-hanging stems; inflorescence 1-flowered — *Tillandsia usneoides*

1'- Leaves with spines; ovary inferior

4- Inflorescence sessile, nidular

5- Leaves with apex rose and sheath yellowish; one bud per rosette — *Neoregelia cruenta*

5'- Leaves with apex green and sheath reddish; three or more buds per rosette — *Neoregelia sapiatibensis*

4'- Inflorescence on a stalk (peduncle)

6- Rosette tubular; inflorescence pendulous

7- Inflorescence simple; scape bracts rose — *Billbergia zebrina*

7'- Inflorescence compound; scape bracts paleaceous — *Billbergia tweedieana* var. *tweedieana*

6'- Rosette open, leaves spreading; inflorescence erect or suberect

8- Inflorescence branched; floral bracts lax — *Bromelia antiacantha*

8'- Inflorescence unbranched; floral bracts imbricate — *Quesnelia quesneliana*

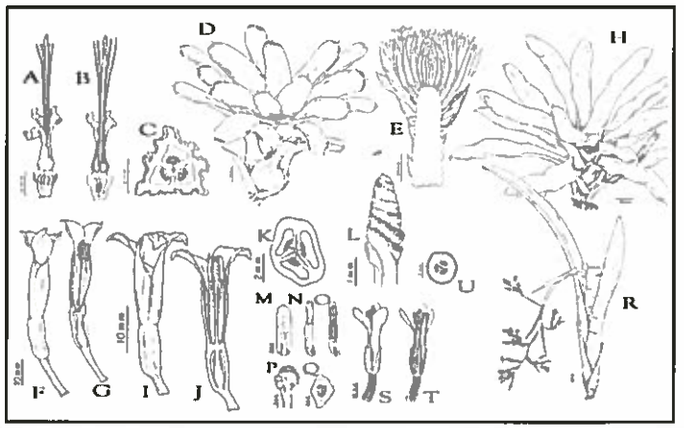

Figure 6. A-C, *Billbergia zebrina*: A. Flower. B. Longitudinal section of the flower. C. Transversal section of the ovary. D-G, *Neoregelia cruenta*: D. Habit. E. Inflorescence. F. Flower. G. Longitudinal section of the flower. H-L, *Neoregelia sapiatibensis*: H. Habit. I. Flower. J. Longitudinal section of the flower. K. Transversal section of the ovary. L. Stigma. M-Q, *Quesnelia quesneliana*: M. Floral bract. N. Flower. O. Longitudinal section of the flower. P. Stigma. Q. Transversal section of the ovary. R-U, *Billbergia tweedieana* var. *tweedieana*: R. Habit. S. Flower. T. Longitudinal section of the flower. U. Transverse section of the ovary.

Figure 7. Population of *Neoregelia cruenta* occupying shady area inside the forest. On the right, detail of *Neoregelia cruenta* inflorescence.

Figure 8. *Billbergia tweedieana* as an epiphyte in coastal lowland forest.

Billbergia tweedieana var. *tweedieana Baker*

Billbergia tweedieana var. *tweedieana* was observed on rocks in undisturbed areas, forming thickets with numerous rosettes amid *Neoregelia cruenta* populations. It is a terrestrial species in forest areas, individuals are up to 1.5 m (FIGURE 8). It is also found as an epiphyte, forming dense rosette groupings on canopies of trees taller than 8 m. In the Cabo Frio region, it was found to be predominantly terrestrial, growing in leaf litter within the forest.

Distribution: Espírito Santo and Rio de Janeiro states, Brazil. Voucher: VIC 26,732.

Billbergia zebrina (Herbert) Lindley

Billbergia zebrina is sparsely distributed in the Restinga areas in the region of Cabo Frio. Only one individual was observed as being epiphytic on this island, in a sunny area, with few rosettes.

Distribution: Northeastern Argentina, Uruguay, Paraguay, and Brazil (Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul states). Voucher: VIC 27,434.

Bromelia antiacantha Bertol.

A single population of approximately 20 individuals of the terrestrial *Bromelia antiacantha* was seen deep inside the forest, close to the mountain side. The low light levels there resulted in the leaves becoming longer and with darker green coloration than on the mainland, where the species is usually found in areas of herbaceous, salt-loving vegetation. The berries are an important source of food for the resident fauna.

Distribution: Uruguay and Brazil (Rio de Janeiro, São Paulo, Paraná, and Rio Grande do Sul states). Voucher: VIC 26,430.

Neoregelia cruenta (Graham) L.B. Sm.

Neoregelia cruenta is the most abundant Bromeliaceae species on the island. It occurs on rocks along with rocky wild coast area, as a terrestrial along thickets, and as an epiphyte in the canopy of larger trees. On the mainland, it was found as terrestrial, developing directly on the sand near the forest transition zone, where it forms large populations. An outstanding characteristic of this species when growing in the full sun is the yellowish coloration of the leaves and their bright red apex. *Philodendron* sp. (Araceae) was observed to develop adventitious roots in the bromeliad tanks thus absorbing water and nutrients. Given the large number of rosettes present in this area, the considerable volume of water stored in the tanks is an important habitat and drinking source for the local fauna (FIGURES 2, 7).

Distribution: Rio de Janeiro and São Paulo states, Brazil. Vouchers: VIC 26,427; VIC 26,735.

Neoregelia sapiatibensis E. Pereira & Penna

Neoregelia sapiatibensis occurs as a terrestrial in shaded areas inside the forest, where it forms colonies of approximately 25 m². Only two populations were observed in Ilha Feia. A vegetative characteristic is the extensive stolon formation (ca. 4 per rosette). It is a species rarely found in other Restinga zones in the region. (Leme, pers. comm.), probably a result of intense real estate development.

Distribution: restingas in the state of Rio de Janeiro, Brazil. Vouchers: VIC 26,736; VIC 26,737.

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

Quesnelia quesneliana is limited to the rocky wild coast amid the *Neoregelia cruenta* populations. Only a few individuals were found on the island, which is in contrast to the larger populations of the mainland.

Distribution: Espírito Santo and Rio de Janeiro states, Brazil. Voucher: VIC 26,738.

Tillandsia stricta var. *stricta* Sol.

Tillandsia stricta was found as an epiphyte either in tree canopies or hanging from lianas, where it forms dense colonies. Populations on rocks were observed on the rocky wild coast at approximately 3 m above sea level.

Distribution: Brazil (Bahia, Espirito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Santa Catarina, and Rio Grande do Sul states), Venezuela, Trinidad, Guyana, Suriname, Paraguay, Uruguay, northern Argentina. Vouchers: VIC 26,741; VIC 26,424.

Tillandsia usneoides (L.) L.

This epiphyte was observed in small trees on the mountain sides. The few individuals seen were restricted to the higher areas of the island.

Distribution: Southeastern USA to Central Argentina and Chile. Voucher: VIC 26,742.

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

Vriesea procera is an epiphyte in sunny areas, living in the canopies of large trees.

Distribution: near sea level in Venezuela, Trinidad, Guyana, coastal Brazil, and northeastern Argentina. Vouchers: VIC 26,741; VIC 26,744; VIC 28,076.

Acknowledgments

We thank Tereza Kolontai (Reserva Tauá - www.reservataua.com.br) for her support of this work, which is a part of a study on the Bromeliaceae of the Restinga in the region of Cabo Frio, and sponsored by the Tauá Reserve.

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Studies on *Orthophytum* – Part III: Three New Long-Scapose Species

Elton M.C. Leme[3] & Claudio Coelho de Paula[4]

The "subcomplex *disjunctum*" in the genus *Orthophytum* (Leme 2004) is characterized by plants with leaves forming a distinct rosette before and at anthesis, scapose inflorescence, petals forming a tubular corolla toward base, except for the suberect, but not cucullate, obtuse to acuminate apex. It groups together the larger number of species in comparison with the other subcomplexes and the most diverse ones as well, like the dwarf short-scapose *O. saxicola* (Ule) L.B. Sm., the giant long-scapose *O. horridum* Leme, the nearly glabrous *O. glabrum* (Mez) Mez and the scurfy *O. magalhaesii* L.B. Sm. The three new species described below are examples of the morphological richness one can found in "*subcomplex disjunctum*".

Orthophytum riocontense Leme, sp. nov. TYPE: Brazil. Bahia: Rio de Contas, Marion, 700 m elevation, July 2003, field collected by *R.F. Reis Jr. s.n.* in July 2003, and flowered in cultivation Oct. 2004, *E. Leme 5787* (Holotype: HB). FIGURES 9,12-14.

Ab *Orthophytum maracasense* L. B. Sm., cui affinis, caule longiore, laminis foliorum crassis, marginibus spinis 4-11 mm inter sese distantibus, inflorescentia subduplo longiora, bracteis floriferis atrorubris et brevioribus, et sepalis rubris brevioribusque differt.

Plant saxicolous, stemless, 40-45 cm high at anthesis, propagating by short basal shoots, shoots originated from the inflorescence not seen at least at anthesis. ***Leaves*** ca. 10, suberect-arcuate, subdensely rosulate and forming a distinct rosette before anthesis, at anthesis the upper leaves not distinguishable from the scape bracts due to the elongation of the stem, the remaining basal leaves ca. 7, forming a lax but distinct rosette; ***sheaths*** inconspicuous; ***blades*** narrowly triangular, long-caudate, 28-32 cm long, ca. 4 cm wide at base, distinctly succulent, 5-6 mm thick near the base, strongly coriaceous, distinctly channeled mainly toward apex, green, not lustrous, abaxially densely adpressed white-lepidote, trichomes persistent and completely obscuring leaf color, forming a membrane, distinctly nerved, adaxially densely white-lepidote near the base and glabrous toward base in color contrast with the abaxial surface, margins straight, densely to subdensely spinose, spines narrowly triangular, uncinate, flattened, distinctly retrorse, yellowish to pale castaneous, 2-3 mm long, 1-2 mm wide at base, 4-11 mm apart. ***Scape*** erect, dark red, white-lanate, 0.9-1.1 cm in diameter; ***scape bracts*** foliaceous and not distinguishable from the leaves, slightly reduced in size toward apex. ***Inflorescence*** bipinnate, cylindrical, erect, ca. 22 cm long, fascicles laxly (toward base) to densely (near the apex) arranged, 1-4 cm apart, forming an inconspicuous head of 2 or 3 fascicles at extreme apex, rachis 0.6-0.8 cm in diameter, flexuous near the apex, smooth, terete to slightly angulose near the apex, dark red, white-sublanate to glabrous; ***primary bracts*** straight or nearly so, spreading or the upper ones reflexed, slightly canaliculate to nearly flat, the basal ones subfoliaceous and resembling the scape bracts, distinctly exceeding the fascicles but abruptly reduced in size toward the inflorescence apex, the upper ones with a triangular or broadly ovate-triangular base and a long-acuminate blade, 2-6 x 1.3-1.6 cm, distinctly exceeding to slightly shorter than the fascicles, densely white-lepidote abaxially, glabrous adaxially, green (basal ones) to reddish (upper ones), distinctly nerved abaxially, laxly (toward apex) to densely (near the base) spinulose, spines triangular, ca. 1 mm long, ca. 0.5 mm wide at base, the basal ones 1-2 mm apart, distinctly retrorse-uncinate; ***fascicles*** 10 or 11, polystichously disposed, suberect, sessile, subglobose-strobilate, densely rosulate, 1.7-2 cm long, 2-2.5 cm in diameter (including the floral bracts), 8- to 15-flowered; ***floral bracts*** ovate-triangular, acute and apiculate, coriaceous, densely spinulose, spines 0.7-1 mm long, the basal ones carinate the upper ones ecarinate, V-shaped and centrally sulcate on the adaxial surface, slightly shorter to equaling the sepals but strongly recurved toward apex, dark red, finely nerved, glabrescent to glabrous, 12-15 x 8-11 mm; ***flowers*** 19-23 mm long (with extended petals), sessile, densely arranged, odorless; ***sepals*** slightly asymmetrical, broadly ovate, 9-11 x 5-5.5 mm, free, entire, red except for the hyaline margins, submembranaceous, glabrous, apex distinctly mucronulate, mucron slightly pungent, ca. 1.5 mm long, the posterior ones alate-carinate with keels decurrent

