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Miscellaneous new species in the Brazilian Bromeliaceae

Miscelânea de novas espécies em Bromeliaceae no Brasil

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Abstract

From 1990 to 2006, 2,875 new angiosperm species were described in Brazil, including 280 new Bromeliaceae species. This publication rate is considered to be a useful indicator of floristic richness and also reveals the huge gaps in our knowledge of species that make up Brazilian biomes and the importance of taxonomy as a basic tool to assess biodiversity and conservation. The goal of modern taxonomists is in a race against time ordained by an unprecedented rate of global biodiversity loss, and therefore collaboration is vital to successfully close these gaps. This paper is the result of a broad cooperative research effort undertaken specifically to provide basic data on the identity of new components of Brazilian biological diversity. The authors describe and illustrate 22 new Bromeliaceae species from three subfamilies: Bromelioideae – *Aechmea guaratingensis*, *A. paratiensis*, *A. rubroaristata*, *Cryptanthus capitellatus*, *C. venecianus*, *C. viridovinosus*, *Hohenbergia aechmeoides*, *H. arcuata*, *H. barbarespina*, *H. reconcavensis*, *Nidularium alegrense*, *Orthophytum teofilo-otonense*, *O. cearence*; Pitcairnioideae – *Dyckia espiritosantensis*, *D. nana*, *Pitcairnia capixaba*; Tillandsioideae – *Tillandsia castelensis*, *Vriesea euclidiana*, *V. fontanae*, *V. multifoliata*, *V. sanctateresensis* and *V. teresopolitana*.

Key words: biodiversity, Bromelioideae, new taxa, Pitcairnioideae, taxonomy, Tillandsioideae.

Resumo

No Brasil, entre 1990 e 2006, foram descritas 2.875 novas espécies de angiospermas, incluindo 280 novos membros para a família Bromeliaceae. Esses números constituem um indicador tanto da riqueza florística do país, como também da grande lacuna de conhecimento das espécies que compõem os biomas brasileiros, ao mesmo tempo em que destacam a importância da taxonomia como uma ferramenta de base no âmbito da catalogação da biodiversidade e da conservação. A tarefa dos taxonomistas modernos é hoje ditada por uma verdadeira corrida contra o tempo em razão da perda global da biodiversidade sem precedentes. Nesse processo, a colaboração é vital para suprir as lacunas do conhecimento. Este trabalho é o resultado de um amplo esforço cooperativo de pesquisa que tem o propósito de fornecer dados básicos sobre a identidade de novas espécies que compõem a biodiversidade brasileira. São aqui descritas e ilustradas 22 espécies novas de Bromeliaceae, pertencentes a três subfamílias e nove gêneros: Bromelioideae –*Aechmea guaratingensis*, *A. paratiensis*, *A. rubroaristata*, *Cryptanthus capitellatus*, *C. venecianus*, *C. viridovinosus*, *Hohenbergia aechmeoides*, *H. arcuata*, *H. barbarespina*, *H. reconcavensis*, *Nidularium alegrense*, *Orthophytum teofilo-otonense*, *O. cearence*; Pitcairnioideae – *Dyckia espiritosantensis*, *D. nana*, *Pitcairnia capixaba*; Tillandsioideae – *Tillandsia castelensis*, *Vriesea euclidiana*, *V. fontanae*, *V. multifoliata*, *V. sanctateresensis* e *V. teresopolitana*.

Palavras-chave: biodiversidade, Bromelioideae, novos táxons Pitcairnioideae, taxonomia, Tillandsioideae.

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Introduction

One of today's most grievous problems is the mass extinction of species. This widespread extinction is the result of, among other reasons, the disappearance and fragmentation of habits brought about by a great variety of man's unrestrained activities (Gascon *et al.* 2001; Tabarelli *et al.* 2007). The number of recent extinctions due to human interference is 100 to 1,000 times greater than what took place in pre-human times (Pimm *et al.* 1995; Rocha 2000). Although we known only an estimated 2 to 15% of the organisms in our biosphere, a loss of one million or more species has been estimated for the 20th century, with today's projection of the extinction rate some 100 or more species per day (Bierner 1994). Morawetz & Raedig (2007) estimate a loss of 100 narrow endemic angiosperm species per year in the Neotropics, most of them affected by habitat loss and fragmentation.

The number of flowering plants on earth is estimated from 220,000 to 420,000, whereby this broad range is due to different application of synonymies (Govaerts 2003; Scotland & Wortley 2003; Wortley & Scotland 2004). Neotropical angiosperms constitute a high proportion of angiosperm species worldwide, ranging from 26% to 37% (Smith *et al.* 2004; Morawetz & Raedig 2007). Brazil is thought to be the leader on earth in number of higher plants, with about 55,000 species (Ministério do Meio Ambiente 1998), with high angiosperm biodiversity, including narrow endemics, concentrated, for example in the south-eastern coastal area, mainly in southern Bahia and around Rio de Janeiro and São Paulo, as well as in north-western Amazon, in the surroundings of Manaus, in the upper Rio Negro area and in the Amazon delta (Morawetz & Raedig 2007).

According to Sobral & Stehmann (2009), from 1990 to 2006, 2,875 new angiosperm species were described in Brazil, including 280 new Bromeliaceae species, out of a total of 3,172 known bromeliad species (Luther 2008). This rate of publication is considered a useful indicator of floristic richness as well as of lack of adequate floristic knowledge. This fact reveals the huge gaps in our knowledge about species that make up Brazilian biomes and the importance of taxonomy as a basic tool to assess biodiversity and conservation (May 1990; Mayo *et al.* 2000).

Taxonomy is essential to implementation of the Convention on Biological Diversity (CBD) as a key input in the management of all types of ecosystems since it provides information on the identity of the components of the biological diversity (Fraga 2007). As Landrum (2001) aptly states, the work of the taxonomist describing and mapping the organisms of the world, is the true foundation of conservation. Recognition of threats to biological resources and informed environmental decision-making to ensure sustainable resource use can only be possible if the species are effectively known (Smith & Wolfson 2004). To address the gaps in our taxonomic knowledge that substantially impact our ability to conserve and promote fare-use of biological diversity and equitable sharing of its benefits, the Sixth Conference of the Parties of the CBD adopted the Global Strategy for Plant Conservation and established the Global Taxonomic Initiative. Thus, the goal of modern taxonomists is trapped in a race against time ordained by an unprecedented rate of global biodiversity loss (Leme 2003), and collaboration is vital for the success in closing these gaps (Paton *et al.* 2008). It is imperative that botanists and conservationists interact to meet the so called global biodiversity challenge (Callmander *et al*. 2005).

In Brazil, facing the perspective of new discoveries, the taxonomist's task is proportional to this country's megadiversity. Taxonomic technical cooperation networks, collaborative research and taxonomist interaction are essential to surpass logistical difficulties related to, *e.g*. territory dimension and complex topography, resources scarcity, reluctant policies, and strengthen scientific production. This paper is the result of a broad research cooperation undertaken with the single purpose of providing basic data on the identity of new components of the Brazilian biological diversity.

Material and Methods

The studied species were collected randomly in pre-selected sites during field activities with the specific purpose of biodiversity prospection in Bromeliaceae. The descriptions and illustrations are based on live fertile material using a stereomicroscope, before pressing and drying, and descriptive terminology follows Smith & Downs (1974, 1977, 1979), with adaptations. Voucher specimens were dried and pressed according to Fidalgo & Bononi (1984) and deposited in the herbaria RB, HB, MBML and VIC (acronyms following Holmgren *et al.* 2003).

The living holotype or paratype descendant (*i.e.* the "living type" according with Fraga & Silva 2004) were grown at the Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro and part of these

cultivate to in Rio de Janeiro Botanic Garden, Rio de Janeiro, following the guidelines recommended by the Convention on Biological Diversity for *ex situ* conservation.

Results and Discussion

Aechmea Ruiz & Pav.

With at least 60% of the species found in Brazil, the genus *Aechmea* is the largest one in subfamily Bromelioideae. It has 256 species (Luther 2008) in eight subgenera: *Aechmea, Chevaliera* (Gaudich. ex Beer) Baker, *Lamprococcus* (Beer) Baker, *Macrochordion* (de Vriese) Baker, *Ortgiesia* (Regel) Mez, *Platyaechmea* (Baker) Baker, *Podaechmea* Mez, and *Pothava* (Baker) Baker. Of these, only *Podaechmea* is not represented in Brazil.

Huge structural and morphological diversity together with a poor understanding of the natural delimitation of these species, and therefore of the subgenera, makes *Aechmea* one of the taxonomy's most important challenges today. These attributes have contributed decisively to the fact that this genus is a dumping ground for taxa, without a well-defined generic position, and this has inflated the universe of discordant elements, especially in subgenus *Aechmea* (Leme 1997; Leme & Siqueira-Filho 2006).

Aechmea guaratingensis Leme & L. Kollmann, *sp. nov.* Type: BRAZIL. BAHIA: Guaratinga, São João do Sul, Fazenda Estrela do Sul, 16º41'46.2"S, 39º58'59.5"W, 777 m elev., 21.IV.2009, fl., *E. Leme, L. Kollmann, A.P. Fontana & C. Esgario 7767* (holotype RB!; isotype MBML!). Figs. 1a-e, 2a-b

Species nova a Aechmea marauensis Leme, *cui affinis, inflorescentia conferta vel fere, plus ramosa, fasciculis basalibus manifeste latioribus, floribus quaquaverse dispositis, bracteis floriferis apicem versus roseis, sepalis roseis sed apice marginibusque lilacinis et antheris apice apiculatis differt*.

Plant terrestrial or epiphytic, flowering 90–110 cm tall. Leaves ca. 20, rosulate, suberect, coriaceous, forming at base a narrow funnelform rosette; sheaths elliptic, 19–20 × 11–12 cm, dark wine-purple on both sides and toward the apex, castaneous outside and toward the base, densely and minutely brown-lepidote on both sides, at apex densely and coarsely spinose, spines similar to those of the basal portion of the blades; blades sublinear, not narrowed toward the base, 60–70 × 4.7–5 cm, green to greenish-yellow or reddish toward the apex, subdensely to sparsely and inconspicuously white-lepidote mainly abaxially, apex acute to acuminate and mucronate, margins densely spinose, spines dark brown, narrowly triangular, flat, the basal ones 3–6 mm long, 1.5–2 mm wide at base, 2–5 mm apart, spreading to slightly retrorse, the upper ones 1.5–3 mm long, 1–1.5 mm wide at base, 4–7 mm apart, prevailing antrorse. Peduncle erect, 40–45 cm long, ca. 1.5 cm in diameter, rose, subdensely white lepidotes, trichomes fimbriate; peduncle bracts sublinear-lanceolate, acute and mucronate, 19–23 ×5–5.5 cm, erect, nerved, entire, subdensely to sparsely lepidote mainly abaxially, distinctly exceeding the internodes and enfolding the scape, thinly coriaceous, pale rose; inflorescence narrowly subpyramidal, 4-pinnate at base and tripinnate toward the apex, about equaling the leaves, erect, 30–38 cm long, 13–15 cm in diameter at base (excluding the petals), rachis 0.8–1.2 mm in diameter, straight, densely white sublanate, rose terete; primary bracts narrowly lanceolate, acuminate, entire, finely nerved, subdensely and inconspicuously white lepidote abaxially and adaxially toward the apex, reddish-rose, chartaceous, cymbiform, loosely reflexed, decreasing in size toward the inflorescence apex, 5–15 × 1.2–2.5 cm, the basal ones distinctly exceeding the branches, the upper ones about equaling to slightly exceeding the branches (excluding the petals); primary branches 23 to 25 in number polystichously and subdensely (at base) to densely (toward the apex) arranged, subspreading, slightly decreasing in length toward the inflorescence apex, 4.5–8.5 cm long, bearing 2 (uppes ones) to 7 (basal ones) secondary branches densely aggregated at apex and forming subflabellate, pulvinate terminal fascicle 3–6 cm wide at apex, stipes 1–3.5 × 0.7–1.3 cm, ebracteate, complanate, bright reddish-rose, densely white sublanate, rachis inconspicuous; secondary bracts broadly ovate, acute and mucronate, 25–35 × 18–22 mm, including the ca. 2 mm long pungent, brown apical mucron, shorter than the secondary branches, suberect, thinly coriaceous, entire, nerved, carinate toward the apex, glabrous, lustrous, rose; secondary branches the basal ones resembling the upper primary branches, the upper ones sessile, ellipsoid, 3–4 × 1.7–2 cm, bearing 6 to 8 flowers; floral bracts broadly elliptic to suborbicular, obtuse and mucronate, 23–27 × ca. 20 mm, including the 2–3 mm long pungent, apical mucron, slightly shorter to equaling the sepals, straight to suberect near the apex, thin in texture, entire, nerved, glabrous, lustrous, and covered by a oleaginous substance, rose toward the apex, those of the basal branches carinate or obtusely carinate toward the apex.

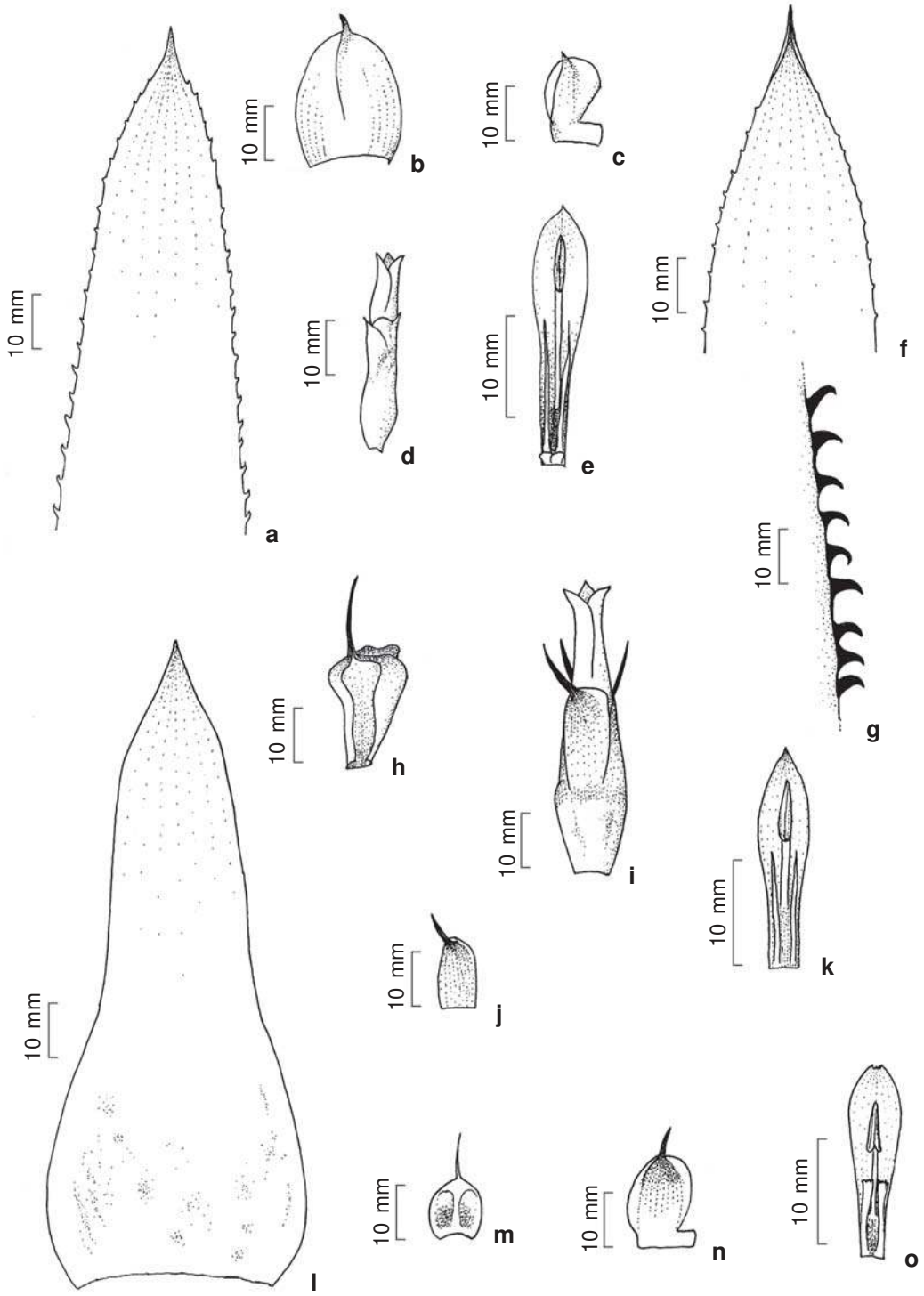

Figure 1 – a-e. *Aechmea guaratingensis* Leme & L. Kollmann – a. leaf apex, adaxial view; b. floral bracts, from above; c. flower in side view; d. sepal, from below; e. petal and stamen, from above. f-k. *A. paratiensis* Leme & Fraga – f. leaf apex, adaxial view; g. margin of the leaf in the basal portion; h. floral bracts, from above; i. flower in side view; j. sepal, from below; k. petal and stamen, from above. l-o. *A. rubroaristata* Leme & Fraga – l. peduncle bract; m. floral bracts, from above; n. sepal, from below; o. petal and stamen, from above. (a-e *Leme 7767*; f-k *Silva 136*; l-o *Leme 1662*).