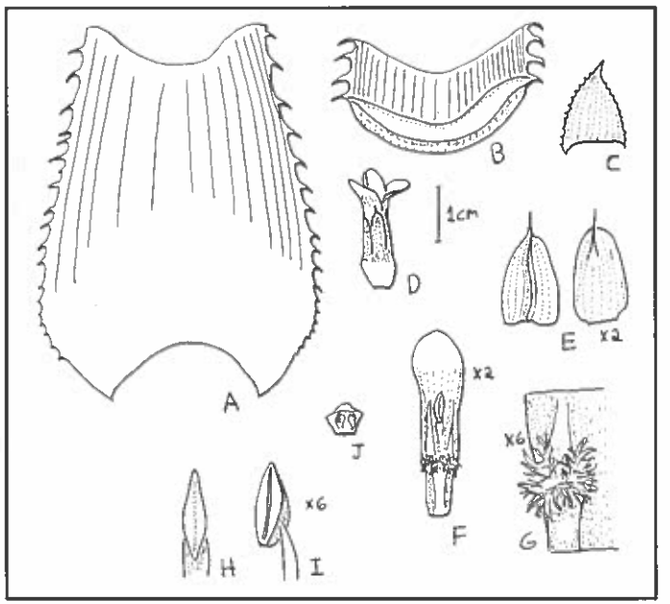

Figure 9. *Orthophytum riocontense* Leme. A. Basal portion of the leaf. B. Cross-section of the leaf blade ca. 5 cm above the leaf base. C. Floral bract. D. Flower. E. Sepals. F. Petal. G. Detail of the petal appendages. H. Front view of the anther. I. Side view of the anther. J. Longitudinal section of the ovary.

Drawing by E. Leme.

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on the ovary; ***petals*** subspatulate, rounded to inconspicuously cucullate-emarginate, 15-17 x 4-4.5 mm, free, erect at anthesis except for the suberect to subspreading apical portion, base whitish, central portion green, and apex white, bearing 2 densely and irregularly oriented, scalloped-fimbriate appendages ca. 4 mm above the base, as well as 2 conspicuous longitudinal callosities which nearly equal the anthers; ***filaments*** terete, whitish toward base, greenish near the apex, the antepetalous ones ca. 9 mm long, adnate to the petals for ca. 5 mm, the antesepalous ones ca. 11 mm long, free; ***anthers*** green, ca. 2.5 mm long, laterally complanate, base obtuse, apex acute, dorsifixed near the middle; ***stigma*** simple-erect, ca. 1 mm in diameter, white, blades reniform, obtuse, erect, inconspicuously crenulate; ***ovary*** ca. 4 mm long, subtrigonous, glabrous, greenish-white; ***epigynous tube*** inconspicuous; ***placentation*** apical; ***ovules*** obtuse, numerous. ***Fruits*** unknown.

Orthophytum riocontense does not have any clear morphological affinity with any known species. However, using the identification key provided by Smith & Downs (1979), this new species keys out near *O. maracasense* L.B. Sm. *Orthophytum riocontense* differs from *O. maracasense* by its taller size (40-45 cm high vs. ca. 30 cm high), leaf blades succulent and thickly coriaceous (vs. thinly coriaceous), which easily break when handled. Other important differences are margins bearing denser arranged spines (4-11 mm apart vs. 10-20 mm apart), inflorescence distinctly longer (ca. 22 mm long vs. ca. 13 mm long), floral bracts dark red and shorter (12-15 mm long vs. ca. 20 mm long), and sepals red and shorter (9-11 mm long vs. ca. 15 mm long).

This new species was found at about 700 m elevation in the mountains near the city of Rio de Contas, in the locality known as Marion. This town is located in the southern portion of the Diamantina Plateau, Bahia State, where "Caatinga" and "Campo Rupestre" vegetation types predominate. These provide a sheltering rich vegetation type composed of a mosaic of grasslands on rocky soils and rock outcrops. The isolation of a myriad of plant habitats in the domain of the Caatinga, where *O. crassifolium* was found, as well as the nearby Campo rupestre has lead to high levels of endemism and species diversity, the species described being a good example of the local biodiversity.

Orthophytum riocontense grows as on sandstone outcrops, where the plants inhabits shallow cavities in slightly inclined to nearly vertical rock filled with sand derived from the weathering of the parent material, and organic material derived from the decaying of the scarce shrubby vegetation covering the nearby slopes. The resulting substrate is acidic and nutrient-poor. Despite the marked leaf succulence of this new species, part of its population in type locality was settled very close to a waterfall, which provide a perennial source of water for the neighboring plants.

Orthophytum rubiginosum Leme, sp. nov. **Type:** Brazil. Espírito Santo: Barra de São Francisco to Vila Pavão, ca. 6 km from Vila Pavão, ca. 150 m elevation, 17 Aug. 2003, *E. Leme 5947, M. Zanoni & E. Colnago* (Holotype: HB; Isotype: RB). FIGURES 10, 15, 16.

Species nova *Orthophytum foliosum* L. B. Sm. affinis sed habitu maiore, foliis rubiginosis, subtus lepidibus duplo vel triplo majoribus, marginibus foliorum suberectis vel leviter recurvatis, dense vel subdense spinosis, scapo longiore, bracteis primariis brevioribus, inferis 22-30 cm longis, superis 6-10 cm longis, petalis apice acutis, ca. 3 mm supra basin ligulis binis apice dense denticulato-crenatis recurvisque et antheris basi obtusis prope medium dorsifixis differt.

Plant saxicolous, stemless to short caulescent before anthesis, 60-70 cm high at anthesis, propagating by rigid basal rhyzomes, ca. 20 cm long, ca. 0.7 cm in diameter. ***Leaves*** ca. 10, laxly rosulate but forming a distinct rosette before and at anthesis, at anthesis the upper leaves not distinguishable from the scape bracts due to the slightly elongation of the stem; ***sheaths*** inconspicuous, suboblong-trapeziform, not contrasting with the blades; ***blades*** sublinear-attenuate, long-caudate, ca. 100 cm long, ca. 33 cm wide at base, ca. 1.5 mm thick near the base, coriaceous, suberect-arcuate, distinctly U-shaped channeled mainly under water stress, castaneous-red on both sides, finely nerved and subdensely to densely adpressed white-lepidote abaxially, trichomes persistent, ca. 0.5 mm in diameter, not obscuring leaf color, adaxially lustrous and glabrous, margins erect to slightly recurved, densely to subdensely spinose, spines uncinate-triangular, flattened, antrorse, yellowish-castaneous, white-lepidote near the base, 1-2 mm long, 1-1.5 mm wide at base, 3-9 mm apart. ***Scape*** erect, green, sulcate, densely white-lanate to glabrescent with age, 25-40 cm long, 0.8-1 cm in diameter; ***scape bracts*** foliaceous and not distinguishable from the leaves, slightly reduced in size

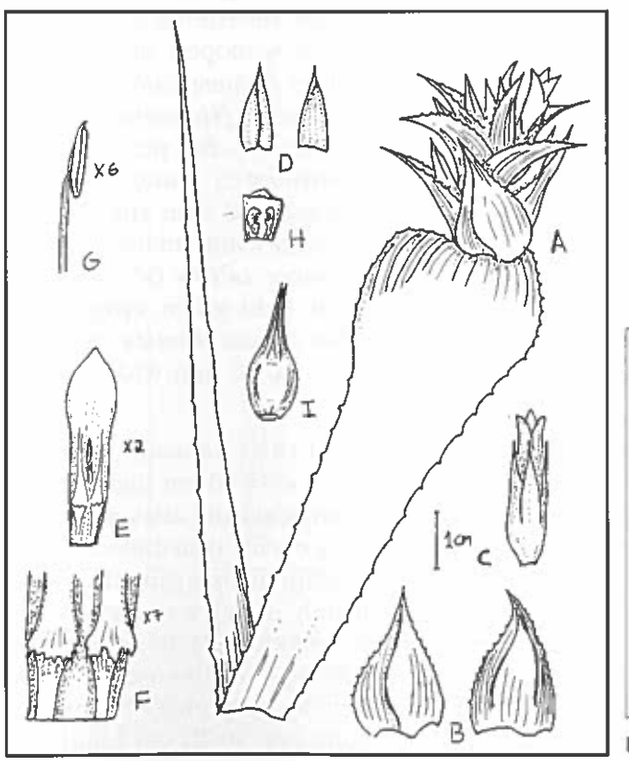


Figure 10. *Orthophytum rubiginosum* Leme. A. Basal primary bract and fascicle. B. Floral bracts. C. Flower. D. Sepals. E. Petal. F. Detail of the petal appendages. G. Side view of the anther. H. Longitudinal section of the ovary. I. Fruit.

Drawing by E. Leme.