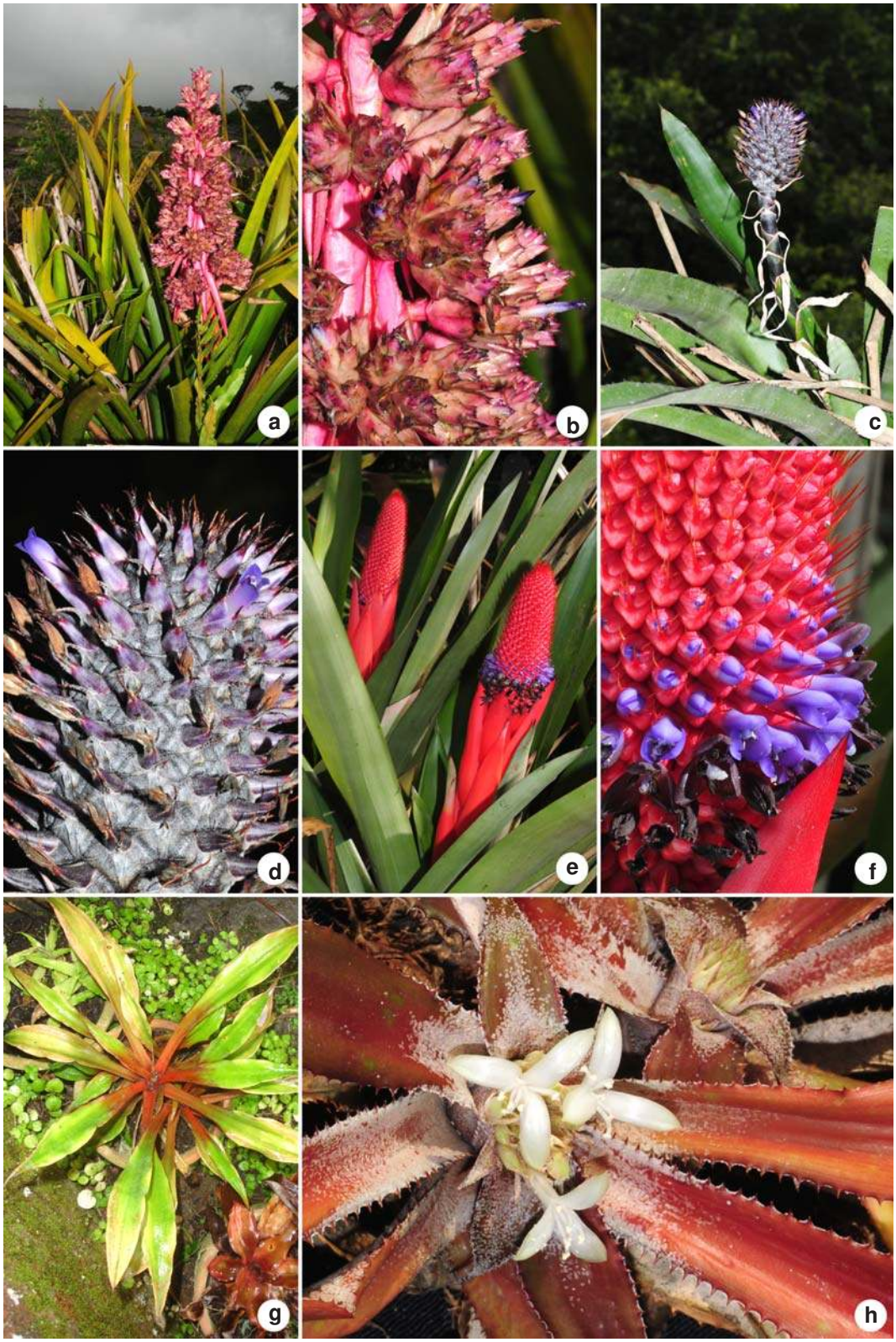

Figure 2 – Habit and detail of inflorescence and flowers – a-b. *Aechmea guaratingensis* Leme & L. Kollmann. c-d. *A. paratiensis* Leme & Fraga. e-f. *A. rubroaristata* Leme & Fraga. g-h. *Cryptanthus capitellatus* Leme & L. Kollmann (photos: E. Leme).

Flowers 30–35 mm long (including the petals), odorless, erect at anthesis, polystichously arranged, sessile, producing an abundant oleaginous, translucent substance; sepals subobovate, distinctly asymmetrical with the lateral membranous, rounded wing nearly equaling the midnerve, rose except for the lilac apical margins, glabrous, lustrous and covered by a oleaginous translucent substance, obtusely if at all carinate toward the apex, ca. 17 × 8 mm, connate at base for ca. 3 mm, apex mucronulate, mucron ca. 1 mm long; petals narrowly subsphatulate, subacute and apiculate, 25–26 × ca. 6 mm, free, lilac in its basal 2/3 and purple in its apical 1/3, erect, except for the suberect extreme apex, forming a tubular slightly convergent corolla, bearing at base 2 shortly conchiform, truncate, denticulate appendages, ca. 1.5 × 2 mm, as well as 2 conspicuous callosities ca. 15 mm long, shorter than the filaments; filaments ca. 18 mm long, complanate, not at all dilated toward the apex, white, the antesepalous ones free, the antepetalo us ones basally adnate to the petals for ca. 5 mm; anthers ca. 5 mm long, dorsifixed near the middle, lilac along the connective zone, base obtuse, apex apiculate; pollen globose, exine reticulate; stigma conduplicate-spiral, subglobose-fusiform, purple, margins remotely crenulate to nearly entire; ovary narrowly subclavate, subtrigonous, ca. 10 mm long, ca. 5 mm in diameter at apex, glabrous; epigynous tube funnelform, ca. 2.5 mm long; placentation apical; ovules long caudate. Fruits unknown.

Aechmea guaratingensis is a member of subgenus *Aechmea*, closely related to *A. marauensis*. It differs from the closer relative by its inflorescence with branches densely arranged toward the base and almost completely hiding the rachis (vs. with branches laxly to subdensely arranged toward the apex, not hiding the rachis), 4-pinnate at base and tripinnate toward the apex (vs. tripinnate at base and bipinnate toward the apex), distinctly broader basal fascicles (3–6 cm wide vs. 1.2–2.5 cm wide), polystichously arranged flowers (vs. distichously arranged flowers or nearly so), floral bracts rose toward the apex (vs. rose toward the base and whitish-lilac near the apex), sepals rose except for the lilac apical margins (vs. greenish at base and lilac toward the apex), and by the apically apiculate anthers (vs. apically obtuse).

While *Aechmea marauensis* is known to grow in lowlands of the coastal zone, both terrestrially as well as an epiphyte in the coastal plain vegetation (Restinga) and in nearby Atlantic Forest, *A. guaratingensis* is a typical inhabitant of the montain Atlantic Forest, around 700 m elevation, where it thrives more often as a terrestrial, despite sparsely distributed epiphytic clumps that were observed at the collection site.

The specific name chosen for *Aechmea guaratingensis* is a reference to the county of Guaratinga, State of Bahia, where it was discovered.

Aechmea paratiensis Leme & Fraga, *sp. nov.* Type: BRAZIL. RIO DE JANEIRO: Parati, Praia de Antigos, 23°20'20.05"S, 44°37'18.81"W, 25 m elev., 8.IX.1999, fl., *B.R. Silva 136*, fl. cult. VIII. 2009 (holotype RB!; isotype HB!). Fig.s 1 f–k, 2 c–d

Species nova a Aechmea aguadocensis Leme & L. Kollmann, *cui affinis, laminis foliorum brevioribus angustioribusque, bracteis floriferis atropurpureo-castaneis, brevioribus et apice truncatis, floribus brevioribus, sepalis brevioribus, apicem versus purpureis et petalis minoribus differt;* Aechmea cariocae L.B. Sm., *cui affinis, laminis foliorum brevioribus angustioribusque, inflorescentia breviora, bracteis floriferis atropurpureo-castaneis, brevioribus apice truncatis, floribus brevioribus, haud odoratis, sepalis apicem versus purpureis, angustioribus et petalis minoribus differt; a* Aechmea muricata (Arruda) L.B. Sm., *proxima, laminis foliorum marginibus spinis basalibus longioribus, inflorescentia breviora, bracteis floriferis atropurpureo-castaneis, brevioribus apice truncatis, floribus brevioribus, sepalis apicem versus purpureis et petalis brevioribus, prope apicem per anthesin suberectis differt.*

Plant epiphytic, propagating by short basal shoots, flowering ca. 65 cm high. Leaves ca. 18, suberect, coriaceous, forming a funnelform rosette; sheaths elliptic, ca. 15 × 8.5 cm, dark castaneous toward the base mainly adaxially, greenish near the apex, densely brown lepidote on both sides; blades sublinear, not narrowed at base, 50–60 × 5.5–6 cm, apex acuminate, ending in a slender dark brown pungent spine ca. 7 mm long, abaxially densely white lepidote with trichomes sometimes forming inconspicuous crossbands, adaxially sparsely and inconspicuously white lepidote, margins densely to subdensely spinose, spines subtriangular, dark brown, the basal ones 3–6 × 1.5–3 mm, 2–6 mm apart, strongly retrorse-uncinate, the upper ones 1.5–2 × ca. 1 mm, slightly antrorse-uncinate to retrorse-uncinate, 6–12 mm apart. Peduncle stout, suberect, ca. 45 cm long, ca. 1.5 cm in diameter, greenish to purplish, white lepidote to glabrescent;

peduncle bracts distinctly exceeding the internodes, the basal ones subfoliaceous, the upper ones with sheaths broadly ovate to subreniform, erect and strongly imbricate, almost completely covering the scape, 2.5–6 × ca. 3.5 cm, dark colored, subdensely white lepidote mainly toward the base, blades narrowly sublinear-lanceolate, strongly contrasting with the sheaths, pale stramineous, suberect to loosely reflexed, 3.5–7 × 0.5–1.5 cm, densely spinulose at apex to entire; inflorescence simple, erect, very densely strobilate, oblong-capitate in late anthesis and subcylindrical, ca. 7.5 × 5 cm in diameter (excluding the petals), apex truncate and bearing a small coma of sterile bracts ca. 1.3 cm in diameter; floral bracts obpyramidate-obovate, navicular, thick-coriaceous and lignified, tricarinate, enfolding the ovary, dark purple-castaneous and densely white lepidote on the visible parts, greenish and glabrous or nearly so at the hidden parts, apex truncate and bearing a spine 7–10 mm long, 19–21 × 12–14 mm (including the apical spine). Flowers sessile, densely and polystically arranged, spreading, 28–31 mm long, odorless; sepals suboblong, thinly coriaceous, asymmetrical with a rounded membranous, lateral wing about equaling the midnerve, bearing a long apical spine, ecarinate, subfree, purple toward the apex except for the white-hyaline margins, reddish near the base, densely white lepidote, ca. 17 × 6 mm, including the ca. 5 mm long dark wine-castaneous apical spine; petals narrowly subsphatulate, apex subacute and distinctly apiculate, lilac near the apex and lilac-rose toward the base on the visible parts, erect except for the suberect apex, 21–22 ×ca. 4.5 mm, free, bearing two well developed longitudinal callosities ca. 12 × 1 mm, without any appendages; filaments whitish, partially concealed by callosities, 15–16 × ca. 1 mm, complanate, not at all dilated toward the apex, the antepetalous ones adnate to petal for ca. 7 mm, the antesepalous ones free; anthers sublinear-lanceolate, base obtuse, apex acuminate, dorsifixed slightly bellow the middle, ca. 5.5 mm long, cream colored; pollen broadly ellipsoid, subporate, exine reticulate; style cylindrical, whitish, ca. 21 mm long, ca. 1 mm in diameter; stigma conduplicate-spiral, ellipsoid, lobes strongly twisted, ca. 2.5 mm long, ca. 1.2 mm in diameter, white, margins shortly crenulate-lacerate; ovary subclavate, terete, free and not fused to other ovaries, whitish, glabrous, ca. 7 mm long, ca. 7 mm in diameter at apex; placentation apical; ovules ca. 1.2 mm long, long caudate; epigynous tube crateriform, ca. 2 mm long. Fruits unknown.

Aechmea paratiensis is a typical member of *Aechmea* subgen. *Chevaliera* and can be morphologically related to *A. aguadocensis*, *A. cariocae* and *A. muricata*, despite its distinctly smaller stature and more delicate general conformation. When compared to *A. aguadocencis*, which is a recently discovered species from the north of Espírito Santo State (Leme & Kollmann 2009), this new species differs by the shorter and narrower leaf blades (50–60 × 5.5–6 cm vs. 120–160 × 11–13 cm), the dark purple-castaneous (vs. pale yellowish-castaneous) and shorter floral bracts (19–21 mm vs. 35–40 mm long) with truncate apex (vs. acuminate), shorter flowers (28–31 mm vs. 50–55 mm long), shorter sepals (ca. 17 mm vs. 25–28 mm long) which are purple toward the apex (vs. pale yellowish-castaneous), and by the smaller petals (21–22 × ca. 4.5 mm vs. ca. 36× 7–8 mm). *Aechmea paratiensis* can be distinguished from *A. cariocae*, an endemic species from the Atlantic Forest of the county of Rio de Janeiro (Leme & Silva 2002), by its smaller leaf blades (50–60 ×5.5–6 cm vs. ca. 250 × 12–15 cm), shorter inflorescence (ca. 7.5 vs. 15–20 cm long), dark purple-castaneous (vs. light green) and shorter floral bracts (19–21 mm vs. 25–30 mm long), with truncate apex (vs. attenuate), shorter and odorless flowers (28–31 mm vs. 50–60 mm long; sweetly fragrant), sepals purple toward the apex (vs. green) and narrower (ca. 6 mm vs. 8–9 mm wide), and by the smaller petals (21–22 × ca. 4.5 mm vs. 40–48 ×9–10 mm).

Finally, in comparison to *Aechmea muricata*, an endemic species from the northern territory States of Pernambuco and Alagoas (Leme & Siqueira-Filho 2006), the morphological differences of *A. paratiensis* are mainly related to leaf blades with longer marginal spines (3–6 mm vs. 1–3 mm long), shorter inflorescence (ca. 7.5 vs. 11–26 cm long), dark purple-castaneous (vs. pale green) and shorter floral bracts (19–21 mm vs. 25–33 mm long) with truncate apex (vs. acute), shorter flowers (28–31 mm vs. 43–45 mm long), sepals purple toward the apex (vs. light green), and by the shorter petals (21–22 mm vs. 35–36 mm long) with suberect apex at anthesis (vs. suberect-recurved).

The living holotype descendant (cult. *E. Leme 7966*) is cultivated in the living collection of the Rio de Janeiro Botanic Garden, as well as in Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro.

Aechmea paratiensis is only known from the type collection. It was found growing as an epiphyte in the lowland Atlantic Forest facing Praia de Antigos, at Parati, Rio de Janeiro State, and strongly influenced by the ocean proximity.

The name of this new species is a explicit reference to the county of Parati, in the south region of Rio de Janeiro State, where it was discovered.

Aechmea rubroaristata Leme & Fraga, *sp. nov.* Type: BRAZIL. SANTA CATARINA: near the border to Paraná, Campo Alegre, Morro do Iquererim ("Quiriri"), 1200 to 1450 m elev., 16.XI.1990, fl., *E. Leme, J.C. Silva & L.C. Marigo 1662* (holotype RB!; isotype HB!). Figs. 1 l–o, 2 e–f

Species nova a Aechmea ornata Baker*, cui affinis, bracteis scapalibus supernis laminis latioribus, integris, bracteis floriferis rubris apice spinis brevioribus, sepalis rubris apice spinis brevioribus, petalis marginibus integris vel fere et appendicis crenulato-denticulatis differt; a* Aechmea roberto-anselmoi E. Pereira & Leme, *cui proxima, laminis foliorum spinis inter sese 1–2 mm distantibus armata, bracteis floriferis rubris inconspicue albo-lepidote vel glabris, apice spinis brevioribus, sepalis rubris, glabris, petalis purpureo-lilacinis et granis polinibus psillatis differt.*

Plant terrestrial, propagating by stout basal shoots, flowering 70–80 cm high. Leaves ca. 20, suberect, coriaceous, forming a funnelform rosette; sheaths elliptic-ovate, ca. 20 × 12 cm, dark castaneous toward the base, green near the apex, densely brown lepidote on both sides; blades sublinear-attenuate, not narrowed at base, channeled toward the base, ca. 80 × 7 cm, apex acuminate, ending in a pungent spine 5–6 mm long, adaxially inconspicuously and sparsely white-lepidote, abaxialy densely white-lepidote, margins densely spinulose, spines triangular, spreading, straight or slightly antrorsely curved, dark brown, 0.2–0.5 mm long, 1–2 mm apart. Peduncle stout, erect, ca. 45 cm long, ca. 1.5 cm in diameter, pale colored, densely white lepidote; peduncle bracts the basal ones subfoliaceous, upper ones narrowly lanceolate to ovate-lanceolate, apex acuminate-spinescent, pungent, distinctly exceeding the internodes, subdensely and inconspicuously white-lepidote to glabrescent, suberect-ascending, subtending the inflorescence, strongly channeled, red, 7–20 × 3.5–5 cm, the basal ones densely spinulose near the apex, the upper ones entire; inflorescence simple, erect, very densely strobilate, narrowly ovate to cylindrical, ca. 15 × 5 cm (at late anthesis, excluding the petals), apex rounded and bearing a distinct apical coma of small sterile bracts; floral bracts broadly obovate to suborbicular, navicular, thickly coriaceous and lignified except for the membranous basal margins, tricarinate, enfolding the ovary, bright red on the visible parts, outside inconspicuously white-lepidote to glabrescent, trichomes not obscuring bracts color, apex truncate and aristate-spinescent, 18–23 × 10–11 mm, including the 7–10 mm long, red, suberect apical spine, distinctly exceeding the sepals, margins entire. Flowers sessile, densely and polystically arranged, subspreading, 23–25 mm long (with extended petals), odorless; sepals broadly suboblong-ovate, asymmetrical with the subrounded lateral inconspicuous wing slightly exceeding the midnerve, apex obtuse and distinctly mucronate, 10–11 × ca. 5 mm, including the 2–2.5 mm long, dark red apical mucron, glabrous, coriaceous except for the membranous, whitish-hyaline lateral wing, red, ecarinate, connate at base for ca. 2 mm, margins entire; petals subsphatulate, apex subobtuse and inconspicuously emarginate, slightly cuccullate, inconspicously apiculate, lilac-purple toward the apex, suberect, ca. 18 × 5 mm, subfree, margins entire or nearly so, bearing 2 well developed longitudinal callosities ca. 10 mm long, as well as 2 appendages ca. 8 mm above the base, cupulate, subsphatulate, with crenulate-denticulate apex; filaments whitish, partially concealed by callosities and appendages, 13–14 mm long, subterete, the antepetalous ones adnate to petal for 4–5 mm, the antesepalous subfree; anthers sublinear, base sagittate, apex apiculate, dorsifixed at 1/3 of its length above the base, ca. 5 mm long; pollen globose, sulcate, exine psillate; style cylindrical, whitish, ca. 14 mm long, ca. 1 mm in diameter; stigma conduplicate-spiral, globose, ca. 1.5 mm long, lilac, margins crenulate; ovary broadly subclavate, subquadrate, ca. 6 × 4 mm, densely white lepidote; placentation apical; ovules long caudate; epigynous tube crateriform, ca. 1.5 mm long. Fruits unknown.

Material examined: BRAZIL. SANTA CATARINA: Campo Alegre, Floresta, Cerro do Pito, ca. 1100 m elev., 17.XI.1990, fl., *E.Leme et al. 1672* (RB).

This new species was innacurately identified by Leme & Marigo (1993) as *Aechmea ornata* var. *hoehnena* L.B. Sm. and more recently as the typical from of *A. ornata* in Sousa (2004). However, problems involving the broad circumscription of *A. ornata*, including *A. roberto-anselmoi* as a synonym (*e.g.* Wendt 1997), which was followed by Sousa (2004) in the revision of *Aechmea* subgen. *Chevaliera,* were already reported by Leme (2009). In the case of *A. roberto-anselmoi*, Wendt (1997), for example,

did not evaluate the fact that the typical *A. ornata*, originally described from Santa Catarina State, presents pollen sulcate and psillate, when *A. roberto-anselmoi*, from Rio de Janeiro State, has porate pollen grains, as cited in its protologue (Pereira & Leme 1985), with reticulate exine, just to exemplify one striking character of distinction between these taxa. More recently, another circumscription of *A. ornata* in disagreement with its original concept also appeared in Costa & Wendt (2007), but in their comments the authors seriously considered the uncertainty of the identification of the taxon they studied from Nova Friburgo, Rio de Janeiro.

However, when compared to the typical *Aechmea ornata*, *A. rubroaristata*, which is a member of subgenus *Chevaliera*, differs by its upper scape bracts with broader blades (3.5–5 cm vs. 1.5–2.7 cm wide), which are also entire (vs. densely spinulose toward the apex), bright red floral bracts (vs. green) with a shorter apical spine (7–10 mm vs. 11–15 mm long), bright red sepals (vs. green), with a shorter apical spine (2–2.5 mm vs. 3–5 mm long), and by the petals with entire apical margins (vs. irregularly crenulate-denticulate apical margins), bearing crenulate-denticulate appendages (vs. long fimbriate-lacerate appendages). On the other hand, *A. rubroaristata* somewhat resembles *A. roberto-anselmoi*, being distinguished from it by its leaf blades with margins more densely spinose (spines 1–2 mm apart vs. spines 4–5 mm apart), bright red (vs. dark purplish) and inconspicuously white lepidote to glabrous floral bracts (vs. densely and conspicuously white lepidote), with a shorter apical spine (7–10 mm vs. 13–17 mm long), bright red (vs. green to purplish), glabrous sepals (vs. densely and conspicuously white lepidote), lilac-purple petals (vs. rose) and by the psillate pollen (vs. reticulate).

Aechmea rubroaristata is a medium sized to large species found at high elevations (1,100–1,450 m) in the county of Campo Alegre, Santa Catarina State, not far from the border with Paraná State. It grows in the exposed sites of the "Campos de Altitude", as well as in more protected, shady condition of the gallery forest, where it reaches a giantic size with an inflorescence so heavy that the scape is bent downwards, as documented by Leme & Marigo (1993).

The name of *Aechmea rubroaristata* is a reference of the eyecatching bright red color of its floral bracts and sepals, combined with the aristate-spinescent floral bracts.

Cryptanthus Otto & A. Dietr.

The genus *Cryptanthus* has 66 species (Luther 2008) restricted to Brazil. Two subgenera are recognized, the type subgenus and *Hoplocryptanthus* Mez. The type subgenus occurs from the State of Rio de Janeiro, through Minas Gerais and Espírito Santo to the State of Rio Grande do Norte, from sea level to ca. 700 m elevation, with species characterized by the presence of odorless flowers that are andro-monoecious; the male flowers are located mainly in the mid- to apical sector of the inflorescence, while the perfect flowers are concentrated in the basal fascicles. The petals are nearly always sublinear-lanceolate with length equal to five times or more maximum width (Leme & Siqueira-Filho 2006).

In contrast, species of the subgenus *Hoplocryptanthus* are concentrated in the montain Atlantic Forest of Espírito Santo and the mountains of the Espinhaço range in Minas Gerais, mainly in wet sites at elevations over 600 m. It is distinguished by the usually strongly perfumed flowers which are perfect, with petals broadly spathulate or obovate, length up to three times the width of the lobes, which may be almost orbicular (Leme & Siqueira-Filho 2006).

Cryptanthus capitellatus Leme & L. Kollmann, *sp. nov.* Type: BRAZIL. ESPÍRITO SANTO: Santa Teresa, Valão de São Brás, Escola Agrotécnica Federal de Santa Teresa, 19º48' 10"S, 40º41' 21"W, ca. 200 m elev., 24.X.2007, fl., *L. Kollmann & R. Britto 10089* (holotype MBML!). Figs. 2 g-h, 3 a-f

Species nova a Cryptanthus beuckeri E. Morren, *cui affinis, petiolis foliorum latioribus, prope apicem gradatim expansis, marginibus spinis longioribus, laminis foliorum angustioribus, sepalis anguste ovato-lanceolatis et longe acuminatis, apicem versus barbare albolepidotis differt.*

Plant terrestrial, stemless, propagating by short basal shoots. Leaves 8 to 11, suberect at anthesis, laxly disposed and forming an open rounded rosette; sheaths suborbicular, reddish, densely white-lepidote and distinctly rugose, densely spinose toward the apex; blades petiolate to subpetiolate, petioles 2–10 × 0.8–1.8 cm, slightly merging into the blades, strongly U to V channeled, thickly coriaceous, densely white lepidote mainly abaxially, reddish, margins slightly recurved, densely spinose to entire at the upper portion, spines narrowly triangular, spreading to slightly antrorsely curved, reddish, 1.5–2 mm long, 1–5 mm apart, blades narrowly lanceolate, 7–21 × 1.5–4.5 cm, coriaceous, sometimes

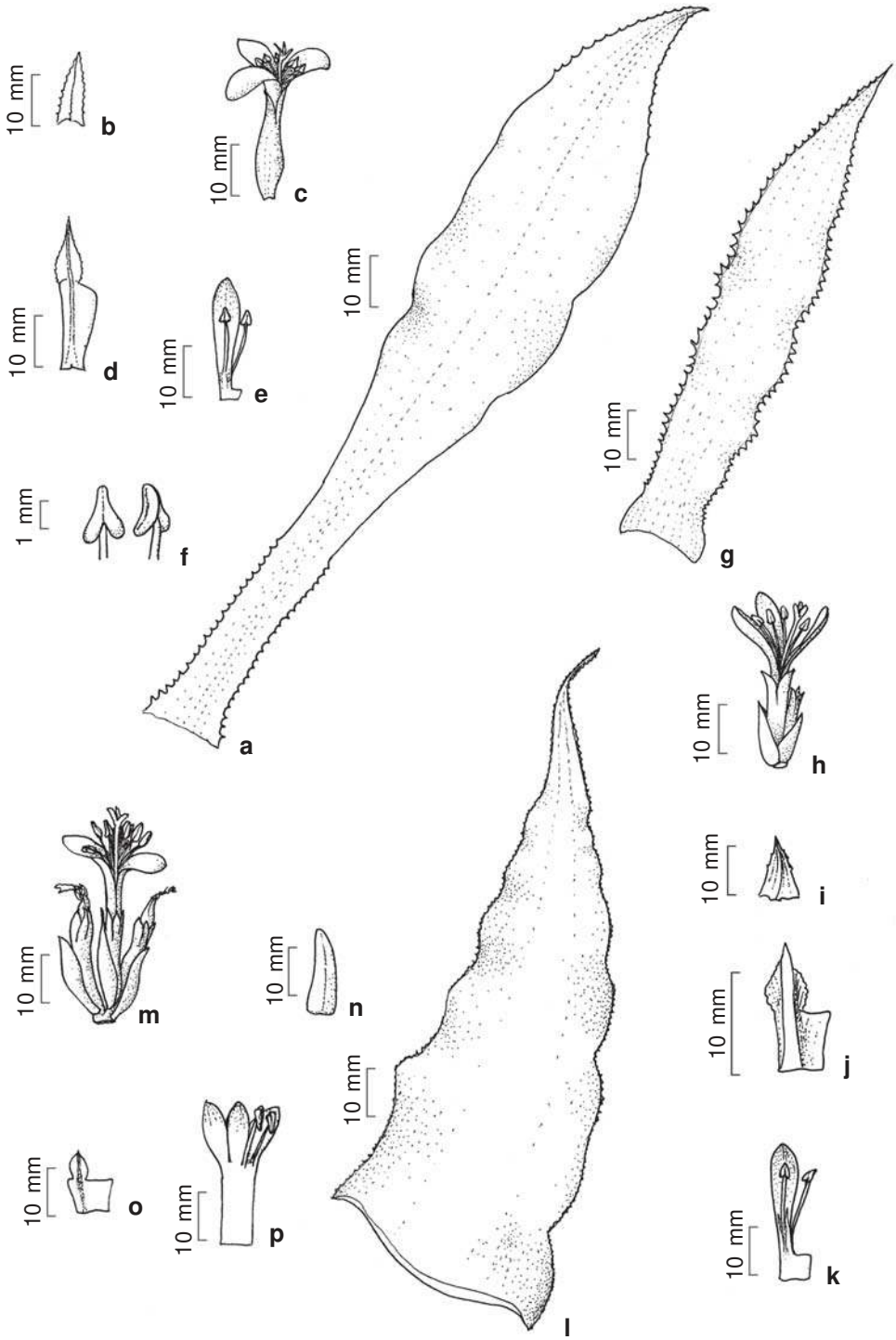

Figure 3 – a-f. *Cryptanthus capitellatus* Leme & L. Kollmann – a. leaf, adaxial view; b. floral bracts, from below; c. flower in side view; d. sepal, from below; e. petal and stamen, from above; f. anther, from above and below, respectively. g-k. *C. venecianus* Leme & L. Kollmann – g. leaf, adaxial view. h. flower and floral bracts, in side view; i. floral bracts, from below; j. sepal, from below; k. petal and stamen, from above. l-p. *C. viridovinosus* Leme – l. leaf, adaxial view; m. inflorescence with flower and floral bracts, in side view; n. floral bracts, from below; o. sepal, from below; p. petal and stamen, from above. (a-f *Kollmann 10089*; g-k *Kollmann 11825*; l-p *Linhares* 678).

bearing a thicker central zone, flat or nearly so, green to reddish, abaxially densely white lepidote with trichomes completely obscuring leaf color, adaxially glabrous and opaque, margins slightly it at all undulate, entire except for the laxly to densely spinulose apex (holotype) to laxly to densely spinulose throughout (*Kollmann 8240*), spines triangular, antrorse-uncinate, 0.3–0.5 mm long, 2–12 mm apart, apex long acuminate-caudate. Inflorescence ca. 3 cm long, ca. 2 cm in diameter, sessile, bipinnate at base and bearing a simple, upper-central head of densely arranged flowers; primary bracts foliaceous; fascicles 3 to 4 in number, inconspicuous, ca. 2-flowered; floral bracts sublinear-lanceolate to narrowly triangular, acuminate, carinate, 14–17 × 3–7 mm, membranaceous, hyaline, densely and coarsely lepidote toward the apex, spinulose to subentire, slightly exceeding the ovary to equaling 1/3 of sepals length. Flowers 32–40 mm long (with extended petals), sessile, odorless; sepals 14–15 mm long, connate for 7–9 mm, greenish-hyaline to reddish except for the hyaline margins, coarsely white lepidote toward the apex, lobes narrrowly ovate, long acuminate and ending in a slender apiculus, ca. 6 × 2–2.5 mm, symmetrical, carinate, margins densely spinulose; petals sublinear-subsphatulate, apex subacute to obtuse and emarginate and cucullate, 24–30 × 4–5 mm, white except for the greenish apex, slightly exceeding the stamens but suberect-recurved at anthesis and exposing them, connate at base for ca. 2 mm, bearing 2 inconspicuous callosities at the base of the free blades; filaments 18–19 mm long, the antesepalous adnate to the petals tube, the antepeta lous adnate to the petals for ca. 6 mm; anthers 1.8–2.5 mm long, fixed near the base, base distinctly sagittate, apex obtuse, laterally complanate; stigma conduplicate, suberect, white, lobes with margins crenulate and inconspicuously papillose; ovary subclavate, 8–10 × 4–5 mm, trigonous, greenish-white, glabrous; epigynous tube lacking; placentation apical; ovules few, obtuse. Fruits unknown.

Material examined: BRAZIL. ESPÍRITO SANTO: Santa Teresa, Distrito Vinte e Cinco de Julho, Bela Vista, VIII.2005, fl., *L. Kollmann et al. 8240* (MBML, RB!).

According to the data provided by Ramírez (1996) in her revision of the genus *Cryptanthus*, this new species is closely related to *C. beuckeri*, differing from it by the leaves with broader petioles (0.8–1.8 cm vs. 0.5–1 cm wide) which are gradually broader toward the apex and are not sharply contrasting with the blades (vs. abruptly contrasting with the much broader blades), petioles margins with longer more pronounced spines (spines 1.5–2 mm vs. ca. 1 mm long), leaf blades narrower (1.5–4.5 cm vs. 5–6 cm wide), and by the narrower, ovate-lanceolate and long acuminate sepals (vs. lanceolate), which are coarsely white lepidote toward the apex (vs. glabrescent). *Cryptanthus capitellatus* is a member of subgenus *Cryptanthus* due to the co-occurence of male and perfect flowers with narrow petals.

The living paratype descendant (cult. *E. Leme 6701*) is cultivated in the collection of the Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro.

Cryptanthus capitellatus was found growing as a terrestrial species in shaded sites of semideciduous Atlantic Forest. The individuals grow scattered on the forest floor, forming a sparsely distributed population in the county of Santa Teresa, Espírito Santo State.

The population where the holotype was collected is characterized by more delicate individuais with leaf blades partially entire, while the paratype population contains more robust and spiny individuais, despite the floral details are identical.

The name of this new species refers to the inflorescence with a simple, upper-central small head of densely arranged flowers.

Cryptanthus venecianus Leme & L. Kollmann, *sp. nov.* Type: BRAZIL. ESPÍRITO SANTO: Nova Venécia, Serra de Baixo, APA da Pedra do Elefante, 18º47'01''S, 40º26'81''W, 578 m elev, 29.IV.2008, *L. Kollmann, A.P. Fontana & P.H. Labiak 11825*, fl. cult. IX.2009 (holotype RB!; isotypes MBML!, CEPEC!). Figs. 3 g-k, 4 a-b

Species nova a Cryptanthus reptans Leme & J.S. Siqueira, *cui affinis, laminis foliorum brevioribus, sepalis late ovatis, latioribus, distincte albolepidotis, apicem versus suberectis, petalis majoribus, callis inconspicuis differt.*

Plant terrestrial, caulescent, stem 8–13 cm long, erect, propagating by axillary shoots developed near the base of the inflorescence. Leaves 14 to 18, spreading-recurved before the anthesis and afterwards, subdensely to densely and subequally disposed along the stem; sheaths inconspicuous, subreniform, ca. 0.8 × 1.8 cm, pale, densely and coarsely white-lepidote and distinctly rugose abaxially, adaxially nerved and glabrous or nearly so, apical margins densely spinulose, spines ca. 0.5 mm long, antrorse; blades sublinear-lanceolate, apex acuminate-caudate, 5.5–10 × 1.7–2 cm, slightly narrowed toward the base, coriaceous, without any thicker central zone, green, flat or nearly so, nerved an densely and coarsely