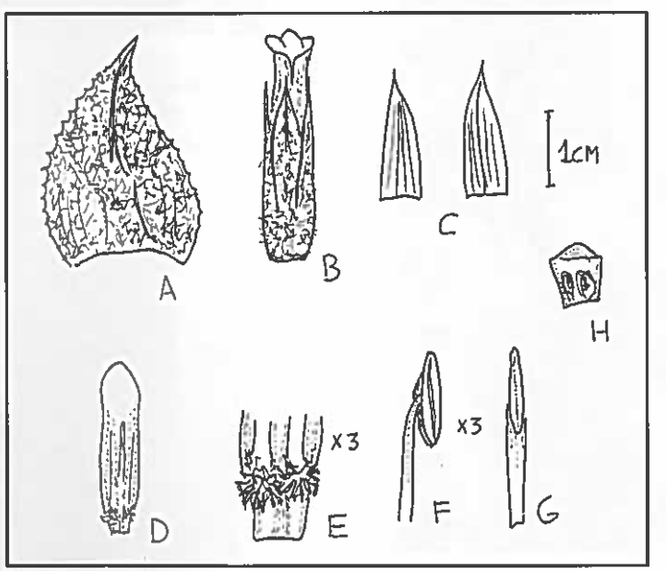
toward apex. ***Inflorescence*** bipinnate, erect, 12-17 cm long, fascicles laxly to subdensely arranged, 2-4 cm apart, except for the subglobose, ca. 4 x 5 cm head of ca. 4 fascicles at extreme apex, rachis 0.7-0.8 cm in diameter, slightly flexuous, sulcate, terete, green, white-lanate to glabrescent with age; ***primary bracts*** foliaceous and resembling the scape bracts, spreading, distinctly canaliculate, much exceeding the fascicles, reduced in size toward inflorescence apex, the basal ones 22-30 cm long, the upper ones narrowly-triangular, long acuminate, 6-10 cm long, ca. 2.5 cm wide at base, castaneous-red except for the greenish adaxial surface near the base, densely spinulose, spines ca. 1 mm long, 2-4 mm apart, antrorse; ***fascicles*** 7 to 8, subdistichously to polystichously disposed, suberect, sessile, subglobose-strobilate, rosulate, 2.5-3 cm long, ca. 3 cm in diameter at apex (including the floral bracts), 10- to 14-flowered; ***floral bracts*** ovate-triangular, acuminate, thin in texture toward mainly toward base, subrigid near the apex, carinate, obtusely bi-ecarinate to ecarinate, V-shaped toward apex, distinctly exceeding the sepals but strongly recurved toward apex and exposing them, green, finely nerved, inconspicuously and sparsely white-lepidote to glabrous, 25 x 15-16 mm, margins densely spinulose, spines ca. 0.5 mm long, antrorse to retrorse, whitish; ***flowers*** ca. 26 mm long (including the petals), sessile, densely arranged, odorless; ***sepals*** narrowly ovate-triangular, apex softly acuminate-caudate, 15 x 4-5 mm, free, entire, light green, submembranaceous, glabrous, finely nerved, the posterior ones alate-carinate toward base with keels decurrent on the ovary, the anterior one acarinate; ***petals*** subspatulate-lanceolate, acute, ca. 17 x 4 mm, free, erect at anthesis except for the suberect apex, white, bearing 2 densely and irregularly denticulate-scalloped, downwardly oriented appendages ca. 3 above the base, as well as 2 conspicuous longitudinal callosities equaling to exceeding the filaments; ***filaments*** terete, whitish, the antepetalous ones ca. 7 mm long, adnate to the petals for 2.5 mm, the antesepalous ones ca. 9 mm long, free; ***anthers*** ca. 2 mm long, base obtuse and apex minutely apiculate-uncinate, dorsifixed near the middle; ***stigma*** simple-erect, ca. 1 mm in diameter, greenish-white, blades obtuse, suberect, margins inconspicuously fimbriate-glandulose; ***ovary*** 6-7 mm long, subtrigonous and slightly complanate, glabrescent, light green; ***epigynous tube*** inconspicuous; ***placentation*** apical; ***ovules*** obtuse. ***Fruits*** enlarged from the ovary, broadly ellipsoidal, subcomplanate, ca. 10 mm wide, lacking mucilagenous material.

Orthophytum rubiginosum is closely related to *O. foliosum*, differing from it by its taller size when in bloom (60-70 cm vs. 35-50 cm high), leaves castaneous-red (vs. pale green or pale green), bearing on the abaxial surface trichomes twice to 3 times larger, and so appearing evenly distributed (vs. trichomes concentrated along the midnerves and distinctly exposing the costal zones), margins suberect or slightly recurved mainly under water stress (vs. margins strongly revolute under water stress), and densely to subdensely spinose with spines 3-9 mm apart (vs. subdensely to laxly spinose, spines 6-18 mm apart), scape longer (25-40 cm vs. 15-20 cm long), primary bracts proportionally shorter, the basal ones 22-30 cm long (vs. 50-70 cm long), the upper ones 6-10 cm long (vs. 6-23 cm long), floral bracts green (vs. whitish-green), petals acute (vs. obtuse and slightly cucullate), bearing ca. 3 mm above the base (vs. 5-7 mm above base) 2 densely and irregularly denticulate-scalloped (vs. laxly dentate), downwardly oriented (vs. upwardly oriented) appendages, as well as by anthers dorsifixed near the middle (vs. dorsifixed ca. 1/4 to 1/5 above the base), base obtuse (vs. distinctly sagittate), and stigma with lobe margins minutely fimbriate-glandulose (vs. subentire).

This new species was found at low elevations (ca. 150 m elev.) northwest of Espírito Santo State, not far from Minas Gerais border. It formed a large island-like clump mixed with some shrubs and a columnar cactus on a thin layer of accumulated organic soil on a huge inclined granitic wall. This sun-exposed environment sheltered other bromeliad species, such as *Orthophytum* aff. *magalhaesii*, *Alcantarea* aff. *extensa* and, on the upper steeper part, *Vriesea* aff. *appariciana*.

It is important to note that the leaves, scape bracts, and primary bracts of *Orthophytum rubiginosum* maintain their castaneous-red color even when cultivated in partial shade.

Orthophytum lanuginosum Leme & Paula, sp. nov. TYPE: Brazil. Minas Gerais: Teófilo Otoni, road to Nanuque, Pedra da Boca, ca. 300 m elevation, 28 Nov. 2002, *E. Leme 5603, C. C. de Paula, M. & M. Grossi.* (Holotype: HB; Isotype: RB). FIGURES 11, 17, 18.



Drawing by E. Leme.

Figure 11. *Orthophytum lanuginosum* Leme & Paula. A. Floral bracts. B. Flower. C. Sepals. D. petal. E. Detail of the petal appendages. F. Side view of the anther. G. Front view of the anther. H. Longitudinal section of the ovary. I. fruit.

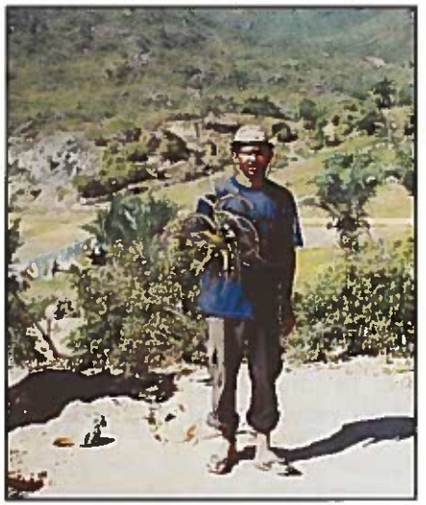


Figure 12. *Orthophytum riocontense* Leme, displayed at the type locality by a resident of the region who took part of the field expedition.

Photograph by Raymundo F. Reis Jr.

Figure 13. The holotype of *Orthophytum riocontense* Leme which flowered in cultivation.

Photograph by E. Leme.

Figure 14. Close up of the inflorescence of *Orthophytum riocontense* Leme in cultivation.

Photograph by E. Leme.

Figure 15. *Orthophytum rubiginosum* Leme, in full bloom at the type locality.

Photograph by E. Leme.

Ab *Orthophytum magalhaesii* L. B. Sm. et *O. fosterianum* L. B. Sm., quibus affinis, bracteis floriferis utrimque dense albo-lanatis, apicem versus rubiginosis, floribus distincte longioribus, sepalis subdense vel dense albo-lanatis et petalis longioribus, totaliter vel fere viridibus differt.

Plant saxicolous, stemless before anthesis, 50-60 cm high at anthesis, propagating by short basal shoots as well as by shoots from the apex of the strobilate fascicles of the inflorescence. ***Leaves*** laxly rosulate but forming a distinct rosette before (8 to 10 leaves in number) and at anthesis (5 to 7 leaves in number), the upper leaves not distinguishable from the basal scape bracts due to the elongation of the stem at anthesis; ***sheaths*** inconspicuous, not contrasting with the blades; ***blades*** lanceolate-attenuate, acuminate-caudate, 20-30 cm long, 27-38 cm wide at base, ca. 2 mm thick near the base, coriaceous, strongly arcuate-recurved, slightly U-shaped channeled, green to bronze colored with color partially obscured by the trichomes, abaxial and adaxial surfaces not contrasting, densely white-lepidote to sublanate on both sides, trichomes persistent, abaxially and near leaf base with a ribbon-like, irregularly and long lacerate blade downwardly oriented, toward apex trichomes multifilamentous with irregularly curled filiform blades, adaxially and toward base trichomes with a broader and irregularly lacerate-margined and somewhat flat blade, near the apex multifilamentous with irregularly curled filiform blades, leaf margins straight to slightly recurved under water stress, slightly undulate, subdensely to densely spinose, spines uncinate-trian-

Figure 16. Inflorescence detail of *Orthophytum rubiginosum* Leme at the type locality.

Photographs by E. Leme.

Figure 17. *Orthophytum lanuginosum* Leme & Paula in full bloom at the type locality.

Figure 18. Detail of the apical part of the inflorescence of *Orthophytum lanuginosum* Leme.

gular, prevailing antrorse, flattened, yellowish-castaneous, white-sublanate near the base, 1.5-3 mm long, 1-2 mm wide at base, 2-8 mm apart. ***Scape*** suberect-arcuate, terete, greenish to bronze colored, densely and coarsely white-lanate, ca. 40 cm long, 0.6-1.2 cm in diameter, sulcate after anthesis; ***scape bracts*** foliaceous and not distinguishable from the leaves, strongly recurved, slightly reduced in size upwardly. ***Inflorescence*** bipinnate, elongate, suberect to near spreading, 11-20 cm long, sometimes appearing pseudosimples, fascicles laxly (at base) to densely (at apex) arranged, 3-4 cm apart except for the subglobose, ca. 3-5 x 3.5-4 cm head of ca. 2 fascicles at extreme apex, rachis ca. 0.6 cm in diameter, straight, terete, greenish to bronze colored, densely and coarsely white-lanate; ***primary bracts*** strongly downwardly curved, slightly canaliculate, green to bronze colored, densely white-sublanate to lanate on both sides with prevailing multifilamentous divided trichomes with irregularly curled filiform blades, primary bract margins densely to subdensely spinulose, spines 1-1.5 mm long, 2-5 mm apart, narrowly triangular, straight to slightly antrorse, the basal primary bracts narrowly triangular-lanceolate, long acuminate-caudate, 7-14 x 2-2.7 cm, much exceeding the fascicles, the upper ones much reduced in size, triangular, acuminate-caudate, 3.5-6 x 2 cm, slightly to distinctly exceeding the fascicles; ***fascicles*** 5 to 6, subdistichously to polystichously disposed, suberect, sessile, subglobose-strobilate, rosulate, 2.5-3 cm long, 3-4 cm in diameter at apex (including the floral bracts), 7- (basal one) to 22-flowered (apical one); ***floral bracts*** ovate-triangular, acuminate, thin in texture to subrigid, carinate to ecarinate, V-shaped channeled, from slightly shorter to exceeding the sepals but strongly recurved toward apex and exposing them, reddish-bronze colored toward apex, finely nerved, densely white-lanate on both sides, 20-30 x 11-20 mm, margins densely spinulose, spines triangular, flat, ca. 0.5-1 mm long, from straight to retrorse, reddish-bronze colored toward base; ***flowers*** ca. 30 mm long (including the petals), sessile, densely arranged, odorless; ***sepals*** narrowly ovate-triangular, apex acuminate-caudate, not pungent, 17-20 x 4-6 mm, free, entire to inconspicuously and irregularly denticulate, green, thin in texture, subdensely to densely white-lanate, finely nerved, the posterior ones alate-carinate with keels decurrent on the ovary, the anterior one ecarinate; ***petals*** sublinear to narrowly subspatulate, subacute or obtuse, 23-26 x 4-5 mm, free, erect at anthesis except for the suberect apex forming a tubular corolla, green except for the white apical margins, bearing 2 densely, irregularly and long-lacerate-scalloped, downwardly oriented appendages ca. 3 above the base, as well as 2 conspicuous longitudinal callosities which equal the filaments; ***filaments*** terete, green, the antepetalous ones ca. 13 mm long, adnate to the petals for 8 mm, the antesepalous ones ca. 16 mm long, free; ***anthers*** elliptic, 2.5-4 mm long, base obtuse, apex minutely apiculate dorsifixed near the middle, laterally distinctly complanate, green; stigma simple-erect, ca. 1 mm in diameter, white, blades obtuse, recurved, margins fimbriate-papillose; ***ovary*** 5-6 mm long, ca. 6 mm in diameter at apex, subtrigonous and slightly complanate, densely white-lanate; ***epigynous tube*** inconspicuous; ***placentation*** subapical; ovules globose, obtuse to subapiculate. ***Fruits*** enlarged from the ovary, nearly globose, ca. 8 mm in diameter, greenish, trichomes persistent, lacking mucilagenous material.

Paratypes: Brazil. Minas Gerais State: without exact locality, field collected in 1982 by *R.B. Marx & L.C. Gurken s. n.*, and flowered in cultivation Nov. 2004, *E. Leme 344* (HB); without exact locality, field collected in 1982 by *L.C. Gurken s. n.*, and flowered in cultivation Oct. 2004, *E. Leme 346* (HB); without exact locality, field collected in July, 1995 by *D. Vandervort s.n.*, and flowered in cultivation Nov. 2004, *E. Leme 3152* (HB); Teófilo Otoni, field collected in 1984 by *L.C. Gurken 199*, and flowered in cultivation Nov. 2004, *E. Leme 613* (HB).

Orthophytum lanuginosum is closely related to *O. magalhaesii* and *O. fosterianum*. However, the new species differs from them by floral bracts densely white-lanate on both sides and reddish-bronze colored toward apex (vs. glabrous to sparsely filamentose-lepidote, and green or yellowish-green throughout), flowers distinctly longer (ca. 30 mm vs. 20-23 mm long), sepals subdensely to densely white-lanate (vs. glabrous or nearly so), petals longer (23-26 mm vs. 14-17 mm long), almost completely green, except for the white apical margins (vs. predominantly white).

Despite being described here, this new species is quite widespread and has been in cultivation in Brazil and overseas since 1980's, usually misidentified as *Orthophytum leprosum* or *O. magalhaesii*. It is easily seen along the road between Teofilo Otoni and Nanuque, in the Northeast region of Minas Gerais, where it grows in plain to slightly inclined bare rock surfaces completely exposed to sunlight. The easy access to the wild populations of *O. lanuginosum* and its very attractive silvery leaves probably contributed to repeated collections and introduction in cultivation by many pioneer bromeliad collectors, like Roberto Burle Marx, Luiz K. Correia de Araujo, the brothers Luiz Carlos and Sergio Gurken, to name few.

Orthophytum lanuginosum shares its habitat with cactus species and other Bromeliaceae, like a huge *Aechmea* sp. possibly belonging to subgenus *Chevaliera*, *Cryptanthus* sp., *O. compactum*, *Pseudananas sagenarius*, *Encholirium horridum*, and *Alcantarea* sp.

Acknowledgments

The author thanks Raymundo Fernandes Reis Junior, Marcos Zanoni, Euclidio Colnago, Marcos Grossi and Marcio Grossi for their generous gifts of living specimens used in this work as well as for their support during field activities.

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Two Puyas from Peru

Leo Dijkgraaf[1] **Photographs by the Author**

Two puyas are presented here. Though neither are known to species, the photographs help illustrate the beauty of this genus. The first Puya is a species I saw in Peru near the Colca Canyon (FIGURES 19, 36). About 100 km north of Arequipa, the Colca River flows from the Andes to the Pacific Ocean. At Chivay (3700 meters elevation) it enters a canyon where some 40 km downriver tourists are attracted by the presence of the condor. It is almost a certainty to see some of these large birds early in the morning at the "Cruz del Condor", where the river is running 1300 meter below. After spending the night in the canyon, the animals warm up in the sun and start flying around for some time before disappearing in the skies above the mountains (FIGURE 20).

It was a memorable moment to see a flying display of condors in a blue sky combined with that of the whitish puyas. The flower itself of this species is green. The photograph was taken in May and I think that the rains in the previous months triggered the flowering.

The other species of *Puya* shown was not seen by me in Peru, but in the Princess of Wales Conservatory of the Royal Botanic Gardens, Kew in England in 1997 (FIGURES 21-23). According to the information on the label, it was collected in Peru by Werner Rauh. A species name was not given; and though I have widely shared the picture in hopes someone could identify it for me, I still don't know what it is. I do know it is a beautiful plant with a flowering height of about 180 cm.

Figure 19. *Puya* sp.

Figure 20. Andean condors roost high in the mountains.

[1] The Netherlands. E-Mail: ldijkgraaf@tiscali.nl

Figures 21, 22, 23 (top to bottom). An elegant *Puya* in cultivation at the Princess of Wales Conservatory, Royal Botanic Gardens, Kew.

Influence of Grey-Leaved *Tillandsia* Species in Hybrid Crosses

Bob Reilly[6]

This paper is largely based on Dimmitt (1990), comments from Margaret Paterson, Nev Ryan and other participants at the Bromeliad Society of Queenslands tillandsia workshop in 2002, some observations from Karen Andreas, and feedback at the Bromeliads XIII conference in 2005. They are also generalisations. Thus, a particular cross may not exhibit the characteristics which one would expect based on the observations in this article.

T. albertiana contributes its growth habit (including size) and petal shape/colour. It appears to be a "dominant" parent in crosses.

T. albida "...has a caulescent habit that does not show up in hybrids with acaulescent species, but its very long, thin inflorescence is dominant. Its hybrids have not been winners, but one with T. streptophylla is interesting. It looks like a giant, acaulescent *T. albida* (or a white-leafed, non-curly *T. streptophylla*) with a very tall, branched, narrow inflorescence with reddish bracts and pale blue flowers..." Dimmitt (1990)

T. baileyi contributes its size, growth habit, and inflorescence shape.

T. bergeri contributes its size and growth habit.

T. brachycaulos "...contributes soft, green leaves. It also greatly shortens or usually completely suppresses the elongated spike of another parent. The bright red leaves at maturity do not come through well unless the other parent has the same trait..." Dimmitt (1990)

T. bulbosa "...with its bulbous base and twisted, awl-shaped leaves (it) is extremely dominant. Nearly all of its hybrids look mostly like it, to the extent that it is difficult to recognise the other parent. It tends to dwarf the inflorescence of hybrids. The trait of red upper leaves at flowering does not come through well..." Dimmitt (1990)

T. butzii contributes its growth habit, including size, and branched inflorescence.

T. capitata contributes the shape, size and colour of its inflorescence.

T. concolor "...transmits stiff leaves and good symmetry of the rosette. The branched spikes and their bright red colour and/or chartreuse bracts are transmitted to offspring very well. Its progeny bloom over an extended period, and the bracts stay colourful for about three months..." Dimmitt (1990)

T. crocata contributes its inflorescence's size, shape and petal colour.

T. didisticha "...greatly slows the growth of its hybrids, even with *T. stricta*; none are even close to flowering at four years of age..." Dimmitt (1990)

[6] Auchenflower. Queensland, Australia.

T. duratii Dimmitt (1990) argued that duratti's size was not evident in its hybrids. This statement is not universally true. For example, Wonga (*T. durattii* x *T. mallemontii*) is much closer in size to *T. duratii*, than *T. mallemontii*. Dimmitt stated that *T. duratii* contributes stiff, succulent, heavily lepidote leaves to its hybrids. This is not universally true; for example, see Wonga and Goomong (*T. duratii* x *T. stricta*) neither of which have succulent-like leaves.

Dimmitt (1990) continues, "...Its (*T. duratii*) green primary and flower bracts are quite dominant in the progeny. In two crosses with species in other subgenera (*T. meridonalis* and *T. gardneri*) the plants have been very beautiful, but the inflorescences have been abortive and without flowers. Hybrids with *T. stricta* produce small, few-branched spikes with some colour in the flower bracts, and small, dark blue flowers. A few clones have very large, many-branched inflorescences with small but deep purple flower bracts. A cross with *T. cacticola* looks like a giant succulent cacticola; the first spikes are appearing and are very large..."

T. edithae does not appear to be a dominant parent in its hybrids

T. exserta typically contributes the size and shape of its inflorescence

T. fasciculata will often contribute its numerous-leaved habit, multi-branched inflorescence, and relatively vigorous "pupping" traits.

T. flabellata contributes its size, growth habit and inflorescence size/shape

T. intermedia contributes its elongated form, and few leaves to most of its hybrids.

T. ionantha "...dwarfs the size of its hybrids and greatly shortens or, more often eliminates the elongated spike of the other parent. The red leaves at maturity do not come through unless the other parent had the same trait..." Dimmitt (1990) p. 121. However the *T. ionantha* cultivar known as "Druid" does not appear to transmit its inflorescence/petal colour to its offspring.

T. ixioides "...contributes stiff, lepidote leaves. The green flower bract colour is very dominant. The yellow flower colour is transmitted if the other parent has white flowers. Crossed with blue flowers, the result is dirty-brown flowers, i.e., with *T. stricta*..." Dimmitt (1990)

T. mallemontii contributes its growth habit, but not necessarily its size.

T. pseudobaileyi "...like *T. bulbosa*, is heavily dominant. Hybrids have bulbous bases, twisted awl-shaped leaves, and frequently faint striations on the foliage. It contributes a large, branched inflorescence..." Dimmitt (1990)

T. recurvifolia (Following are Dimmitt's comments for *T. meridonalis* which is a synonym for *recurvifolia*) "...contributes stiff, lepidote leaves and fairly vigorous growth, through not as fast as *T. stricta*. The white flower color dilutes the color of the other parent in the progeny..." Dimmittt (1990)

T. rothii contributes the shape and colouration of its inflorescence and the red "hue" which its leaves assume at flowering e.g. see Belli (*T. rothii* x *T. exserta*).