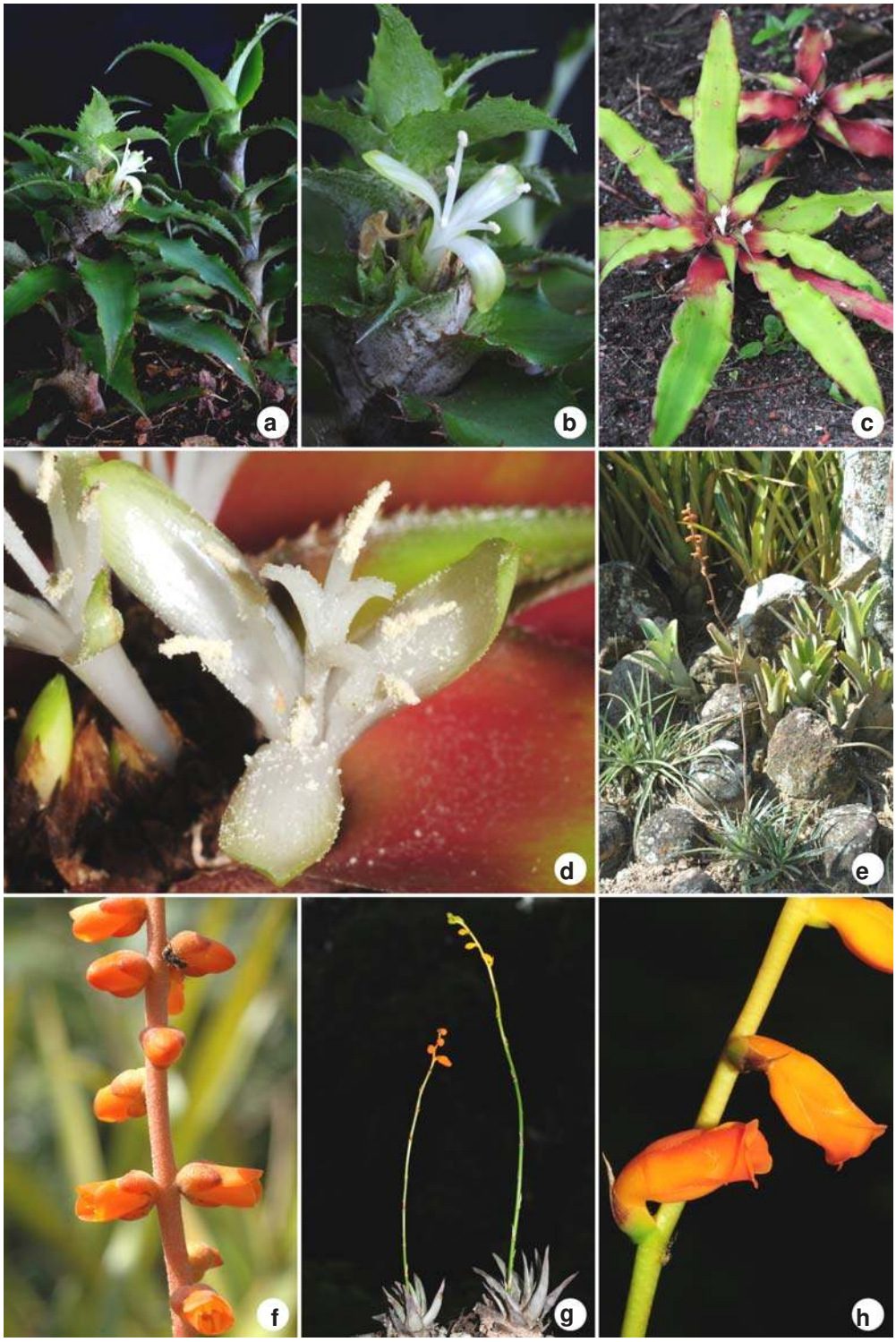

Figure 4 – Habit and detail of inflorescence and flowers – a-b. *Cryptanthus venecianus* Leme & L. Kollmann. c-d. *C. viridovinosus* Leme. e-f. *Dyckia espiritosantensis* Leme & A.P. Fontana. g-h. *D. nana* Leme & O.B.C. Ribeiro. (photos: E. Leme).

white-lepidote abaxially, trichomes obscuring leaf color and contrasting with the adaxial surface, adaxially glabrous except for the inconspicuously white lepidote base, dark green, margins slightly undulate, densely spinulose, spines straight to slightly antrorse, reddish-castaneous toward the apex, 1–1.5 mm long, 1–3 mm apart. Inflorescence ca. 2.5 cm long, ca. 1.5 cm in diameter, sessile, few-flowered; primary bracts foliaceous; fascicles ca. 4, the basal ones ca. 20 × 10 mm (excluding the petals), 2-flowered; floral bracts triangular, acuminate, 13–14 ×7–8 mm, green toward the apex, hyaline toward the base, sparsely and coarsely white lepidote near the apex, equaling the middle of the sepals, strongly carinate, margins entire to subentire. Flowers ca. 35 mm long (with extended petals), sessile, slightly if at all fragrant, those of the upper central part of the inflorescence staminate, the other perfect; sepals ca. 13 mm long, connate for ca. 6.5 mm, hyaline near the base, subdensely white lepidote toward the apex with fimbriate trichomes, lobes suberect at anthesis, broadly ovate, ca. 6.5 × 4 mm, symmetrical, obtusely if at all carinate, margins shortly and irregularly scalloped, apex acuminate, subulate; petals sublinear, apex subacute, slightly cucullate, suberect to suberect-recurved, 28–29 ×4.5–5 mm, white toward the base, green at apex, exceeding the stamens but suberect to recurved at anthesis and exposing them, connate for ca. 5 mm, bearing inconspicuous callosities near the base; filaments ca. 22 mm long, terete, white, the antesepalous adnate to the petals tube and free above it, the antepetalous ones adnate to the petals for ca. 10 mm; anthers oblong, ca. 2.5 mm long, fixed at the middle, base obtusely sagittate, apex obtuse; pollen subglobose, sulcate, sulcus large, exine reticulate, lumina irregularly polygonal; stigma conduplicate, suberect, not spiraled, lobes green, with irregularly scalloped and undulate margins; ovary ca. 6 × 3 mm, obovate, subtrigonous, greenish, inconspicuously and sparsely white lepidote; epigynous tube lacking; placentation apical; ovules few, subglobose, obtuse. Fruits unknown.

Cryptanthus venecianus is closely related to *C. reptans*, mainly considering its caulescent habit and leaf conformation. However, this new species differs by the shorter leaf blades (5.5–10 cm vs. 13–17 cm long), broadly ovate sepals (vs. narrowly ovate), which are broader (ca. 4 mm vs. 2–3 mm wide) and distinctly white lepidote (vs. glabrous), with suberect projected apex (vs. erect), and by the larger petals (28–29 ×4.5–5 mm vs. 21–25 × 2–3 mm), bearing inconspicuous callosities (vs. bearing suberect acicular callosities).

The living holotype descendant (cult. *E. Leme 7743*) is cultivated in the collection of the Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro.

This new species was discovered growing terrestrially in shaded sites covered by Semidecidual Tropical Forest, around the inselberg known as Pedra do Elefante, in the county of Nova Venécia, Espírito Santo state. On the higher parts of the inselberg, where grass-like vegetation predominates, as well as bare granitic outcrops, huge populations of a underscribed *Alcantarea* species, as well as a large sized *Dyckia* sp. and *Pitcairnia* sp. can be observed. On the steep rock surfaces, *Vriesea aff. appariciana* E. Pereira & Reitz is predominate.

The name chosen for *Cryptanthus venecianus* is a reference to the county of Nova Venécia, where this new species was found.

Cryptanthus viridovinosus Leme, *sp. nov.* Type: BRAZIL. BAHIA: Alagoinhas, near Icatu, ca. 80 m elev., IX.2000, fl., *S. Linhares* & *R. Alves 678* (holotype HB!). Figs. 3 l-p, 4 c-d

Species nova a Cryptanthus grazielae H. Luther*, cui affinis, laminis foliorum supra opacis, prope basin vinosis, sepalis oblongo-ellipticis acutisque vel fere, distincte angustioribus differt.*

Plant terrestrial, stemless, propagating by stolons ca. 12 cm long, ca. 0.6 cm in diameter. Leaves 8 to 10, spreading-recurved at anthesis, laxly disposed and forming an open subrounded rosette; sheaths inconspicuous, greenish, densely white-lepidote and distinctly rugose mainly toward the apex, entire or nearly so; blades lanceolate, apex long acuminate, 23–28 × 3.5–5 cm, distinctly narrowed toward the base but not petiolate, coriaceous, bearing a slightly thicker central zone, apple green except for the wine color at base and along the basal margins, flat or nearly so, densely and coarsely white lepidote abaxially, trichomes not completely obscuring leaf color, adaxially glabrous and opaque except for the densely white-lepidote base, nerved mainly near the margins, margins undulate, densely spinulose, spines triangular, nearly straight to antrorse-uncinate, 0.5–1 mm long, 1–2 mm apart. Inflorescence ca. 3 cm long, ca. 3 cm in diameter, sessile; primary bracts foliaceous; fascicles ca. 7, the basal ones ca. 25 mm × 18 mm (excluding the petals), 3-flowered; floral bracts castaneous-hyaline, lustrous, sparsely and coarsely brown-lepidote near the apex, nerved, slightly exceeding the ovary and to equaling the sepals length, margins entire, the ones of the fascicles sublinear-lanceolate, subacute to obtuse, strongly

carinate, 17–20 × 6–7 mm. Flowers ca. 40 mm long (with extended petals), sessile, odorless, those of the upper central part of the inflorescence and inner part of the fascicles staminate, those of the outer part of the fascicles perfect; sepals 12–13 mm long, connate for 6–7 mm, whitish toward the base, lobes oblong-elliptic, acute to subacute and apiculate, sparsely and coarsely brown-lepidote, white toward the base and castaneous toward the apex but soon stramineous, ca. 6 × 2.5–3 mm, symmetrical, carinate, margins entire; petals sublinear-subspatulate, apex acute to subobtuse, apiculate, 30–33 × 3.5–4 mm, white except for the greenish apex, slightly exceeding the stamens but suberect at anthesis and exposing them, connate at base for ca. 17 mm, bearing 2 conspicuous callosities at the base of the free blades; filaments ca. 27 mm long, complanate, equally adnate to the petals tube; anthers ca. 3.5 mm long in the staminate flowers to ca. 6 mm long in the perfect flowers, fixed at 1/3 of its length above the base in staminate flowers or slightly below the middle in the perfect flowers, base sagittate, apex obtuse and inconspicuously apiculate; stigma conduplicate, suberect-recurved, slightly exceeding the anthers, lobes with margins scalloped-glandulose and undulate; ovary subclavate, 10–11 × ca. 6 mm, trigonous, white, glabrous; epigynous tube lacking; placentation apical; ovules few, obtuse, obovoid. Fruits unknown.

Cryptanthus viridovinosus presents some morphological affinities with *C. grazielae*, an endemic species from the coastal area of Espírito Santo State, near the city of Vitória (Luther 1998). However, this new species differs from it by the adaxially opaque leaf blades (vs. distinctly lustrous), which are wine colored near the base and apple green toward the apex (vs. green throughout), and by the oblong-elliptic, acute or nearly so sepals (vs. elliptic to oblanceolate and broadly rounded), which are distinctly narrower (2.5–3 mm vs. 4–5 mm wide).

On the other hand, this new taxon is morphologically similar to the complex of species living north of São Francisco River, like *Cryptanthus dianae* Leme, which has narrower leaves, longer flowers, longer and broader sepals, to mention few distinctive characters.

This new species was discovered growing terrestrially on sandy soil partially shaded, which is a forest to shruby semideciduous vegetation in the transition between Atlantic Forest and "Caatinga" biomes, about 70 km from the ocean. The habitat of *Cryptanthus viridovinosus* is severely affected by sand extraction that completely destroy the vegetation.

The striking color contrast of the leaves of *Cryptanthus viridovinosus*, with the basal portion wine colored and apical portion apple green colored inspired the name of this new species.

Dyckia Schult. & Schult. f.

The genus *Dyckia* has 136 species (Luther 2008), including recently described species (Braun & Pereira 2008; Braun *et al.* 2008a; 2008b; Leme & Miranda 2009), and grows in all regions of Brazil, especially in the Northeast, Midwest and South, and in neighboring Uruguay, Paraguay, Argentina and Bolivia. The species are generally characterized by coriaceous, often succulent, leaves, whose rosettes do not form a tank nor do they impound water. The lateral floral scape allows the plant to grow continuously, with multiple and continuous flowering period. The racemose inflorescence is simple or branched, with sessile to pedicellate flowers, the sepals are clearly different from the petals, and these are connate at the base, forming a tube together with the filaments.

Dyckia espiritosantensis Leme & A.P. Fontana, *sp. nov.* Type: Brazil, Espírito Santo, São Roque do Canaã, Alto Misterioso, morro em frente a Pedra dos Três Carneiros, 19º44.62'S, 40º44.75'W, 196 m elev., 30 Sept. 2006, *E. Leme*, *L. Kollmann*, *A.P. Fontana* & *M. Zanoni 6930* (holotype RB!; isotypes MBML!, VIC!). Figs. 4 e-f, 5 a-g

Species nova a Dyckia mello-barretoi L.B. Sm., *cui affinis, laminis foliorum marginibus spinis brevioribus, pedunculo subdense lepidoto, inflorescentia simplex, rhachidi subdense et pallide ferrugineo lepidota et sepalis brevioribus differt.*

Plant rupiculous, flowering ca. 105 cm high, propagating by short basal shoots. Leaves ca. 25, densely rosulate, strongly coriaceous, slightly succulent, nearly subulate at the apex; sheaths suborbicular, ca. 2.5 × 3 cm, whitish toward the base, glabrous or nearly so; blades narrowly triangular, flat, suberect, 20–23 cm long, 1.5–1.7 cm wide at base, 3–4 mm thick near the base, green to reddish, opaque, finely nerved abaxially and densely white-lepidote with trichomes arranged along the midnerves and not at all obscuring the leaf-color, adaxially subdensely white-lepidote with trichomes inconspicuously arranged along the midnerves, abaxial and abaxial surfaces slightly if at all contrasting in color, apex acuminate, nearly subulate, terminating in a pungent spine, margins white-lepidote, laxly spinose, spines 2–3 mm long, 1.5–2.5 mm wide at

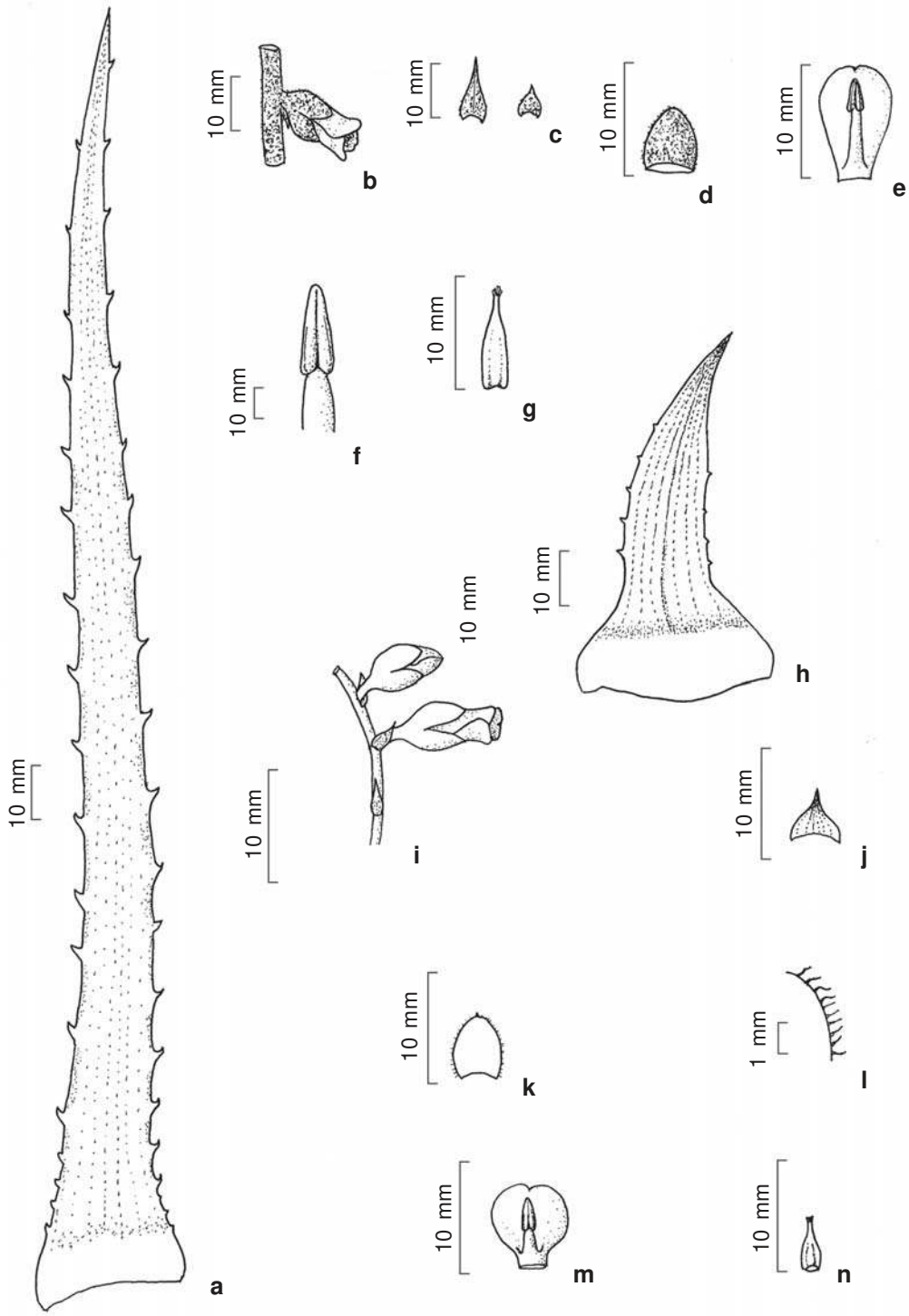

Figure 5 – a-g. *Dyckia espiritosantensis* Leme & A.P. Fontana – a. leaf, adaxial view; b. flower and floral bracts, in side view; c. variation of floral bracts, from below, respectively; d. sepal, from below; e. petal and stamen, from above; f. anther, from above; g. pistil, in side view. h-n. *D. nana* Leme & O.B.C. Ribeiro – h. leaf, adaxial view; i. flower and floral bracts, in side view; j. floral bracts, from below; k. sepal, from above; l. margin of the sepal, in detail; m. petal and stamen, from above; n. pistil, in side view. (a-g *Leme 6930*; h-n *Leme 7484*).

base, 8–20 mm apart, triangular, complanate, subdensely white-lepidote, pale colored, prevailing antrorse-uncinate. Peduncle lateral, erect, ca. 50 cm long, 0.5–0.7 cm in diameter, subdensely white-lepidote, trichomes with lacerate-fimbriate margins, to glabrous, greenish to bronze colored; peduncle bracts the basal ones subfoliaceous, the other ones stramineous at anthesis, nerved, subdensely white-lepidote, erect, narrowly triangular, acuminate, 10–20 × 4–6 mm, inconspicuously denticulate to subentire, distinctly shorter than the internodes; inflorescence erect, simple, ca. 37 cm long, rachis 3–5 mm in diameter, nearly straight, terete, pale orange, subdensely pale ferrugineous-lepidote, trichomes lacerate-fimbriate, to glabrescent; floral bracts distinctly nerved, stramineous at anthesis, spreading to reflexed at anthesis, the basal ones narrowly subtriangular-ovate, acuminate, slightly shorter than the sepals, bearing a protruded central nerve and appearing carinate, densely pale ferrugineous-lepidote, trichomes lacerate-fimbriate, margins remotely denticulate to entire, 7–10 × 4–5 mm, the upper ones broadly ovate to suborbicular, acuminate, slightly exceeding the pedicels, ca. 4 × 3 mm. Flowers ca. 45, laxly to subdensely arranged, ca. 15 mm long, spreading to reflexed at anthesis, odorless, the upper ones subverticilate, pedicels inconspicuous, orange, densely pale ferrugineous-lepidote with lacerate-fimbriate trichomes, 2.5–3 mm long, ca. 5 mm in diameter at apex; sepals broadly ovate, apex rounded, ecarinate, convex, 5–6 × ca. 5 mm, orange, densely pale ferrugineous-lepidote with lacerate-fimbriate trichomes, margins entire; petals symmetric, obovate-spathulate, apex obtuse-emarginate, connate at base for ca. 1 mm in a common tube with the filaments, ca. 11 × 7.5 mm, ecarinate, orange, margins entire, glabrous or nearly so, erect to suberect at anthesis and forming a narrowly campanulate corolla ca. 7 mm in diameter. Stamens slightly shorter than the petals; filaments complanate, connate for ca. 1 mm in a common tube with the petals, ca. 8 × 1.5 mm, pale orange toward the apex; anthers narrowly subtriangular, ca. 2.5 mm long, straight at anthesis, base truncate, apex acute, fixed near the base; pistil ca. 9 mm long, about equaling the anthers; stigma conduplicate-spiral, blades ca. 1 mm long, orange, margins minutely crenulate; style 1–1.5 mm long; ovary narrowly suboblong, ca. 6.5 mm long, pale yellow. Capsules unknown.