T. schiediana often contributes its "two tone" petal colour to its progeny's flowers.

T. streptocarpa contributes its growth habit (but not necessarily its size), inflorescence shape/size and petal colours.

T. streptophylla "...transmits its large size and very large , well branched spike to almost all of its hybrids. Some hybrid progeny also have twisted leaves..." Dimmitt (1990). However from my observations *T. streptophylla* usually imparts its form to its progeny.

T. stricta "...contributes its rapid growth more than anything else, including its short-lived blooming habit. The pink flower bracts and blue flower colour are greatly suppressed when crossing with green-bracted or white flowered species..." Dimmitt (1990). However *T. stricta* also appears to often transmit its growth habit and size to its offspring, although this outcome isn't always evident.

T. tenuifolia contributes its caulescent growth habit.

T. xerographica typically contributes its wide, greyish-succulent looking leaves and its multi-branched inflorescence.

T. xiphioides "...usually transmits its very slow growth rate. The only hybrids yet to flower has been with T. stricta. The green flower bracts washed out the pink of the other parent. The large flower size did not come through well, the hybrid's flowers were about twice the size of *T. stricta* and less than one-quarter of *T. xiphioides*..." Dimmitt (1990)

Concluding comments

Some comments, in no particular order, on this topic are:

(a) It usually takes 2 or 3 generations before one can be confident as to the final characteristics e.g. size, inflorescence, of a particular hybrid.

(b) There appears to be little information available on the extent to which different clones, of a given species, produce hybrids with dissimilar traits

(c) The comments in the first part of this paper are based on primary crosses (F1) between species. There is little experience with F2 crosses.

(d) While relatively little information is available on the traits which "strong" (dominant) parents such as *T. durattii*, *T. bulbosa* transmit to their offspring, there is even less available on which species do not transmit their characteristics. Yet this information is just as important if future hybridists are not to repeat the "mistakes" of the past.

Continued on Page 186

Studies on *Orthophytum* - Part IV: Two Unusual New Species from Brazil

Elton M.C. Leme[7] & Marlon C. Machado[8]

In a continuation of studies on *Orthophytum*, two new species are described and illustrated: *Orthophytum macroflorum* Leme & M. Machado and *O. schulzianum* Leme & M. Machado. *Orthophytum macroflorum* is distinguished by its flat and broad leaves, long yellowish-green sepals and the markedly longer petals. *Orthophytum schulzianum* is characterized by having the leaves and sepals densely and coarsely white-lepidote, and by the petals bearing 2 basal, laminate, obovate, cupulate, and apically denticulate appendages.

Orthophytum macroflorum Leme & M. Machado, sp. nov. **Type:** Brazil. Bahia: field collected by *E. Leme 6007, R. Reis Jr., J. C. Falcon, M. Machado, E. Silva, P. Waters & C. Moreira*, at Mun. Licínio de Almeida, ca. 15 km north of town on road to Brejinho das Ametistas (Mun. Caetité), 14°32' S, 42°31' W, ca. 800 m elev., 25 Sep. 2003, and flowered in cultivation, Aug. 2004 (Holotype, HB). FIGURES 24-27.

Ab *Orthophytum sanctum* L. B. Sm., cui affinis, laminis foliorum prope basin latioribus, basin versus planis, sepalis distincte longioribus, flavovirescentibus et petalis subtriplo longioribus differt.

Plant saxicolous, stemless, 55-80 cm tall at anthesis, propagating by short basal shoots, shoots originating from the inflorescence not seen at least at early anthesis. ***Leaves*** 7-10 (at anthesis), subdensely rosulate and forming a distinct rosette before anthesis and afterwards, at anthesis the upper leaves not distinguishable from the scape bracts due to the elongation of the stem; ***sheaths*** inconspicuous; ***blades*** narrowly subtriangular-attenuate, long acuminate-caudate, 35-48 cm long, 3.5-4.7 cm wide at base, ca. 3 mm thick near the base, strongly coriaceous, suberect to suberect-arcuate, nearly flat near the base to channeled toward apex mainly under water stress, light green or red-ferruginous colored, not lustrous, finely nerved abaxially, densely, coarsely and strongly adpressed white-lepidote near the base and glabrous toward apex on both sides (green-leaf specimens; e.g., holotype), or abaxially densely, coarsely and strongly adpressed white-lepidote throughout with trichomes obscuring leaf color, and adaxially subdensely to densely, coarsely and strongly adpressed white-lepidote toward the base and glabrescent near the apex with trichomes not obscuring leaf color (red-ferruginous leaf specimens; e.g., paratypes), margins straight, densely (near the base) to laxly (toward the apex) spinose, spines narrowly triangular, flattened toward base, light green or red ferruginous near

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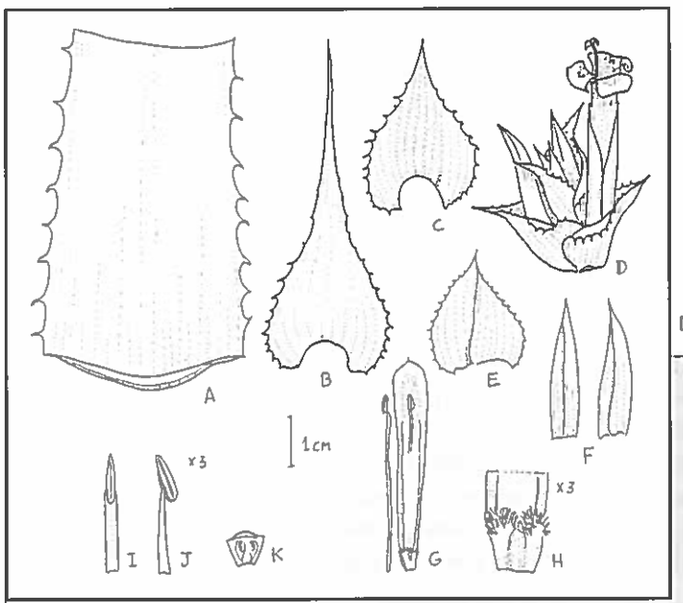
the base, castaneous toward apex, the basal ones strongly retrorse-uncinate, 2-2.5 mm long, ca. 1.5 mm wide at base, 3-6 mm apart, the median ones from retrorse to nearly straight, and the apical ones prevailing antrorse-uncinate, ca. 1 mm long, ca. 1 mm wide at base, 10-20 mm apart. ***Scape*** erect, light green to yellowish-green, finely sparsely (green-leafed specimens) to densely (red-ferrugineous leafed specimens) white-lanate to glabrescent with age, smooth, terete, 20-42 cm long, 1.2-1.6 cm in diameter at base and 0.8-1 cm in diameter at apex; ***scape bracts*** the basal ones foliaceous and not distinguishable from the leaves, suberect, the upper ones foliaceous to subfoliaceous, reduced in size toward apex, nearly spreading. ***Inflorescence*** bipinnate, cylindrical, erect, 18-30 cm long, fascicles laxly arranged toward base and subdensely to densely arranged near the apex, 2-5 cm apart, rachis 0.6-1 cm in diameter, smooth to inconspicuously sulcate, light green, finely white-lanate to glabrous, slightly flexuous toward apex, terete to slightly angulose near the apex; ***primary bracts*** strongly reflexed, nearly flat, the basal ones subfoliaceous and resembling the upper scape bracts, 3 times longer than the fascicles but gradually reduced in size toward the inflorescence apex, the upper ones ovate-triangular, long acuminate, 3-7 x 2.2-2.5 cm, shorter to exceeding the fascicles, light green to bronze colored toward apex, distinctly nerved abaxially, densely and finely white-lanate near the base and glabrous toward apex (green leafed specimens; e. g., holotype), or abaxially densely white-lanate near the base and coarsely and strongly adpressed white-lepidote toward the apex, and adaxially laxly to subdensely white-flocose toward the apex (red-ferruginous leafed



Drawing by Elton Leme.

Figure 24. *Orthophytum macroflorum* Leme & M. Machado. A. Basal portion of the leaf blade. B. Median primary bract. C. Upper primary bract. D. Fascicles. E. Floral bract. F. Sepals. G. Petal. H. Detail of the petal appendages. I. Front view of the anther. J. Side view of the anther. K. Longitudinal section of the ovary.

specimens; e. g., paratype), densely to subdensely spinulose, spines triangular, 1-2 mm long, 1-1.5 mm wide at base, 2-5 mm apart, prevailing retrorse-uncinate; ***fascicles*** 8 to 10, polystichously disposed, suberect, sessile, laxly head-like rosulate, 3-4.5 x 3.5-5 cm (including the floral bracts and sepals), 2 to 7-flowered; ***floral bracts*** ovate to broadly ovate-subtriangular or broadly subtriangular, acuminate, slightly pungent, distinctly carinate, thin in texture toward base, distinctly shorter than the sepals, suberect, yellowish-green, finely nerved, sparsely and inconspicuously white-lepidote with fimbriate trichomes, to glabrous, 20-34 x 18-25 mm, margins densely spinulose, spines ca. 1 mm long, prevailing retrorse-uncinate, yellowish; ***flowers*** 50-65 mm long (with extended petals), sessile, subdensely arranged, odorless; ***sepals*** narrowly lanceolate, apex acuminate, 29-37 x 6-7 mm, free, entire, yellowish-green, thin in texture mainly toward the margins, sparsely and inconspicuously white-lepidote, trichomes fimbriate, to glabrous, the posterior ones alate-carinate with keels decurrent on the ovary, slightly asymmetric, the anterior one carinate to ecarinate; ***petals*** sublinear, rounded to subacute and inconspicuously and tenuously apiculate under lens, 43-57 x 7-8 mm, free, erect at anthesis and forming a slightly recurved tubular corolla with strongly reflexed petal apices, pale green toward base, white near the apex and toward apical margins, bearing at base 2 thick, densely and upwardly-prevailing fimbriate appendages 2-5 mm above the base, as well as 2 conspicuous longitudinal callosities shorter to nearly equaling the filaments; ***filaments*** terete, greenish, 30-45 mm long, the antepetalous ones adnate to the petals for 20-25 mm, the antesepalous ones free; ***anthers*** green, 3-4 mm long, laterally strongly complanate, base obtuse, apex obtuse and inconspicuously apiculate, dorsifixed near 2/5 of its length above the base; ***pollen*** ellipsoid, sulcate; ***stigma*** simple-erect, 1.5-2 mm in diameter, white, blades suborbicular, obtuse, suberect to recurved, finely and shortly fimbriate; ***ovary*** ca. 5 mm long, ca. 7 mm in diameter at apex, subtrigonous, densely but inconspicuously and finely white-lanate to glabrescent; ***epigynous tube*** lacking; ***placentation*** apical; ***ovules*** numerous, obtuse. ***Fruits*** unknown.

Paratype. Brazil. Bahia: field collected by *E. Leme 6001, R. Reis Jr., J. C. Falcon, M. Machado, E. Silva, P. Waters & C. Moreira*, in the Mun. Licínio de Almeida, ca. 15 km north of town on road to Brejinho das Ametistas (Mun. Caetité), 14°32' S, 42°31' W, ca. 800 m elev., and flowered in cultivation Aug. 2004 (HB); same locality, field collected by *E. Leme 6009, R. Reis Jr., J. C. Falcon, M. Machado, E. Silva, P. Waters & C. Moreira*, and flowered in cultivation Sept. 2005 (CEPEC).

This new species is closely related to *Orthophytum sanctum*, according to the original description and illustration provided by Smith (1962). However, *O. macroflorum* differs from it by the broader leaf blades near the base (3.5-4.7 cm vs. ca. 3 cm wide), which is nearly flat (vs. evenly channeled with a semicircular curve in cross-section), sepals distinctly longer (29-37 mm vs. 14 mm), yellowish-green (vs. white), and by the petals nearly 3 times longer (43-57 mm vs. ca. 16 mm long).

Orthophytum macroflorum has by far the largest flowers observed for the scapose complex of species (50-65 mm long) and also the largest petals ever reported for the genus (43-57 mm long), even considering the complex of species with obtuse-cucullate petals, like *O. eddie-estevesii* Leme, with petals ca. 36 mm long, and *O. schulzianum* Leme & M. Machado, described below, bearing petals ca. 37 mm long.

This new species was found at altitudes of about 800 m in the mountains north of Licínio de Almeida, a town located in the south-central region of Bahia. The mountains of this region are somewhat contiguous with the mountains of Grão Mogol, Serranópolis de Minas, Mato Verde e Monte Azul in Minas Gerais and represents a more or less isolated outlier of the Espinhaço Mountain Range.

Orthophytum macroflorum grows on sandstone outcrops, where the plants inhabits shallow cavities in the rock filled with sand derived from the weathering of the rock, and humus derived from the decaying of the scarce vegetation, what makes the substrate acidic and nutrient poor. The vegetation where the new species grows is termed *campo rupestre*, a very rich vegetation type composed of a mosaic of grassland and rock outcrops which provides a myriad of plant habitats where isolation has lead to very high levels of endemism and species diversity. Associated plants include representatives of the Orchidaceae (*Pseudolaelia sp., Pleurothalis spp.*), Velloziaceae

Figure 25. Detail of the flower of *Orthophytum macroflorum* Leme & M. Machado, in cultivation. The type specimen was prepared from this clone.

Photograph by Elton Leme.

Figure 26. *Orthophytum macroflorum* Leme & M. Machado, in cultivation. The type specimen was prepared from this clone.

Photograph by Elton Leme.

(*Vellozia spp., Barbacenia spp.*), Eriocaulaceae (*Syngonanthus spp., Paepalanthus spp.*), Cactaceae (*Pilosocereus superbus, Micranthocereus albicephalus, Melocactus bahiensis ssp. amethystinus, Cereus jamacaru, Brasilicereus phaeacanthus*) and other Bromeliaceae (*Vriesia sp., Tillandsia streptocarpa, Bromelia sp., Hohenbergia sp.*).

Orthophytum schulzianum Leme & M. Machado, sp. nov. **Type:** Brazil. Minas Gerais: field collected by *M. Machado & R. Schulz s.n.* at Diamantina, 8 km on the road to Conselheiro Mata, ca. 1260 m elev., on rock outcrops, 18°18'S, 43°43'W, Aug. 2003 and flowered in cultivation Nov. 2003, *E. Leme 5881* (holotype, HB). FIGURES 28, 29.

Species nova ab *Orthophytum eddie-estevesii* Leme, cui proxima, bracteis floriferis longioribus, alboviridescentibus, sepalis dense et grosse albo-lepidotis, alboviridescentibus, petalis basi appendicibus obovatis cyathiformibus, ca. 3 mm longis, apice denticulatis et tubo epigyno nullo differt; ab *O. mello-barretoi* L. B. Sm., cui affinis, foliis utrimque perdense et grosse albo-lepidotis, marginibus dense spinosis, sepalis longioribus, dense et grosse albo-lepidotis et petalis basi appendicibus obovatis cyathiformibus, ca. 3 mm longis, apice denticulatis recedit.

Plant terrestrial, stemless, 17-19 cm high, propagating by slender stolons. ***Leaves*** subdensely arranged; ***sheaths*** inconspicuous; ***blades*** narrowly triangular, attenuate-caudate, ca. 12 cm long, ca. 3 cm wide at base, coriaceous, distinctly channeled with upright-incurved margins, completely

Figure 27. The red-ferruginous leafed *Orthophytum macroflorum* Leme & M. Machado (Leme 6009, paratype), in cultivation.

Photograph by Elton Leme.

Figure 28. *Orthophytum schulzianum* Leme & M. Machado, flowering in cultivation. The type specimen was prepared from this clone.

Photograph by Elton Leme.

covered by a thick layer of coarse, white trichomes on both sides, distinctly nerved abaxially, margins densely spinose, spines narrowly triangular, flattened, nearly straight to slightly retrorse, densely white-lepidote at base, yellowish toward apex, ca. 2 mm long, ca. 1 mm wide at base, 2-3 mm apart. ***Scape*** ca. 10 cm long, ca. 0.8 cm in diameter, erect, densely white-lanate, green, sulcate; ***scape bracts*** foliaceous but slightly reduced in size toward apex, suberect. ***Inflorescence*** subcorymbose, densely bipinnate, ellipsoid-capitate, erect, 5-6 cm long, ca. 3 cm in diameter; ***primary bracts*** suberect, completely covered by a dense and thick layer of coarse white tricomes on both sides, greenish-white near the base, slightly darker toward the apex, the basal ones foliaceous to subfoliaceous, distinctly exceeding the fascicles but gradually reduced in length toward the inflorescence apex, the upper ones, slightly exceeding the fascicles, bearing a broadly ovate-triangular base, ca. 28 x 25 mm, margins densely spinose, spines ca. 1 mm long, acicular, yellowish toward apex, blades long caudate, apex nearly subulate, pungent, subdensely to laxly spinulose at base, entire toward apex. ***fascicles*** ca. 5 in number, polystichously and densely disposed, erect or nearly so, nearly sessile, narrowly flabellate, subpulvinate, ca. 3.5 cm long (excluding the petals), ca. 1.5 cm wide, 2 or 3-flowered; ***floral bracts*** suberect, greenish-white, nerved, densely and coarsely white-lepidote mainly abaxially, those of the fascicles narrowly triangular, acuminate, strongly carinate, slightly shorter than the

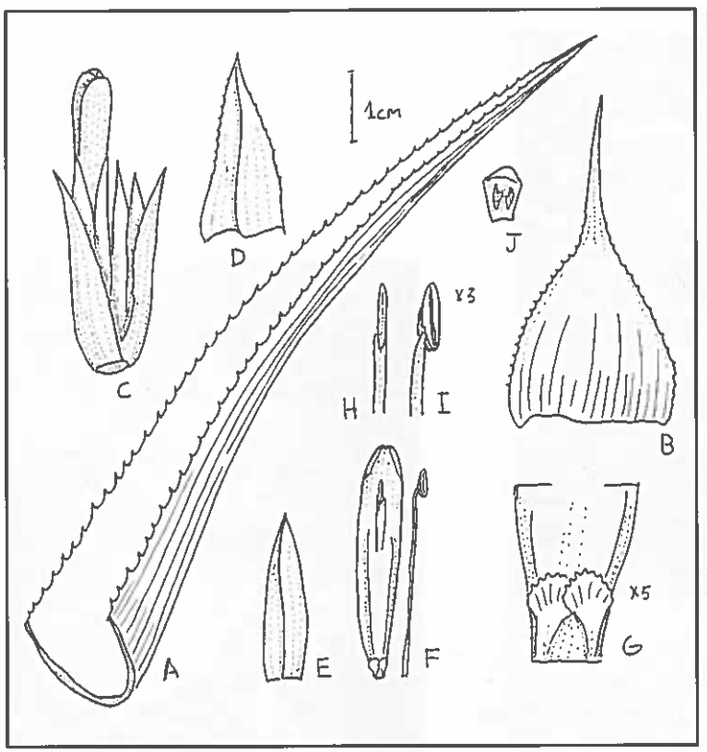


Figure 29. *Orthophytum schulzianum* Leme & M. Machado. A. Leaf blade. B. Primary bract. C. Fascicle. D. Floral bract. E. Sepal. F. Petal. G. Detail of the petal appendages. H. Front view of the anther. I. Side view of the anther. J. Longitudinal section of the ovary.

Drawing by Elton Leme.

sepals, membranaceous, ca. 29 x 13 mm, densely spinulose toward apex, spines acicular, straight to slightly curved, ca. 0.5 mm long, those of the simple apical part of the inflorescence narrowly triangular to broadly ovate, long apiculate, apiculus pungent, ecarinate, slightly shorter to equaling the sepals, subcoriaceous toward apex, 31-35 x 10-16 mm, densely spinulose, spines straight to slightly curved, ca. 1 mm long. ***Flowers*** ca. 46 mm long (with extended petals), sessile, erect, densely arranged, odorless; ***sepals*** subsymmetrical, narrowly lanceolate, apex acuminate, 26-27 x 7 mm, free, entire to remotely denticulate near the apex, greenish-white, membranaceous, densely to subdensely and coarsely white-lepidote except for the white-lanate apex, carinate, the posterior ones with keels decurrent on the ovary; ***petals*** sublinear-spatulate, obtuse-cucullate, ca. 37 x 6 mm, free, erect at anthesis, green except for the white apex and apical margins, bearing 2 laminate, obovate, cupulate, apically denticulate appendages at base, ca. 3 x 1.5 mm, as well as 2 conspicuous longitudinal callosities ca. 25 mm long; ***filaments*** terete, greenish, the antepetalous ones ca. 28 mm long, adnate to the petals for ca. 20 mm, the antesepalous ones ca. 31 mm long, free; ***anthers*** ca. 3.5 mm long, base and apex obtuse, fixed at 1/3 of its length above the base; ***stigma*** simple-erect, ca. 1 mm in diameter, blades green near the base, white toward the apex, suberect; ***ovary*** ca. 7 mm long, trigonous; ***epigynous tube*** lacking; ***placentation*** apical; ***ovules*** obtuse. ***Fruits*** known.