Dyckia espiritosantensis is clearly morphologically related to the species of Minas Gerais State. Its closest relative is *D. mello-barretoi*, but the new species differs by the leaf blades with smaller marginal spines (2–3 mm vs. ca. 4 mm long), subdensely lepidote peduncle (vs. inconspicuously lepidote peduncle), simple inflorescence (vs. inflorescence subsimple to compound), with subdensely and pale ferrugineous-lepidote rachis (vs. rachis soon glabrous), and by the shorter sepals (5–6 mm vs. ca. 8 mm long).

On the other hand, *Dyckia espiritosantensis* is somewhat similar to *D. martinelli* B.R. Silva & Forzza, which was recently discovered in the south region of Rio de Janeiro State (Forzza & Silva 2004). However, this new species differs from it by the narrower leaf blades (1.5–1.7 cm vs. 2.2–2.6 cm wide), upper peduncle bracts distinctly shorter than the internodes (vs. equaling to exceeding the internodes), inflorescence with rachis densely pale ferrugineous lepidote (vs. white lepidote), sepals densely and pale ferrugineous white lepidote (vs. white lepidote) and by the filaments free above the common tube with the petals (vs. connate for ca. 1.5 mm above the common tube with the petals).

This species grows terrestrially on shallow soils at the higher parts of low elevated hills (ca. 200 m), in the county of São Roque do Canaã. It forms median to large clumbs in the herbaceous or subshruby vegetation, under full sun exposure.

The name of *Dyckia espiritosantensis* is an explicit reference to the State where it was discovered.

Dyckia nana Leme & O.B.C. Ribeiro, *sp. nov.* Type: BRAZIL. MINAS GERAIS: Diamantina, Road Diamantina to Conselheiro Mata, ca. 10 km from Conselheiro Mata, 18º18.50'S, 43º53.43"W, 1288 m elev., 25.VI.2008, fl., *E. Leme, C.C. Paula, T. Coser, R. Moura & O.B.C. Ribeiro 7484* (holotype RB!; isotype HB!). Figs. 4 g-f, 5 h-n

Species nova a Dyckia consimilis Mez, *cui affinis, laminis foliorum latioribus utrinque dense albolepidotis, marginibus spinis brevioribus, floribus longioribus, et filamensis breviter connatis differt; a* Dyckia macedoi L.B. Sm., *cui affinis, foliis per anthesim suberectis vel fere erectis (vs. suberect-recurved), laminis foliorum brevioribus utrinque dense albolepidotis, distincte nervatis, floribus per anthesim unilateraliter curvatis, stilo conspicuo ca. 1 mm longo differt.*

Plant terrestrial in stony soil, flowering 19–29 cm high. Leaves 8 to 10, densely arranged, coriaceous; sheaths broader than the blades, ca. 2.5 × 3 cm, dark castaneous and glabrous toward the base abaxially, pale colored adaxially, densely

white lepidote near the apex on both sides, the older ones forming a globose base, 2.5–3 × 2.5–3.5 cm; blades narrowly triangular, distinctly canaliculate, suberect to nearly erect and slightly unilaterally secund, 3–5 × 1.2–1.4 cm, green but the color obscured by the dense layer of coarse white trichomes on both sides, opaque, distinctly nerved, apex acuminate and terminating in a pungent spine, margins laxly spinulose, spines 0.5–1 mm long, ca. 0.3 mm wide at base, 4–10 mm apart, subtriangular-acicular, spreading to slightly antrorse, castaneous near the apex, glabrous. Peduncle lateral, erect, 15–20 × 0.15–0.2 cm in diameter, glabrous, smooth, green; peduncle bracts erect, stramineous, nerved, bearing a central protruded nerve and appearing carinate toward the apex, sparsely white-lepidote, 5–11 × 3–3.5 mm, with a broadly subtriangular base and a long lanceolate-acuminate-caudate blade, margins microscopically denticulate to nearly entire, distinctly shorter than the internodes. Inflorescence erect, 2.5–5 cm long, glabrous, subdensely to laxly flowered, rachis nearly straight, terete, smooth, greenish to orange-yellow, glabrous, 1–1.5 mm in diameter; floral bracts broadly ovate-subtriangular, acuminate-caudate, bearing a central protruded nerve and appearing carinate toward the apex, finely nerved, stramineous toward the apex, 4–4.5 × 3.5–4 mm, subspreading to suberect, equaling to slightly exceeding the pedicels, margins bearing fimbriate trichomes, remotely and irregularly denticulate to entire. Flowers 4 to 6, 12–13 mm long with extended petals, spreading and unilaterally secund before anthesis and afterwards, subdensely to laxly arranged, 6–15 mm apart, odorless, pedicels conspicuous, slender, terete, glabrous, yellow-orange, 3.5–5 × 2–2.5 mm, curved; sepals symmetric, broadly ovate, convex, apex obtuse and remotely and irregularly apiculate, ecarinate, 4–5.5 × 3.5–4 mm, orange, glabrous except for the retrorsely curved, long fimbriate trichomes along the margins; petals symmetric, broadly obcordate or nearly so from a distinctly narrowed base, apex broadly emmarginate, connate at base for ca. 1.5 mm in a common tube with the filaments, ca. 7.5 × 6.5–7 mm, ecarinate, orange, erect except for the slightly recurved apex at anthesis and forming a subtubular to slightly campanulate corolla 4–5 mm in diameter. Stamens distinctly shorter than the petals and not exposed; filaments complanate, yellow, connate at base for ca. 1.5 mm in a common tube with the filaments, ca. 1.5 mm wide at base; anthers oblong-ovate, ca. 2.5 mm long, base sagittate, apex acute, yellow on both sides, fixed near the base, straight or nearly so; pistil ca. 4.7 mm long; stigma conduplicate-spiral, blades shortly crenulate-lacerate, yellow; style ca. 1 mm long, distinct, yellow; ovary suboblong-ovate, ca. 2.5 mm long, ca. 1.5 mm in diameter, yellow. Capsules unknown.

Dyckia nana is one of the smaller species the genus, yet proportionally robust. It is closely related to *D. consimilis*, differing by the broader leaf blades (1.2–1.4 cm vs. ca. 0.7 cm wide), which is densely white lepidote on both sides (vs. glabrous adaxially), bearing smaller marginal spines (0.5–1 mm vs. ca. 3 mm long), longer flowers (12–13 mm vs. ca. 8 mm long), and by the filaments free above the short common tube with the petals (vs. highly connate above the common tube with the petals). On the other hand, *D. nana* can be related to *D. macedoi*. The main differences of the new species are: leaves suberect to nearly erect at anthesis (vs. suberect-recurved at anthesis), leaf blades shorter (3–5 cm vs. 6–8 cm long) and densely white lepidote on both sides (vs. adaxially glabrescent), distinctly nerved (vs. longitudinal nerves inconspicuous), unilaterally secund flowers at anthesis (vs. flowers not secund at anthesis), and by the distinct style separating the ovary from the stigma ca. 1 mm long, (vs. stigma subsessile).

Dyckia nana grows terrestrially on white quartzite soil, amidst the grass-like vegetation of the Campos Rupestres, at elevation ca. 1,200 m. The individuals are sparsely and irregularly distributed in the collected site, growing under direct sunlight, where isolated specimens of *Vriesea diamantinensis* Leme were observed.

The name of *Dyckia nana* recalls the uncommon miniature size of its vegetative parts.

Hohenbergia Schult. & Schult. f.

The genus *Hohenbergia* has 57 recognized species (Luther 2008; Leme & Kollmann 2009) organized in two subgenera. The subgenus *Hohenbergia* includes 36 species and four varieties, mostly bearing apiculate to caudate ovules and yellow, green to lilac-blue petals. Except for *H. stellata* Schult. & Schult. f., the subgenus *Hohenbergia* is endemic to Brazil, with a major center of distribution in Northeastern Brazil, mainly in the State of Bahia. The subgenus *Wittmackiopsis* Mez holds the remaining taxa, occurring in the region of Greater Antilles, and consists of species with obtuse ovules and white petals.

Hohenbergia aechmeoides Leme, *sp. nov.* Type: BRAZIL. PARAÍBA: near João Pessoa, III.1998, *R. Menescal s.n.* , fl. cult. (holotype RB 495810!; isotype HB!). Figs. 6 a-h, 7 a-b

Species nova a Hohenbergia ridleyi (Baker) Mez, *affinis, bracteis floriferis majoribus glabrisque, apice spina longiore, floribus duplo longioribus vel fere, sepalis et petalis longioribus differt.*

Plant terrestrial, flowering 160–170 cm tall. Leaves ca. 15, coriaceous, forming a crateriform rosette; sheaths ovate, 20–23 × 14–15 cm, densely brown lepidote on both sides, winish-castaneous toward the base, entire; blades linear, suberect, 70–85 × 7–8 cm, densely white-lepidote abaxially with trichomes not at all obscuring the color of the blades, inconspicuously and sparsely white-lepidote adaxially, yellowish-green and dark purplish-wine colored mainly near the apex, apex acuminate, dark blackish-wine, ending in a long pliable point, margins subdensely to laxly spinose, spines 0.5–2 × 0.5–1 mm, narrowly triangular, dark castaneous, straight or nearly so, 6–20 mm apart. Peduncle erect, stout, ca. 57 cm long, 1.2–1.3 cm in diameter, reddish, subdensely white lanate but soon glabrous; peduncle bracts narrowly lanceolate, acuminate, erect, 10–12 × ca. 3 cm, about equaling the internodes, stramineous, nerved, glabrescent, the basal ones subdensely spinulose near the apex, the upper ones entire; inflorescence narrowly pyramidal, 4-pinnate, ca. 82 cm long, ca. 27–35 cm in diameter at base, erect, rachis 0.6–1 cm in diameter, straight or nearly so, red, white lanate but soon glabrous; primary bracts resembling the upper scape-bracts, spreading, the basal ones shorter than the fascicles, the upper ones about equaling the fascicles; primary fascicles 30–35, subspreading or slightly suberect, the basal ones 15–20 cm long, distinctly stipitate, stipes 2–3 × 0.6–0.8 cm, slightly complate, red, glabrous, bearing 7 to 12 shortely stipitate to sessile secondary fascicles laxly arranged near the base and subdensely arranged near the apex, the basal primary fascicles laxly arranged, 8–11 cm apart, the upper ones subdensely arranged, 0.5–4 cm apart, resembling the upper secondary fascicles, 3–5 cm long (excluding the petals); secondary bracts narrowly lanceolate to narrowly triangular, acuminate-caudate, soon drying, 2.3–3.7 × 10–11 cm, shorter than the secondary fascicles, papyraceous, distinctly nerved, ecarinate to carinate due to a protruded central nerve, glabrous, suberect with the secondary branches; secondary fascicles the basal ones subpyramidal, shortly stipitate to subsessile, 3.5–4.5 × 2.5–3 cm, bearing at base 1 to 2 tertiary branches, the upper ones narrowly ellipsoid to subcylindrical, subsessile, 3–3.5 × 1.5–1.7 cm (not including the petals), bearing 5 to 8 flowers densely arranged; tertiary bracts resembling the basal floral bracts but longer and narrower, shorter than the fascicles; tertiary fascicles resembling the upper secondary fascicles but smaller, bearing 3 to 5 flowers densely arranged; floral bracts suborbicular, acute with a long spinescent apex, suberect, slightly shorter to equaling the sepals, 15–18 × ca. 16 mm, including the 5–7 mm long apical spines, yellowish-green, glabrous, lustrous, distinctly nerved, appearing carinate toward the apex due to a central protruded nerve, entire, strongly convex, thinly coriaceous. Flowers 26–30 mm long, sessile, densely and polystichously arranged, suberect, slightly fragrant; sepals distinctly distinctly asymmetric with the lateral membranous wing distinctly exceeding the midnerve, 9–10 × 7–7.5 mm, connate at base for ca. 1 mm, glabrous, yellowish-green, ecarinate; petals spathulate, apex obtuse and inconspicuously apiculate, suberect at anthesis, 19–21 × ca. 7.5 mm, free, lilac-purple, bearing 2 conspicuous appendage-like callosities with irregular digitate-caudate blades along their ca. 8 mm length. Stamens included; filaments complanate and dilated toward the apex, the antepetalous ones adnate to the petals for ca. 8 mm, the antesepalous free; anthers sublinear, base obtuse-sagittate, apex obtusely apiculate, dorsifixed slightly below the middle; pollen subglobose, biporate to triporate, exine irregularly and sparsely perforate; stigma conduplicate-spiral, ellipsoid-capitate, white, margins crenulate-lacerate and papillose; ovary broadly ellipsoid, terete, 6–7 mm long, ca. 6 mm in diameter, green, glabrous; placentation apical; ovules long caudate; epigynous tube ca. 2 mm long. Fruits unknown.

This new species does not present a close morphological affinity with any known *Hohenbergia* species, due to the general aspect of its inflorescence with fewer and larger flowers per secondary and terciary branches. This unusual aspect produces an intermediate appearance between *Hohenbergia* and some complex of species of *Aechmea* subgen. *Aechmea*, mainly *A. ramosa* Mart. *ex* Schult. & Schult. f. and *A. floribunda* Mart. *ex* Schult. & Schult. f. However, the flowers being in more or less cylindrical fascicles,

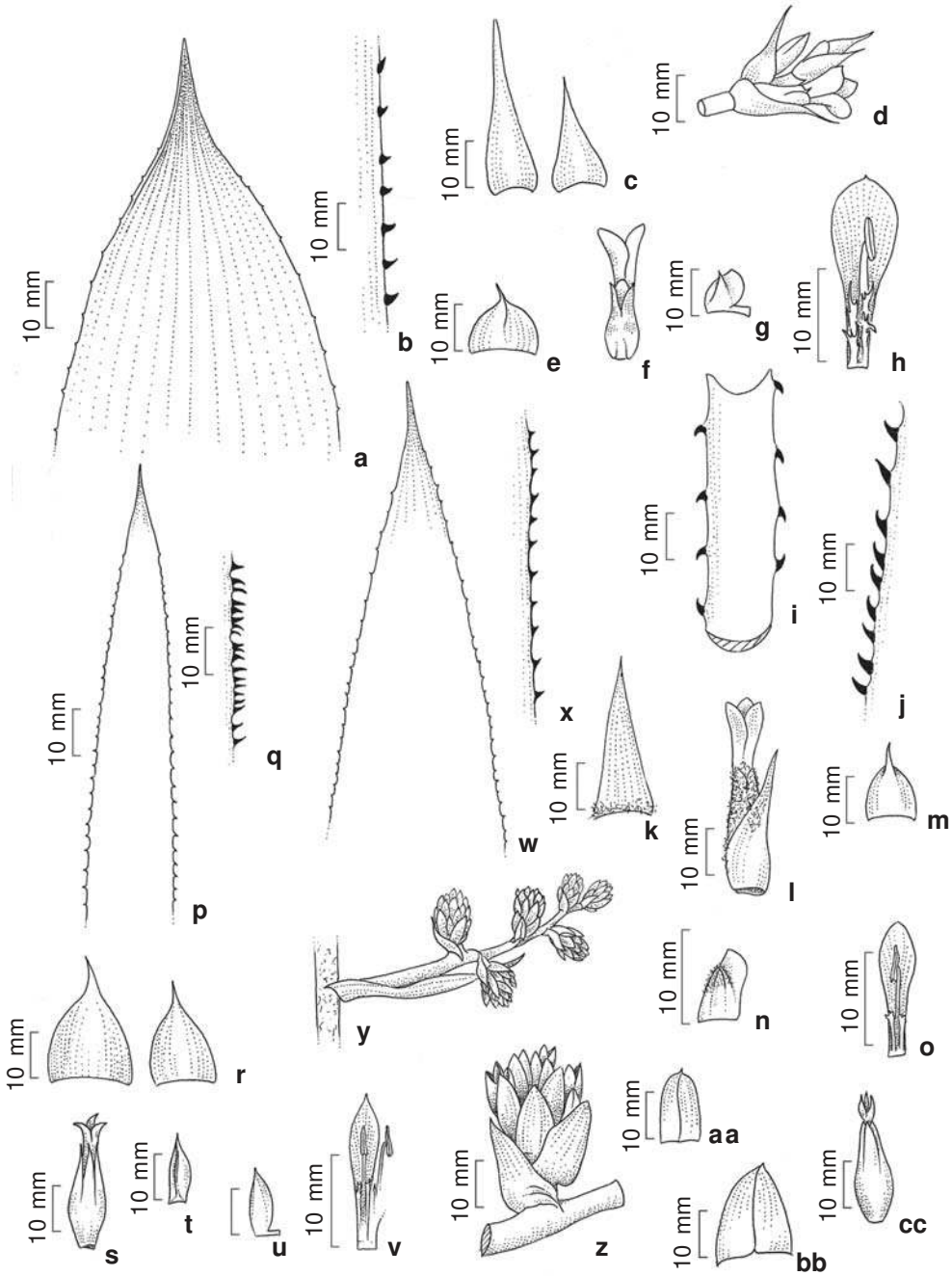

Figure 6 – a-h. *Hohenbergia aechmeoides* Leme – a. leaf apex, adaxial view; b. margin of the leaf in the basal portion; c. variation of secondary bracts, from above; d. secondary fascicles, in side view; e. floral bracts, from below; f. flower in side view; g. sepal, from below; h. petal and stamen, from above. i-o. *H. arcuata* Leme & M. Machado – i. apical segment of the leaf, adaxial view; j. margin of the leaf in the basal portion; k. primari bract, from below; l. flower in side view; m. floral bracts, from below; n. sepal, from below; o. petal and stamen, from above. p-v. *H. barbarespina* Leme & Fraga – p. leaf apex, adaxial view; q. margin of the leaf in the basal portion; r. variation of secondary bracts, from above; s. flower in side view; t. sepal, from below; u. sepal, from above; v. petal and stamen, from above. w-cc. *H. reconcavensis* Leme & Fraga – w. leaf apex, adaxial view; x. margin of the leaf in the basal portion; y. primary branches and bracts, from side view; z. secondary branches and floral bracts, from side view; aa. upper floral bracts, from below; bb. basal floral bracts, from below; cc. flower in side view. (a-h *Menescal s.n.* (RB 495810); i-o *Machado s.n.* (RB 495806); p-v *Leme 4363*; w-cc *Linhares 936*).