Orthophytum schulzianum is closely related to *O. eddie-estevesii* (Leme 2000), but differs from it by its longer floral bracts (29-35 mm vs. 22-23 mm long), greenish-white (vs. orange at apex), sepals densely and coarsely white-lepidote (vs. glabrous), and greenish-white (vs. reddish-orange toward apex), petals bearing 2 laminate, obovate, cupulate, apically denticulate appendages at base, ca. 3 mm long (vs. fimbriate, ca. 8 mm above the base), epigynous tube lacking (vs. ca. 1.5 mm long). This new species also resembles *O. mello-barretoi* in the broad concept adopted by Smith & Downs (1979). However, it can be distinguished by having leaves densely, coarsely and persistently white-lepidote on both surfaces (vs. soon glabrous above), margins densely spinose, spines 2-3 mm apart (vs. laxly spinulose, spines 5-10 mm apart), sepals longer (26-27 mm vs. 17-20 mm long), and petals bearing at base 2 laminate, obovate, cupulate, apically denticulate appendages, ca. 3 mm long (vs. fimbriate, ca. 7 mm above the base).

This new species is named for Rudolf Schulz, of Teesdale, Australia, who found the plant together with the second author while studying species of *Uebelmannia* (Cactaceae) for a book on the genus (Schulz & Machado 2000; see page 49 for a picture of *O. schulzianum*).

Orthophytum schulzianum grows in the mountainous area of central Minas Gerais within the Espinhaço Range, near the town of Diamantina around which lies the so-called Diamantina Plateau, at altitudes above 1200 m. The region has an average annual precipitation of 1300-1550 mm with an average annual temperature of 18-19°C. Summers are humid with rain falling from Spring (October) to Autumn (April). Temperatures may reach 32-35°C

during the warmer months. Winters are dry and daily minimum temperatures may drop to about 5°C for a few days during the months of July and August. Heavy cloud-banks are common during the dry season. These usually form at night and remain through much of the morning, only burning off around noon. The cloud-banks provide abundant mist, and this is an important source of water for the vegetation during the dry season and a key factor for Bromeliaceae abundance.

Orthophytum schulzianum inhabits shallow cavities on sandstone outcrops filled with sand derived from the weathering of the rock, and humus derived from the decaying of the scarce vegetation. Associated plants include representatives of the Orchidaceae (*Pleurothallis teres, Laelia* spp.), Velloziaceae (*Vellozia* spp., *Barbacenia* spp.), Eriocaulaceae (*Syngonanthus* spp., *Paepalanthus* spp.), Cactaceae (*Cipocereus minensis, Pilosocereus aurisetus, Uebelmannia pectinifera subsp. flavispina, Discocactus placentiformis*) and other Bromeliaceae (*Vriesia* spp., *Aechmea phanerophlebia, Tillandsia streptocarpa, Neoregelia bahiana, Encholirium* spp., *Dyckia* spp.), as well as a wealth of lichen species. The cacti *Uebelmannia pectinifera* subsp. *flavispina* and *Discocactus placentiformis* are both listed as endangered species in CITES Appendix I (IUCN 2001).

This new species is infrequent in the habitat of its only known location, with small groups of plants widely spaced. With its silvery color and compact growth habit, *Orthophytum schulzianum* is an exceedingly attractive species. This, coupled with the presumed scarcity of plants in habitat, could lead to a quick demise of the species case large scale collection of plants is conduced at its only known locality, suggesting the urgent need of further field investigation for the establishment of its conservation status.

Acknowledgments

The authors thank the field support and companion during expeditions kindly provided by Carlos Estevão Moreira, Edmundo Silva, Jeanette and Peter Walters, José Carlos Martinez Falcon, Raymundo Fernandes Reis Jr., and Rudolf Schulz.

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New BSI Awards Announced for Best New Cultivar Exhibitor and Best New Cultivar Breeder

Geoff Lawn, BSI Director, Australia

In May 2005 the BSI Board of Directors decided to create biennial awards to recognise breeders' new creations and exhibitors' competitive entries of new cultivars, also to promote further excellence in breeding and showing.

Awards

1) Four separate awards are to be presented:
   a) Best New Cultivar Exhibitor, Hobbyist.
   b) Best New Cultivar Exhibitor, Commercial.
   c) and (d) Best New Cultivar Breeders of above winning entries, which may be hobbyist-bred or commercially bred in either section (a) or (b).

Assessing the Winners

1) Only competitive entries at World Bromeliad Conference standard shows are eligible. Qualifying entries from standard classes are automatically included in these separate awards.
2) Qualifying entries are to be judged by a panel appointed by the WBC Judges Chairperson.
3) Entries are judged based solely on the cultivar's uniqueness compared to all other known cultivars.

Award Rules

1) Cultivars that have been registered, or that are able to be registered, are eligible
2) Species cultivars and hybrid cultivars are both eligible.
3) Eligible cultivars must have been produced in cultivation, not wild-collected.
4) Hobbyist exhibitors and commercial exhibitors compete for separate awards.
5) Eligible entries must have been either:
   a) registered in the Bromeliad Cultivar Registry within the previous 5 years, or,
   b) bred from seed within the last 8 years, or,
   c) developed as vegetative sports within the last 8 years.

Call for Sponsorship

The BSI Board is seeking individual and corporate sponsors for these awards, which would carry the sponsor's name in the title(s). The length of sponsorship contract and the type of prizes—whether plaques, certificates, trophies, or medallions, are negotiable. The Best New Cultivar Awards win-

ners will be recognized and displayed on the head table at the San Diego World Bromeliad Conference, June 6-11, 2006 .

Interested sponsors should contact BSI President Joyce Brehm at president@bsi.org before the sponsorship deadline of March 1, 2006.

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Joyce Brehm, BSI President

The BSI has volunteer Committee Chairs who serve the members in various ways. The Publications Committee Chair, currently George Allaria, maintains an inventory of old Journals, publications of interest to BSI members, and other items of bromeliad interest. He is ably assisted by his wife Jean who does the packaging and much of the mailing.

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Donations to the Bromeliad Society International January 1, 2005-June 30, 2005

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Memorial Donations

Bromeliad Society of Central Florida, to the BIC in memory of Jerry Lutz, James Mahler, Shirley Massey.

Allyn Pearlman and Charlien Rose, to the Color Fund in memory of Valerie Steckler

Hawaiians Love Bromeliads!

Ron ìKanaheleî Parkhurst*

Though Bromeliads are not indigenous to Hawaii, they have been a part of the Hawaiian landscape for many years. Pineapple was introduced into Hawaii over a hundred years ago, and still remains one of the state's major agricultural exports. Hawaiian pineapple or Ananas comosus has been crossed and hybridized over the years to produce some of the sweetest pineapple fruit in the world. It is a highly protected crop in Hawaii, and therefore bromeliads are very restricted coming into the state, and those making it through quarantine have been quite limited. Thus the only solution for Hawaii's premiere hybridizers such as Howard Yamamoto and his student David Shiigi has been to use the gene pool they already had to create new hybrids. This has set the trend in Hawaii for bromeliad hybrids to this day.

From these early pioneers of Bromeliads, these plants have literally spread throughout all of the islands and into the remote areas of Hawaii. One such place, Kahakuloa, is one of the last true Hawaiian villages in Hawaii. It is located in a remote valley on Maui, where Maui King Kahekili was born and raised. There are very few ìpureî Hawaiians left in Hawaii, as they have become ìpartî Hawaiians over the years due to the influx of different nationalities into Hawaii. Kawika Puailihau (FIGURE 30) is a pure Hawaiian and a Kupuna, which means teacher or elder. He is holding two of David Shiigi's hybrids on his aina or land in Kahakuloa. Guzmania 'Puna Gold', Kapoho 'Fire' and 'Alii', all hybrids of David Shiigi, have special meaning to the Hawaiian people as they contain yellow and red, the colors of Hawaiian royalty. Kawika gave me my Hawaiian name, Kanahele, which was the name of his grandfather who lived on Niihau. Niihau is a small island off of Kauai where only pure Hawaiians live. If a Hawaiian leaves the island, they cannot return to live. Outsiders are allowed on the island by invitation only, which is good for only one day.

Hana, Maui, the heartland of Hawaii is being protected from outside development and thus depends upon cultural traditions. Some of Hawaii's pristine beauty is in the Hana area which also has the ìBest Beachî in the world, Hamoa Beach, which was once used by native royalty and the late great Duke Kahanamoku, Hawaii's surfing and Olympic swimming legend. Recently my part Hawaiian friend Darwin from Hana, and his wife Shannon were King and Queen of the Hana Aloha Festivals (FIGURE 31). He also converted his golf cart into the world's first Bromeliad cart! (FIGURE 32). Darwin is always ready to lend a hand, give a smile and show Aloha, which is a Hawaiian tradition.

Bromeliads have had a huge impact on Hawaii and are now part of the landscape on each of the islands. So when you think of paradise and tropical gardens, you know a Bromeliad is in the picture somewhere. Aloha kakou and Aloha 'oe! (May you be loved and may there be friendship between us!)

* Makawao, Hawaii

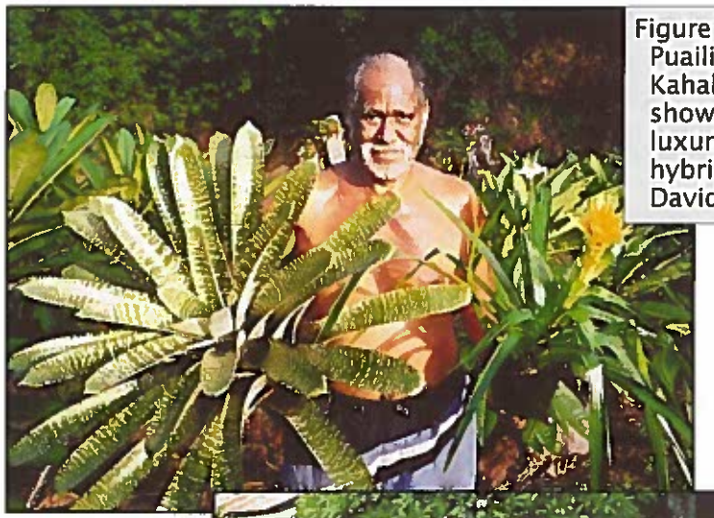

Figure 30. Kawakia Puailihau, from Kahakuloa, Maui shows off some luxuriant bromeliads hybrids made by David Shiigi.