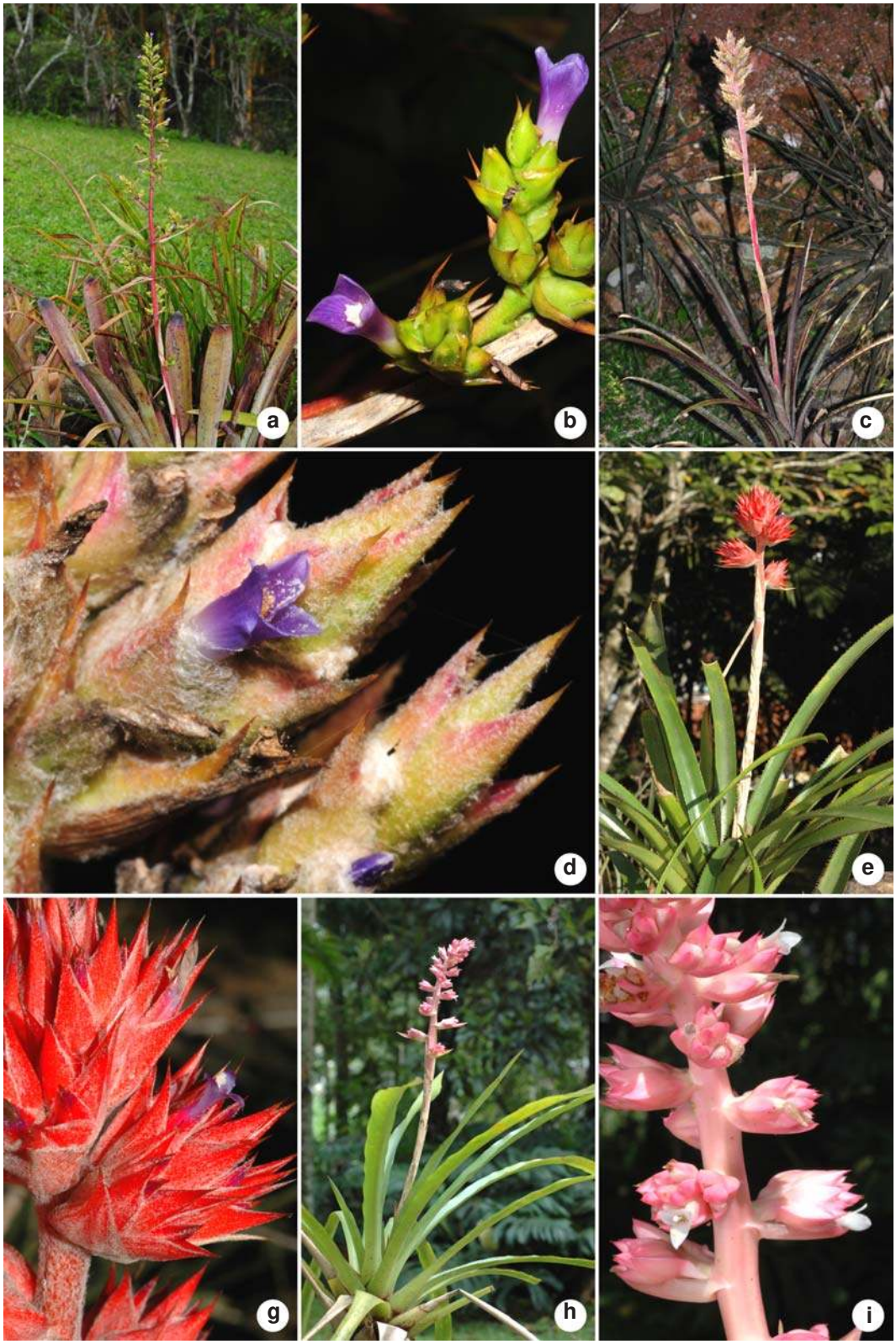

Figure 7 – Habit and detail of the inflorescence and flowers – a-b. *Hohenbergia aechmeoides* Leme. c-d. *H. arcuata* Leme & M. Machado. e-f. *H. barbarespina* Leme & Fraga. g-h. *H. reconcavensis* Leme & Fraga (photos: E. Leme).

the appendage-like petals callosities, and mainly its biporate to triporate pollen, with irregularly and sparsely perforate exine, allow the inclusion of this new species in the genus *Hohenbergia*.

The new species does have some morphological affinities with *Hohenbergia ridleyi*, which grows in Paraíba and Pernambuco States. The differences of *H. aechmeaoides* are: larger floral bracts (15–18× ca. 16 mm vs. 10–12 × 12–15 mm), which are glabrous (vs. lanate) and present a longer apical spine (5–7 mm vs. 2–3 mm long), flower twice longer or so (26–30 mm vs. ca. 15 mm long), longer sepals (9–10 mm vs. 4–5 mm long) and by the longer petals (19–21 mm vs. ca. 12 mm).

The living holotype descendant (cult. *E. Leme 4205*) is cultivated in the collection of the Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro.

This new species is a typical terrestrial encountered in the coastal plain vegetation ("Restinga"), where it forms large clumps, in the neigbourhood of João Pessoa, Paraíba State.

The name chosen for this new species to call the attention to its intermediate floral structure when compared to typical *Hohenbergia* and some members of the genus *Aechmea.*

Hohenbergia arcuata Leme & M. Machado, *sp. nov.* Type: BRAZIL. BAHIA: Chapada Diamantina, Morro do Chapéu, ca. 1,5 km na estr. BA 051, a leste da cidade, 11º33'33"S, 41º08'55"W, 1015 m elev., XII.2003, *M. Machado s.n.*, fl. cult. VIII.2009 (holotype RB 495806!). Figs. 6 i-o, 7 c-d

Species nova a Hohenbergia horrida Harms, *cui affinis, laminis foliorum apicem versus angustioribus, prope basin marginibus spinis dense dispositis, inflorescentia prope basin tripinnata, ramis primariis brevioribus, sepalis brevioribus apice inconspicue mucronulatis et ovulis obtusis differt.*

Plant saxicolous, flowering ca. 90 cm tall. Leaves 25–30, thick and coriaceous, with sheaths forming at base an ovoidal bottle-like rosette; sheaths ovate, ca. 20 × 9 cm, densely brown-lepidote on both sides, castaneous toward the base, reddish-wine toward the apex to pale colors; blades sublinear, not narrowed at base, 40–56 × 2–3 cm, greenish to bronze colored, arcuate, strongly U-shaped canaliculate, abaxially subdensely white-lepidote with trichomes arranged in rows along the intercostal area, distinctly nerved, adaxially subdensely and inconspicuously white-lepidote to glabrescent, apex narrowly acuminate and ending in a nearly subulate pungent point, the outer ones reduced in size, margins densely to subdensely spinose at base, spines narrowly triangular, antrorsely uncinate, blackish, 3–5 ×2–3 mm, 3–10 mm apart, the upper ones laxly arranged, antrorsely to retrorsely uncinate, blackish toward the apex, 1.5–3 × 1–2 mm, 15–20 mm apart. Peduncle erect, stout, ca. 50 cm long, 0.7–0.9 cm in diameter, red, densely white lanate, glabrescent; peduncle bracts lanceolate, acuminate, 6.5–7 × ca. 2 cm, stramineous, papyraceous, distinctly nerved, the basal ones minutely spinulose at apex, the upper ones entire, erect, slightly shorter to nearly equaling the internodes, not completely covering the scape, white-lanate mainly at base but soon glabrous or nearly so; inflorescence narrowly paniculate, cylindrical, tripinnate, ca. 24 cm long, 6–7 cm in diameter at base, erect, rachis ca. 0.7 cm in diameter, straight, densely white-lanate, red; primary bracts resembling the upper scape-bracts, lanceolate, acuminate, entire, stramineous, sparsely white-sublanate, suberect, shorter (the upper ones) to exceeding (the basal ones) the branches, 3–6 × 1–1.7 cm; primary branches suberect, 4–4.5 cm long at middle anthesis, sessile or nearly so, the basal to median ones sparsely arranged, bearing at base 1 to 3 sessile secondary branches densely aggregated, the apical ones densely arranged and resembling the secondary branches; secondary bracts resembling the floral bracts but larger, with a broadly ovate to suborbicular base, 10–15 × 10–13 mm, and a long spinescent apex, 5–7 mm long, shorter than the branches, pale rose, distinctly nerved, entire, white-lanate but soon glabrous, bearing a protruded central nerve and appearing carinate; secondary branches suberect, sessile, ellipsoid-ovate (in early state) to subcylindrical, terete, acuminate, 2.5–3.5 × 1.2–1.4 cm, bearing 10 to 15 flowers; floral bracts subtriangular-orbicular to suborbicular, suberect toward the apex, exceeding the sepals, 16–20 × 10–15 mm (including the spinescent apex), thinly coriaceus, green toward the base and reddish near the apex, sparsely pale sublanate, distinctly nerved, entire, ecarinate, apex acute and long mucronate-spinescent, pungent, mucron 5–8 mm long. Flowers 20–21 mm long, sessile, densely and polystichously arranged, suberect, odorless; sepals strongly asymmetric with a subacute wing distinctly exceeding the midnerve, 7–8 × ca. 4 mm (with wing extended), bearing a completely adnate, inconspicuous mucron on the distal-abaxial portion, but appearing muticous, free or nearly so, densely pale-lanate mainly toward the apex, entire, green, ecarinate; petals subspatulate, apex subacute, ca. 15 ×4 mm, free, lilac, suberect at anthesis, bearing at base 2 sublinear-spathulate appendages, ca. 5 × 1 mm, subentire to irregularly denticulate at the

apex. Stamens included; filaments terete, pale green, the antepetalous ones adnate to the petals for 4–5 mm, the antesepalous ones free; anthers sublinear, ca. 4 mm long, base sagittate, apex acuminate, fixed slightly below the middle; ovary broadly obovate, ca. 5 mm long, ca. 5 mm wide at apex, densely pale-lanate, green, subtrigonous; placentation apical; ovules obtuse; epigynous inconspicuous; stigma conduplicate-spiral, ellipsoid, white, exceeding the anthers. Fruits unknown.

According to the description provided by Leme & Siqueira Filho (2006), this new species is closely related to *Hohengergia horrida*. However, *H. arcuata* can be distinguished from it by the narrower leaf blades toward the apex, with the basal part bearing spines more densely arranged (spines 3–10 mm vs. 7–35 mm apart), tripinnate inflorescence (vs. 4-pinnate at base), shorter primary branches (4–4.5 cm vs. 8–10 cm long), shorter sepals (7–8 mm vs. 9–11 mm) with an inconspicuous mucron at apex (vs. apical mucron 2.5–3.5 mm long), and by the obtuse ovules (vs. shortly caudate).

The living holotype descendant (cult. *E. Leme 6095*) is cultivated in the collection of the Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro.

This new species is a typical inhabitant of the "Campos Rupestres" of Chapada Diamantina, where it is rupiculous in full exposed sites in the subshruby vegetation, forming small to medium groups of plants.

The strongly arcuate-recurved leaf blades of *Hohenbergia arcuata* inspired its name, on the basis of the Latin word *arcuatus*.

Hohenbergia barbarespina Leme & Fraga, *sp. nov.* Type: BRAZIL. BAHIA: Wenceslau Guimarães, road BA 889, between Cocão and Nova Esperança (Teolândia to Jaguaquara), ca. 500 m elev., 25.VII.1998*, E. Leme & R. Alves 4363* (holotype RB!). Figs. 6 p-v, 7 e-f

Species nova a Hohenbergia stellata Schult. & Schult. f., *cui affinis, laminis foliorum distincte angustioribus, apice acuminatis, marginisbus spinis longioribus denseque dispositis, inflorescentia breviora, sepalis angustioribus, petalis angustioribus acuminatisque differt.*

Plant epiphytic, flowering ca. 55 cm tall. Leaves ca. 30, coriaceous, forming a funnelform rosette; sheaths elliptic to obovate, 8–9 × 5–6.5 cm, densely brown lepidote on both sides, dark castaneous, coarsely and densely spinose at the apex; blades linear, suberect-arcuate, 45–48 × 2–3 cm, sparsely to subdensely white-lepidote abaxially with trichomes arranged in longitudinal rows along the intercostal areas, inconspicuously and sparsely white-lepidote adaxially, green, apex acuminate and apiculate, margins densely and coarsely spinose at base with spines 2.5–4 × 1–1.5 mm, narrowly triangular, dark castaneous, straight to sometimes antrorse and more often retrorsely uncinate, 0.5–2 mm apart, toward the apex margins subdensely spinose, spines triangular, prevailing retrorse-uncinate, 1–2 ca. × 1 mm, 4–7 mm apart. Peduncle erect, stout, ca. 35 cm long, 0.7–0.8 cm in diameter, green, densely white lanate; peduncle bracts narrowly lanceolate, acuminate, erect, densely imbricate, 5.5–8.5× 1.5–2 cm, distinctly exceeding the internodes, stramineous, nerved, sparsely white lanate to glabrescent, entire; inflorescence narrowly pyramidal to subcylindrical, tripinnate, ca. 10 cm long, ca. 7 cm in diameter at base, erect, rachis 0.6–0.7 cm in diameter, straight or nearly so, reddish, white lanate; primary bracts resembling the upper scape-bracts, spreading to slightly reflexed, the basal ones exceeding the fascicles, the upper ones about equaling the fascicles; primary fascicles ca. 6, spreading or nearly so, 3.5–4 × 2.5–3.5 cm, sessile, with 2 to 4 sessile secondary fascicles densely arranged, the basal primary fascicles laxly arranged, 1.5–2.5 cm apart, the upper ones densely aggregated at inflorescence apex and forming a subglobose head; secondary bracts resembling the floral bracts but slightly larger, ca. 2.8 × 2.2 cm, shorter than the secondary fascicles, coriaceous, distinctly carinate, reddish-rose, white-lanate, suberect toward the apex; secondary fascicles obovoid, pulvinate, sessile, 2.7–3 ×ca. 1.5 cm, 4 to 6-flowered; floral bracts broadly ovate-subtriangular to suborbicular, acute with a long spinescent apex, suberect, about equaling to exceeding the sepals, 20–25 × 12–19 mm, including the apical spines 6–8 mm long, rose-red, white lanate, irregularly sulcate, entire, ecarinate (inner ones) to distinctly carinate (outer ones), strongly convex, coriaceous. Flowers 26–28 mm long, sessile, densely and polystichously arranged, suberect, odorless; sepals subelliptic-ovate, slightly asymmetric with the lateral membranous wing distinctly shorter than the midnerve, 15–16 × 4–5 mm, apex acuminate-mucronate, bearing a mucron ca. 1.5 mm long, connate at base for ca. 1 mm, white lanate, rose-red, the abaxial ones slightly exceeding the adaxial ones, alate-carinate with keels decurrent on the ovary, the abaxial one ecarinate; petals narrowly lanceolate, apex acuminate, apiculate-caudate, distinctly recurved at anthesis, 16–19 × 2.5–3.5 mm, connate at base for 3–3.5 mm, purple, bearing 2 irregularly digitate

appendages 7–9 mm above the base, ca. 1 ×0.5 mm. Stamens included; filaments slightly complanate, the antepetalous ones adnate to the petals for ca. 8 mm, the antesepalous ones adnate to the petals for 3–3.5 mm; anthers base obtuse, apex apiculate, apiculus nigrescent, dorsifixed at 1/3 of its length above the base; pollen globose, triporate, exine psillate; stigma conduplicate-spiral, ellipsoid-capitate, white, margins crenulate-lacerate; ovary obconic, subtrigonous, ca. 8 mm long, ca. 6 mm in diameter, white, glabrous; placentation apical; ovules long caudate; epigynous tube inconspicuous, ca. 1 mm long. Fruits purple.

Hohenbergia barbarespina is morphologically related to *H. stellata*, differing from it by the distinctly narrower leaf blades (2–3 cm vs. 5.5–7.5 cm wide), with acuminate apex (vs. acute to subrounded), and margins densely spinose basal spines proportionally longer (2.5–4 mm long and 0.5–2 mm apart vs. 1.5–3.5 mm long and 3–30 mm apart), smaller inflorescence (ca. 10 ×7 cm vs. 36–67 × 12–25 cm), narrower sepals (4–5 mm vs. 6–10 mm wide), and by the narrower petals (2.5–3.5 mm vs. ca. 5 mm wide) with acuminate apex (vs. acute apex).

This new species was found growing epiphytically on the higher tree branches of an Atlantic Forest fragment, along the road between the locality known as Cocão and Nova Esperança, in the county of Wenceslau Guimarães, Bahia. Due to the poor conservation condition of its habitat is was not possible to determine the extent of the population.

The specific name of *Hohenbergia barbarespina* portrays the very dense disposition of the spines along the basal portion of the leaf margins, as well as their proportionally longer length in comparison with the closer relative.

Hohenbergia reconcavensis Leme & Fraga, *sp. nov.* Type: BRAZIL. BAHIA: Santo Amaro, Recôncavo, II.2002, *S. Linhares 936*, fl. cult. IV.2003 (holotype RB!). Figs. 6 w-cc, 7 g-h

A Hohenbergia belemii L.B. Sm. & Read, *cui affinis, laminis foliorum basin versus dense spinosis, inflorescentia triple longiore vel fere, ramis primariis longioribus, bracteis floriferis apice acutis et breviter apiculatis differt.*

Plant terrestrial, flowering 70–110 cm tall, propagating by short basal shoots. Leaves ca. 30, suberect to arching, forming a broad funnelform rosette; sheaths elliptic, 10–17 × 7–9.5 cm, densely brown-lepidote on both sides, dark castaneous except for the green apex, rigid coriaceous and brittle, nerved, margins pale castaneous for ca. 4 mm, entire or densely spinose at the transition to the blades; blades linear, apex acuminate, ending in a pungent spine ca. 10 mm long, inconspicuously if at all narrowed at base, slightly channeled, 40–80 ×3–4.8 cm, subcoriaceous, sparsely and inconspicuously white-lepidote mainly abaxially, green and lustrous, nerved, margins densely spinose, spines antrorse, triangular, dark brown, 2–5 mm apart except for eventually ca. 10 apart in the medium portion, the basal ones 1.5–2 mm long, 1–2 mm wide at base, the apical ones 0.5–1 mm long, ca. 1 mm wide at base. Peduncle erect, stout, 40–60 cm long, 1–1.5 cm in diameter, red, sparsely white-lanate; peduncle bracts lanceolate, acuminate and mainly the basal ones ending in a pungent brown spines, 8–16 × 2–4 cm, stramineous, papyraceous, finely nerved, imbricate, erect, distinctly exceeding the internodes and covering all but a few portions of the scape, densely white-lepidote abaxially near the base to inconspicuously white-lepidote or glabrescent toward the apex, the basal ones spinose near the apex, the upper ones entire; inflorescence shortly paniculate, pyramidate, 4-pinnate at base, tripinnate to bipinnate toward the apex, 22–32 cm long, 12–18 cm in diameter at base, erect, rachis stout, slightly angulose, sparsely white-lanate to glabrous, red; primary bracts resembling the upper scape-bracts, but smaller, spreading to suberect with the branches, the basal ones green to soon stramineous, slightly exceeding to shorter than the branches but distinctly exceeding their basal sterile stipes, 6.5–9 × 1.8–2 cm, the upper ones red with orange upper third, nearly equaling the branches, 1.5–5 × 1–1.5 cm; primary branches suberect, the lower ones 6–13 cm long, stipes 2–3.5 × 0.6–0.7 cm, complanate, red, sparsely white-lanate to glabrous, with 5 to 7 shortly stipitate to subsessile secondary branches laxly arranged at base to densely arranged at apex, the median primary branches 4.5–8 cm long, stipes 1–2.5 × 0.5–0.6 cm, complanate, with 3 to 5 subsessile secondary branches subdensely to densely arranged, the upper primary branches 3–4 cm long, resembling the secondary branches; secondary bracts resembling the basal floral bracts, shorter than the branches, carinate to ecarinate; secondary branches the basal ones with 2 densely arranged fascicles, 3–3.4 × 2.5–3 cm (excluding the petals), shortly stipitate, stipes 0.3–0.5 × ca. 0.4 cm, the upper ones strobilate, oblong-ellipsoid, subsessile, suberect, 2–3 × 1.5–2 cm (excluding the petals), with 6 to 10 flowers; floral bracts red except for the orange apex, inconspicuously and sparsely white-lepidote to glabrous, nerved, membranous along the margins, entire, carinate except for eventually the apical ones, convex, erect to suberect with the flower,

slightly shorter to nearly equaling the sepals, the basal ones 15–20× 14–16 mm, broadly triangular-ovate, acute and shortly apiculate, apiculus 1–1.5 mm long, pungent, the upper ones 13–18 × ca. 9 mm, oblong-ovate to oblong, broadly acute to obtuse and apiculate, apiculus ca. 1 mm long, pungent. Flowers 23–28 mm long, sessile, densely and polystichously arranged, erect to suberect; sepals oblong to subobovate, asymmetrical, the lateral, rounded wing from equaling to very slightly exceeding the midnerve, 10–12 × 5–6 mm, connate at base for 1–1.5 mm, glabrous, entire, centrally and toward the apex rose, lilac along the margins, apex obtuse and mucronulate, mucron 0.5–1 mm long, the posterior ones carinate with keel decurrent on the ovary, the anterior ones ecarinate; petals lanceolate, apex narrowly acute, 18–20 ×ca. 4 mm, free, lilac to dark purple toward the apex, bearing 2 sublinear-spathulate, nearly truncate at apex, 5–8 mm above the base, adnate to the petals for 3–5 mm, each with a lower more pronounced lacerate fringe and an apical denticulate fringe. Stamens included; filaments complanate and slightly dilated and lilac toward the apex, ca. 1 mm long, ca. 1.5 mm wide at apex, the antepetalous ones adnate to the petals for 5–6 mm, the antesepalous free; anthers ca. 3.5 mm long, base slightly sagittate, apex apiculate, fixed at 1/3 of its length above the base; ovary subtrigonous, laterally carinate, 6–8 mm long, 6–7 mm wide at apex, glabrous, white; placentation apical; ovules obtuse to apiculate, ca. 0.3 mm long; epigynous tube inconspicuous; style ca. 15 mm long, ca. 0.7 mm in diameter, lilac toward the apex; stigma conduplicate-spiral, broadly ellipsoid, lilac, blades long glandulose-fimbriate. Fruits unknown.

This new species is close related to *Hohenbergia belemii* but can be easily distinguished from it by the leaf blades densely spinose toward the base (vs. laxly spinose), spines 2–5(–10) mm apart (vs. 5–25 mm apart), inflorescence 3 times longer or nearly so (22–32 cm long vs. 8–10 cm long), primary branches longer (6–13 cm vs. 3–4.5 cm long) and by the floral bracts with apex acute and shortly apiculate (vs. acuminate and long spinescent).

Hohenbergia reconcavensis grows terrestrially, forming large clumps, in humid Atlantic Forest fragments, in the region of Santo Amaro, in Recôncavo Baiano, Bahia State.

The name of *Hohenbergia reconcavensis* is a reference to the large region known as "Recôncavo Baiano", which surrounds Baía de Todos os Santos, where this new species was found near the city of Santo Amaro.

Nidularium Lem.

The Brazilian endemic genus *Nidularium* contains 45 species (Leme 2000; Luther 2008), exclusive to the understory of the Atlantic Forest that stretches from the State of Bahia, in Northeastern Brazil, to Rio Grande do Sul, in Southern Brazil. It is found from sea level, in sandy coastal plain vegetation or in transition zones between Atlantic Forest and mangroves, to the edge of the cloud forest that rings the high altitude grasslands above 2,000 m. However, most of the species are confined to forest on the moist slopes of the Serra do Mar, and a few are found in equally wet habitats in Serra da Mantiqueira, or they penetrate the Campos Rupestres domain in Minas Gerais and Bahia by way of gallery forests. The State of Rio de Janeiro, with 29 species, has the highest diversity for the genus, followed by São Paulo (19 spp.), and Espírito Santo (10 spp., not including the species described here).

The genus is characterized by a subcorymbose inflorescence with broad primary bracts forming a uniutriculate to miltiutriculate rosette with a surprising capacity for rainwater storage, which is unique within the family and also within the bromelioid genera of the *Nidularium* complex (i.e, *Canistropsis*, *Canistrum*, *Edmundoa*, and *Wittrockia*), appearing to be a specialization associated with moist forest environments. Its flowers have long-tubular architecture, with short, erect-convergent petals with an obtuse cucullate apex, and according to Sazima *et al*. (2000) is related to specialized long-billed humminbirds pollination.

The taxonomy of *Nidularium* was revised by Leme (2000), and there have been few new contributions since (*e.g.* Leme 2002). A recent expedition to the highest mountain in the county of Alegre, Espírito Santo State brings to light one more delicate new species from the montaine Atlantic Forest.

Nidularium alegrense Leme & L. Kollmann, *sp. nov.*
Type: BRAZIL. ESPÍRITO SANTO: Alegre, trilha para o topo da Pedra da Caveira da Anta, 1126 m elev., 20º39.11'S, 41º22.94'W, 05.VI.2009, fl., *E. Leme*, *L. Kollmann* & *D. Couto 7855* (holotype RB!; isotypes MBML!, HB!). Figs. 8 a-f, 9 a-b

A Nidularium meeanum Leme, Wand. & Mollo, *cui affinis, laminis folioum subintegris vel inconspicue spinulosis, inflorescentia apice angustiora, bracteis primariis laminis suberectis prope apicem leviter recurvatis, brevioribus, bracteis floriferis angustioribus, sepalis minoribus, sublineari-lanceolatis, petalis longioribus et fructibus rubris*

differt; a N. utriculosum Ule*, cui proxima, laminis foliorum angustioribus, marginibus spinis minoribus, inflorescentia apice angustiora, bracteis primariis brevioribus, laminis angustioribus, sepalis brevioribus et petalis longioribus differt.*

Leaves 15 to 22, suberect and recurved toward the apex, thin in texture, forming a narrow funnelform rosette, propagating by short basal shoots; sheaths narrowly elliptic, 13–14 × 5–5.2 cm, subdensely and inconspicuously brown lepidote on both sides, pale green; blades linear, distinctly narrowed toward the base, 23–37 × 1.8–2.6 cm, green, sparsely and inconpicuously white lepidote abaxially, adaxialy glabrous or nearly so, lustrous, apex acuminate and slenderly apiculate, margins subentire to sparsely and inconspicuously spinulose, spines 0.2–0.3 mm long, 10–25 mm apart. Peduncle 13–15 cm long, ca. 0.5 cm in diameter, whitish, exceeding the leaf-sheaths at anthesis; peduncle bracts foliaceous to subfoliaceous, completely concealing the scape, the basal ones distinctly exceeding the inflorescence; inflorescence once-branched, narrowly obconic, apex substellate, 5–6 cm long, 9–10 cm in diameter, distinctly elevated above the rosette, but shorter than the leaves; primary bracts suberect and slightly recurved near the apex, inconspicuously white lepidote to glabrescent, 8–11 cm long, green except for the distal 1/3 red, sheaths broadly elliptic, 4–5 × 3.5–4.5, blades narrowly triangular, 4–6 × 2–2.5 cm, apex acuminate and minutely apiculate, margins sparsely to subdensely spinulose, spines 5–13 mm apart; fascicles ca. 5, the basal ones ca. 28 × 16 mm (excluding the petals), 3-flowered, stipe inconspicuous; floral bracts narrowly subtriangular-lanceolate, apex subacute and minutely apiculate, entire or remotely denticulate at apex, 20–21 × ca. 5 mm, membranous, hyaline, greenish toward the apex, about equaling 1/2 of sepals length, inconspicuously and sparsely lepidote, trichomes fimbriate. Flowers ca. 63 mm long, subsessile; sepals sublinear-lanceolate, apex subacute and minutely apiculate, 15–16 × 4.5–5 mm, connate for 3.5–5 mm, green, glabrous; petals ca. 50 mm long, connate for ca. 40 mm, tube white, lobes broadly oblong-ovate, ca. 10 × 6 mm, dark purple except for the white margins, bearing 2 inconspicuous callosities at base; anthers ca. 6 mm long, base obtusely-sagittate, apex subacute and shortly caudate; pollen suboblong-ellipsoid, biporate with large pores, exine broadly reticulate, muri narrowed, lumina polygonal; stigma globose, white, lobes with minutely crenulate margins; ovary subclavate, ca. 14 mm long, ca. 6 mm in diameter at apex; ovules obtuse. Fruits slightly enlarged from the ovary, odorless, red, the persistent calyx red.

Nidularium alegrense is morphologically related to *N. meeanum*, differing from it by the leaf blades subintire to inconspicuously spinulose (spines 0.2–0.3 mm long, 10–25 mm apart, vs. ca. 5 mm long, 4–5 mm apart), inflorescence with a narrower apex (9–10 cm in diameter vs. 12–16 cm in diameter), primary bracts with blades suberect and slightly recurved near the apex (vs. subspreading-recurved), shorter (4–6 cm long vs. 7–10 cm long), floral bracts narrower (ca. 5 mm wide vs. 10–12 mm wide), sepals smaller (15–16 × 4.5–5 mm vs. 17–20 × 6–7 mm), sublinear-lanceolate (vs. obovate to broadly oblong-elliptic), petals longer (ca. 50 mm long vs. 33–40 mm long), and by the red fruits. On the other hand, this new species can be associated to *N. utriculosum*, distinguishing from it by leaf blades narrower (1.8–2.6 cm wide vs. 2.5–3.5 cm wide), with marginal spines smaller (0.2–0.3 mm long vs. ca. 0.5 mm long), inflorescence with a narrower apex (9–10 cm in diameter vs. 12–15 cm in diameter), primary bracts shorter (8–11 cm long vs. 10–13 cm long), with narrower blades (2–2.5 cm wide vs. 3–3.5 cm wide at base), sepals shorter (15–16 mm vs. ca. 20 mm long), and by the longer petals (ca. 50 mm long vs. ca. 40 mm long).

This new species was found growing as a terrestrial, shade-dweller in a montane Atlantic Forest at about 1,126 m elevation, at the base of Pedra da Caveira da Anta, a granitic inselberg with an elevation of nearly 1,500 m. The habitat of *Nidularium alegrense* comprises a moist low-forest along a spring, where some terrestrial and epiphytic bromeliads species were observed, like *Aechmea pineliana* var. *minuta* M.B. Foster, *Billbergia* aff. *alfonsi-joannis* Reitz, *Canistropsis billbergioides* (Schult. & Schul. f.) Leme, *Neoregelia dayvidiana* Leme & A.P. Fontana, *Neoregelia* aff. *macrosepala* L.B. Sm., *Nidularium procerum* Lindm., *Quesnelia kautskyi* C.M. Vieira, *Vriesea carinata* var. *flavominiata* Leme, *Vriesea lubbersii* (Baker) E. Morren, to name few. In the open, rocky habitats towards the summit of Pedra da Caveira da Anta, a grasslike vegetation predominates, where rupicolous and saxicolous bromeliad species thrive in profusion, like a large population of *Pitcairnia* aff. *azouryi* Martinelli & Forzza, *P. carinata* Mez, *Alcantarea* sp., and a dark leafed form of *Vriesea fosteriana* L.B. Sm.

The name choosen for *Nidularium alegrense* is an explicit reference to the county of Alegre, where it was discovered.