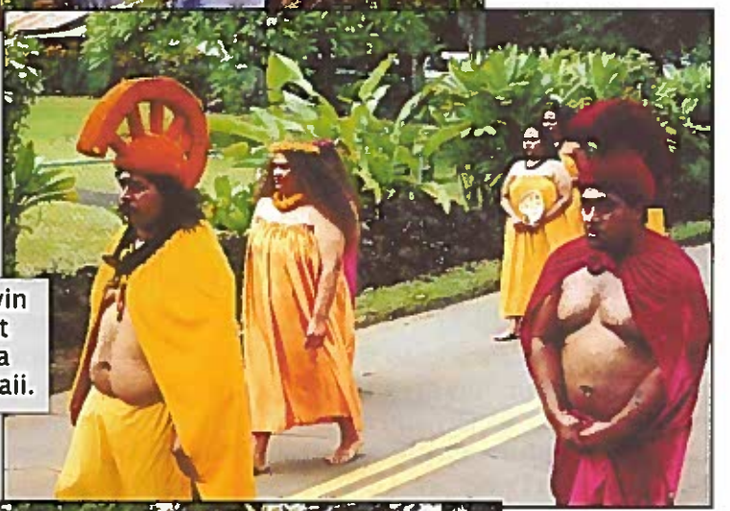

Figure 31. Darwin (left) as King at the Hana Aloha Festivals, Hawaii.

Figure 32. Darwin riding in his bromeliad cart.

Reilly, continued from Page 170

(e) Crossing two similar species, e.g., *T. recurvata* and *T. stricta* often results in offspring displaying hybrid vigour with, for example, larger inflorescences than either parent (Dimmitt, 1990). The converse is also often true. Perhaps there is a case to concentrate on crossing species within a given subgenus.

(f) While a matter of personal preference, I've found hybrids with *T. albertiana*, *T. duratti*, *T. fasciculata*, *T. streptophylla*, and *T. xerographica* as parents to be well worth growing.

Literature Cited

Dimmitt, M.A. 1990. Additional notes on breeding superior tillandsias. J. Bromeliad Soc. 40(3): 118-123.

Events Calendar

March 4-5, 2006. *Bromeliad Show and Plant Sale*. Bromeliad Society of Mt. Coot-tha Botanic Gardens. Mt. Coot-tha Botanic Gardens Auditorium, Brisbane, Queensland, Australia. Mar 4, 8-4; Mar 5, 9-3. Entry Fee $3.00 adults, children under 14 accompanied by an adult are free. For more information, contact Norma Davis. E-mail: norma.davis@griffith.edu.au or phone (Aust 07 3389 1061).

June 6-11, 2006. *Bromeliad World Conference*, Large show and sale, judged competion, lectures, social events, and more. Sponsored by the Bromeliad Society International and the San Diego Bromeliad Society. Town and Country Resort Hotel, Mission Valley, San Diego, California, USA. Hotel rates are $124 per night. For more information, contact BSI Membership Secretary, 1608 Cardenas Dr. NE, Albuquerque, NM 87110, USA. E-mail: membership@bsi.org; or visit www.bsi.org.

September 30, 2006. *Florida Council of Bromeliad Societes' Extravaganza*. Sale, banquet and rare plant auction. Miccousukee Indian and Gaming Resort Convention Center. Miami, Florida USA. For more information visit www.fcbs.org

The Pineapple

Derek Butcher, BSI Cultivar Registrar

In 2003 the anticipated authorative book on Pineapples was published and there are some surprising changes. I have been working closely with the principal author because of the effect on the interpretation of Cultivars.

Most pineapple cultivars are linked to the fruit trade and will not be part of our Cultivar Register but some are grown because of their leaf structure and these will be part of the Register.

For example, some of you may be growing the dark-red leaved form of *Ananas lucidus* which unbeknownst to the Registrar, has been called 'Chocolat' (or 'Selvagem' if you live in Brazil) for many years.

Let us now look at the changes that will occur under the ICBN rules because they do affect Cultivars.

Because Pineapples play such a vital role in the fruit trade, the genus *Ananas* has had more scientific investigations than any other bromeliad genus. While Lyman Smith may have been working at the taxonomic level, much work was done at molecular level in breeding techniques, etc.

The following are the changes from the sytem presented by Smith & Downs (1979). The major change is that the genus *Pseudananas* becomes one of the only two species in *Ananas*. Because the writers saw little difference in the listed species of *Ananas* these are now treated at varietal level under *A. comosus*.

Smith & Downs	Coppens d'Eeckenbrugge & Leal
Ananas ananassoides	*Ananas comosus* var. *ananassoides*
Ananas bracteatus	*Ananas comosus* var. *bracteatus*
Ananas comosus	*Ananas comosus* var *comosus*
Ananas fritzmuelleri	*Ananas comosus* var. *bracteatu*
Ananas lucidus	*Ananas comosus* var. *erectifolius*
Ananas monstrosus	Invalidated by Leal (1990) and treated as a form of *A. comosus*
Ananas nanus	*Ananas comosus* var. *ananassoides*
Ananas parguazensis	*Ananas comosus* var. *parguazensis*
Pseudananas sagenarius	*Ananas macrodontes*

Figure 33.
Ananas 'Tricolor'.

Photograph by
Derek Butcher.

Figure 34.
Ananas 'Variegatus'

Photograph by
Derek Butcher.

Figure 35.
Ananas stamps.

Photograph by
Derek Butcher
courtesy of
Jason Grant.

Anyone growing *Ananas nanus* will now have to use a longer label! The big change is in variegates, because although treated at varietal level in Smith & Downs (1979), they have not been addressed in this latest work. We know that variegation is not a trait consistently transferred in sexual reproduction and as such is perhaps better catered for under the rules of the International Code of Nomenclature of Cultivated Plants.

This means that *Ananas comosus* var. *variegatus* becomes either *Ananas comosus* var. *comosus* 'Variegatus' or *Ananas* ''Variegatus'. Likewise *Ananas bracteatus* var *tricolor* becomes *Ananas comosus* var. *bracteatus* 'Tricolor' or *Ananas* 'Tricolor'. These changes only apply to plants currently known by these names. However, if you have lost the label on your variegated pineapple, plants can be linked to 'Variegatus' if the plant is like 'comosus' but the leaves are variegated. They can be linked to 'Tricolor' if the plant is like 'bracteatus' and the leaf blades are variegated with longitudinal stripes. There are already accepted Cultivars of these two varieties but, no doubt, there will be other Cultivar forms of these and other varieties that will arise from time and time in the future.

Discussions with the 'pineapple people' regarding the variability or non-stability of variegations has strengthened my resolve regarding registering variegated plants. We must remember that variegated is a major adjective and terms such as albomarginate, striate, medio-picta are but types of variegation. Therefore new registrations will be accepted as variegates only. Should the inevitable happen with a change in the form of variegation or the variegation disappears the name will not be invalidated. All you do is add the type of variegation or NOVAR (no variegation) that currently applies, as an adjective to the Cultivar name.

Literature cited

Coppens d'Eeckenbrugge, G.& F. Leal F. 2003. The Pineapple: Botany, Production and uses. CAB Int. 2:13-32.

Leal, F. 1990. On the Validity of *Ananas monstrosus*. J. Bromeliad Soc. 40: 246.

Smith, L.B. & R.J. Downs. 1979 Bromelioideae (Bromeliaceae). Flora Neotropica 14(3): 1493-2142. New York Botanical Garden, New York.

[*] BSI Secretary

The Bromeliad Society International

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

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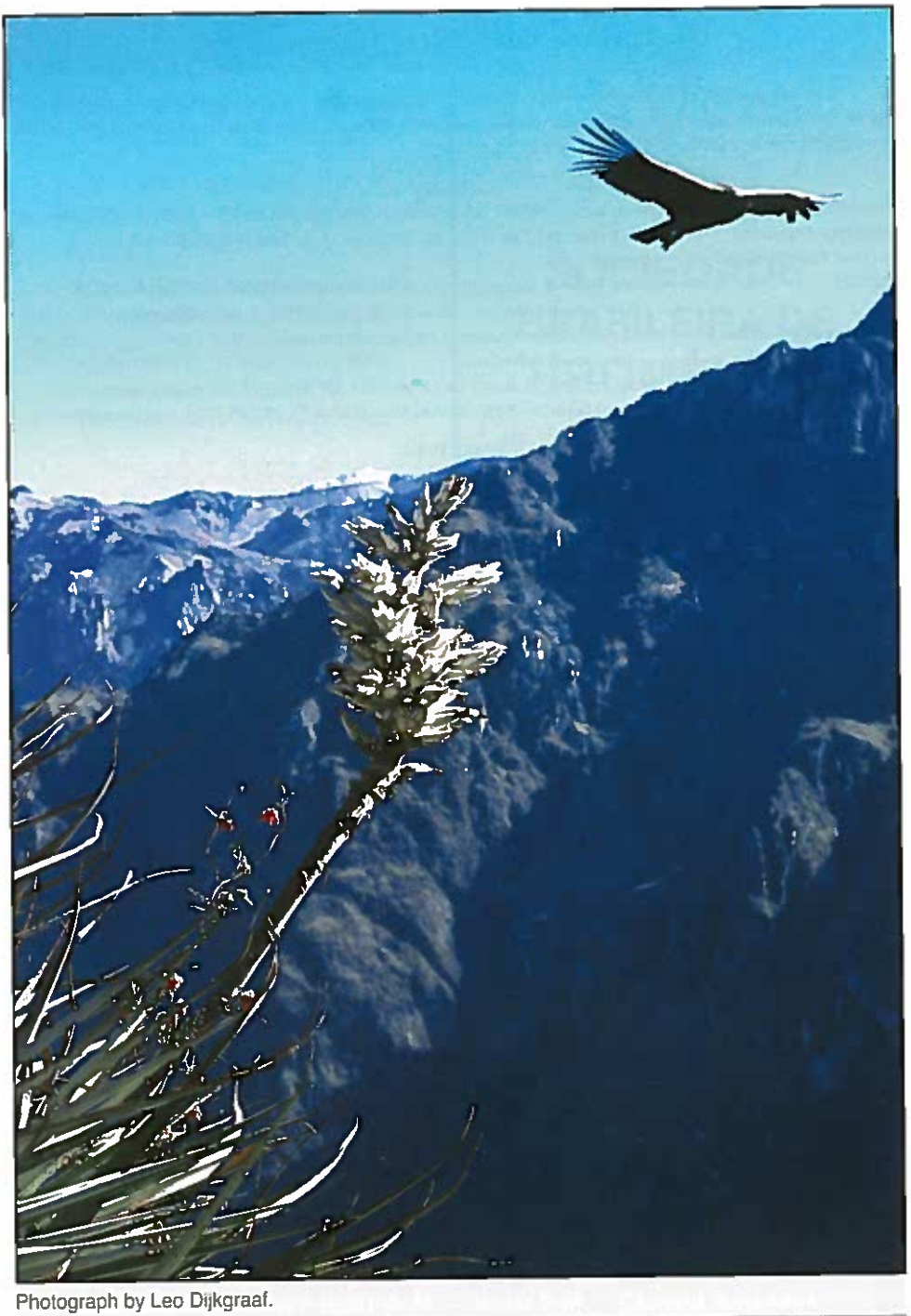

Photograph by Leo Dijkgraaf.

Figure 36.
A majestic Andean Condor flies by an unidentified species of *Puya*.