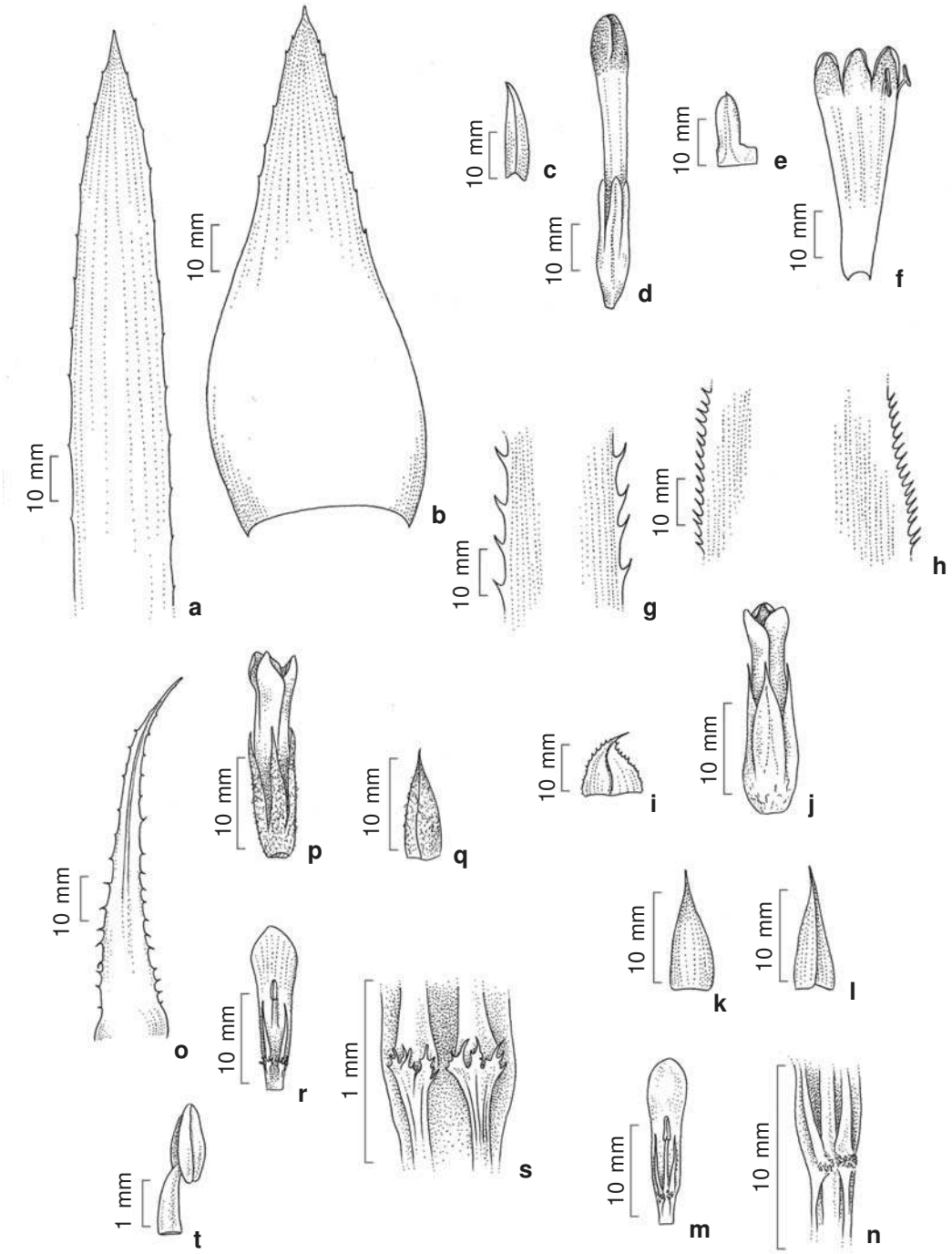

Figure 8 – a-f. *Nidularium alegrense* Leme & L. Kollmann – a. leaf apex, adaxial view; b. basal primary bract; c. floral bracts, from below; d. flower in side view; e. sepal, from below; f. petal and stamen, from above. g-n. *Orthophytum teofilo-otonense* Leme & L. Kollmann – g. apical segment of the leaf, adaxial view; h. basal segment of the leaf, adaxial view; i. floral bracts, from below; j. petal and stamen, from above; k. flower in side view; l. sepal, from above; m. sepal, from below; n. petal appendages in detail. o-t. *O. cearense* Leme & F. Monteiro – o. leaf, adaxial view; p. flower in side view; q. sepal, from below; r. petal and stamen, from above; s. petal appendages in detail; t. anther in side view. (a-f *Leme 7855*; g-n *Leme 7919*; o-t *Monteiro 201*).

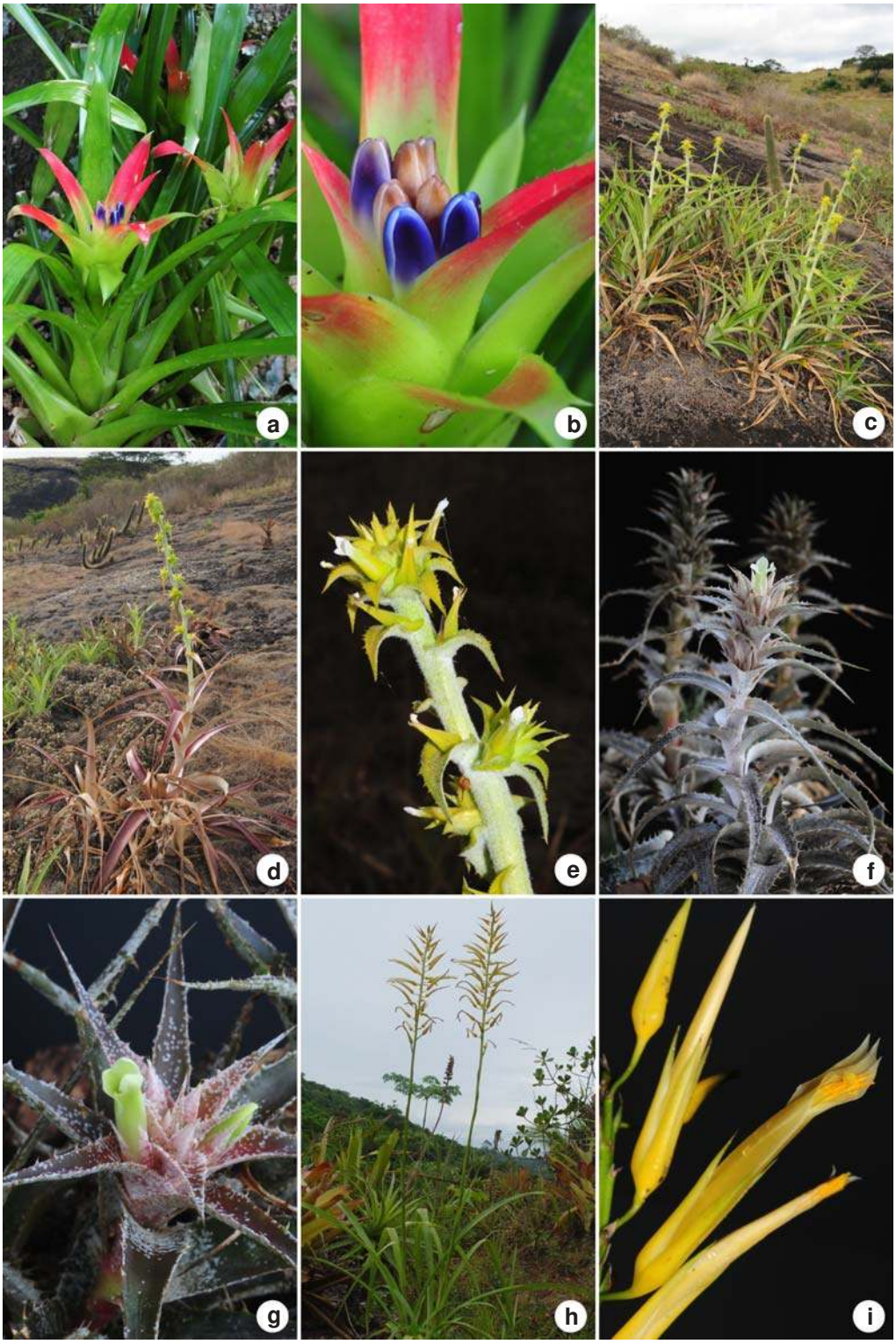

Figure 9 – Habit and detail of inflorescence and flowers. a-b. *Nidularium alegrense* Leme & L. Kollmann. c-e. *Orthophytum teofilo-otonense* Leme & L. Kollmann (c. holotype population; d. paratype population). f-g. *O. cearense* Leme & F. Monteiro. h-i. *Pitcairnia capixaba* Fraga & Leme (photos: a-g and i E. Leme; h B.R. Silva).

Orthophytum

The genus *Orthophytum* is a medium-sized bromelioid genus, comprising 51 known species (Luther 2008). It is endemic to Brazil and lives in rocky environments that stretch from the central-north region of Espírito Santo State, Southeastern Brazil (the southernmost limit) to the northeastern States of Alagoas, Pernambuco, Paraíba and Ceará (the northernmost limit). The diversity center of the genus is concentrated in the northeastern-southeastern States of Bahia and Minas Gerais.

The species of *Orthophytum* are exclusively terrestrial and saxicolous, mostly occuring in usually low elevated and sun exposed areas in rocky escarpments in the domain of the Atlantic Forest, or more often in the grasslands on rocky soils, on quartzite and sandstone outcrops that form the usually high-altitude landscape of the Serra do Espinhaço range, standing out from the savannas domain.

The taxonomical knowledge on *Orthophytum* is still rudimentary. There are very basic questions to be answered on the identity of some imperfectly known key-species (*e.g. O. leprosum* (Mez) Mez, *O. sanctum* L.B. Sm., *O. alvimii* W. Weber), and concerning the set of morphological characteristics that should be used for consistent taxa delimitation. However, on the basis of the current knowledge on the genus, as well as taking into consideration field observations, it is possible to recognize, from time to time, new taxa.

Orthophytum teofilo-otonense Leme & L. Kollmann, *sp. nov.* Type: BRAZIL. MINAS GERAIS: Teófilo Otoni, estr. MG 418, entre Teófilo Otoni e o entroncamento para Ataléia, ca. 370 m elev., 17°54.45'S, 41°16.72'W, 4.VII.2009, fl., *E. Leme, L. Kollmann & M. Grossi 7919*(holotype RB!; isotypes HB!, MBML!). Figs. 8 g-n, 9 c-e

Ab Orthophytum magalhaesii L.B. Sm., *cui affinis, planta altiora, laminis foliorum latioribus, supra glabris, pedunculo robustiore, inflorescentia longiore, bracteis primariis majoribus, basalibus 10–25 × 2.5–3.5 cm, supernis 3–6 × 1.5–3 cm, bracteis floriferis subtus subdense albo-lepidotis, petalis appendicis breviter fimbriatis differt; ab* Orthophytum alvimii W. Weber, *cui proxima, foliis per anthesim plus numerosis, bracteis floriferis subtus subdense minuteque albo-lepidotis, petalis obtusis vel subacutis differt.*

Plant saxicolous, stemless before anthesis, 70–90 cm high at anthesis, propagating by short basal shoots as well as by shoots from the strobilate fascicles of the inflorescence. Leaves laxly rosulate but forming a distinct rosette before (ca. 12 in number) and afterwards (7 to 10 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, 45–55 cm long, 4–5.5 cm wide at base, ca. 2 mm thick near the base, coriaceous, suberect-arcuate, distinctly U-shaped channeled, green (holotype specimen) to dark red (paratype specimens), with color not obscured by the trichomes, abaxial and adaxial surfaces distinctly contrasting, densely white-sublanate abaxially with trichomes persistent, finely multifilamentous divided, partially obscuring leaf color, lustrous and glabrous adaxially except for the densely white lepidote base, margins straight to recurved under water stress, densely at base to laxly spinose toward the apex, spines narrowly triangular, spreading to antrorse-uncinate, flattened, yellowish-castaneous toward the apex, white-lanate near the base abaxially, 1.5–3 mm long, 1–2 mm wide at base, the basal ones 2–5 mm apart, the upper ones 7–12 mm apart. Peduncle erect, terete, greenish, densely and finely white-lanate, 40–45 cm long, 0.7–2 cm in diameter; peduncle bracts foliaceous and not distinguishable from the leaves, suberect to strongly reflexed, slightly reduced in size upwardly; inflorescence once-branched, elongate, erect to suberect, 15–40 cm long, rachis 0.7–1.2 cm diam., straight to slightly flexuous, terete, greenish, densely and finely white-lanate; primary bracts subspreading to reflexed, flat or nearly so, green to reddish-bronze colored, subdensely white sublanate abaxially, adaxially glabrous to sparsely and inconspicously white lepidote with filamentous trichomes, margins densely (near the base) to laxly (toward the apex) spinulose, spines 1–2.5 mm long, 2–11 mm apart, narrowly triangular, antrorse, the basal primary bracts subfoliaceous, 10–25× 2.5–3.5 cm, much exceeding the fascicles, the upper ones much reduced in size, narrowly ovate triangular, acuminate-caudate, 3–6 × 1.5–3 cm, slightly to distinctly exceeding the fascicles; fascicles 8 to 15, polystichously disposed, laxly (at base) to subdensely (at apex) arranged, 2–5 cm apart, suberect, sessile, subglobose-strobilate, rosulate, 2–3 cm long, 2.5–3.5 cm in diameter at apex (including the floral bracts), 7 to 10–flowered; floral bracts broadly ovate-triangular, acuminate, thinly coriaceous, pungent, carinate to ecarinate, V-shaped channeled, from equaling to exceeding the sepals but strongly recurved toward the apex and exposing them, light green to yellowish-green, finely nerved, abaxially subdensely and minutely white lepidote with filamentous trichomes,

adaxially glabrous and lustrous, 15–25 × 10–16 mm, margins densely spinulose, spines triangular, flat, ca. 0.5 mm long, from straight to irregularly curved, yellowish-green. Flowers 22–25 mm long (including the petals), sessile, densely arranged, odorless; sepals narrowly ovate-subtriangular, apex acute and apiculate to acuminate, 13–16 ×5–5.5 mm, free, entire, yellowish-green, thin in texture, inconspicuously and sparsely white-lepidote to glabrous, finely nerved, the posterior ones alate-carinate toward the base with keels decurrent on the ovary, the anterior one acarinate; petals sublinear to narrowly subsphatulate, obtuse to subacute, slightly if at all cucullate, 18–20 × ca. 4 mm, free, erect at anthesis except for the suberect apex, white except for the greenish basal tube, bearing 2 densely and densely and shortly fimbriate, upwardly oriented, cupulate appendages ca. 3 mm above the base, as well as 2 conspicuous longitudinal callosities which equal the filaments; filaments terete, greenish-white, the antepetalous ones ca. 10 mm long, adnate to the petals for ca. 5 mm, the antesepalous ones ca. 12 mm long, free; anthers sublinear, 2.5–3 mm long, base sagittate, apex obtuse and remotely apiculate, dorsifixed at 1/3 of its length above the base, laterally strongly complanate; pollen ellipsoid, sulcate, exine microreticulate; stigma conduplicate, ca. 1 mm in diameter, white, blades obtuse, distinctly recurved, margins densely glandulose; ovary ca. 3 mm long, ca. 6 mm in diameter at apex, subtrigonous and slightly complanate, subdensely white-lanate; epigynous tube lacking; placentation apical; ovules subcylindraceous, obtuse to subapiculate. Fruits unknown.

Material examinado: BRAZIL. MINAS GERAIS: Teófilo Otoni, estr. MG 418, 17°54.45'S, 41°16.72'W, 4.VII.2009, fl., *E. Leme et al. 7920* (RB); *L. Kollmann et. al. 11780* (MBML); *L. Kollmann et al. 11781* (MBML).

Orthophytum teofilo-otonense is closely related to *O. magalhaesii*, differing from it by the larger size at anthesis (70–90 cm vs. ca. 55 cm high), leaf blades comparatively broader at base (4–5.5 cm vs. 2.5–3 (–4.5) cm wide), glabrous adaxially (vs. subdensely to densely white-sublanate on both sides), peduncle more robust (0.7–2 cm vs. 0.5–1.2 cm diam.), longer inflorescence (15–40 cm long vs. 10–15 cm long), larger primary bracts (basal ones 10–25 × 2.5–3.5 cm vs. 5–7 ×ca. 2 cm, upper ones 3–6 ×1.5–3 cm vs. 2.5–3 ×ca. 2 cm), floral bracts subdensely white lepidote abaxially (vs. glabrous or nearly so), and by the petal appendages shortly fimbriate and upwardly oriented (vs. densely and irregularly scalloped-lacerate, and downwardly oriented).

On one hand, *Orthophytum teofilo-otonense* can be associated to the imperfectly known *O. alvimii*, which was discovered at Bahia State in 1983, by Alvim Seidel. On the other, it can be distinguished at least by the more numerous leaves at anthesis (7 to 10 vs. 4), the subdensely and minutely white lepidote floral abaxially (vs. glabrous), and by the obtuse to subacute petals (vs. acuminate).

This new species was found at low elevation (ca. 370 m), growing on a slightly inclined granitic surface, under direct sunlight, in the Atlantic Forest domain, in the county of Teófilo Otoni, Minas Gerais State. It forms a large population composed by red-leafed and green-leafed groups of plants distributed like "islands" on a shallow organic soil. In a continuous and ecologically identical nearby rock outcrop, a huge population of *Encholirium gracile* L.B. Sm., together with few specimens of *Alcantarea* sp., were observed, being distinctly and curiously segregated from the *Orthophytum teofilo-otonense* population.

The name of this new species is an explicit reference to the county of Teófilo Otoni where it was discovered, in Minas Gerais State, which is an important center of diversity for the genus.

Orthophytum cearense Leme & F. Monteiro, *sp. nov.* Type: BRAZIL. CEARÁ: Catunda, Serra do Olho D'Água, Pico da Serra Branca, 1144 m elev., 04°45'55.4"S, 40°07'46.9"W, 26.I.2009, fl., *F.J.S. Monteiro 201*, fl. cult. (holotype RB!).

Figs. 8 o-t, 9 f-g

Species nova ab Orthophytum disjunctum L.B. Sm.*, cui affinis, planta distincte breviora, pedunculo breviore, inflorescentia simplicissima vel dense strobiliforme-composita, fasciculis primariis dense dispositis, floribus per fasciculis perpaucis, petalis majoribus, viridulis vel apicem versus virido-albescentibus differt; ab* Orthophytum triunfense J.A. Siqueira & Leme*, cui proxima, planta haud rhizomatosis, laminis foliorum brevioribus et angustioribus, supra apicem versus glabrescentibus, petalis viridulis vel apicem versus virido-albescentibus, apice obtusis vel emarginatis differt.*

Plant saxicolous or terrestrial, stemless, 7–12 (–20) cm high, propagating by short basal shoots. Leaves 5 to 10 (to 20) at anthesis, rosulate and forming a distinct rosette before and at anthesis; sheaths inconspicuous; blades narrowly triangular-attenuate, 5–9 (–14) cm long, 0.8–1.1 (–2) cm wide at the base, ca. 2.5 mm thick at the middle, subcoriaceous to coriaceous, suberect-arcuate to spreading-

recurved, slightly to distinctly channeled, bronze colored, abaxially densely and coarsely white-lepidote with trichomes obscuring blades color, finely nerved, adaxially densely and coarsely white-lepidote near the base and glabrescent toward the apex, trichomes not at all obscuring blade color, apex attenuate-caudate, margins densely (near the base) to laxly (toward the apex) spinose, spines narrowly triangular, subspreading to retrorse-uncinate, 1–3 mm long, 0.5–1.5 mm wide at the base, 2–8 mm apart, castaneous toward the apex. Peduncle erect, 3–6 cm long, 0.3–0.6 cm in diameter, densely white-lanate, pale reddish-bronze colored but the color almost completely obscured by the trichomes; peduncle bracts foliaceous, suberect-arcuate to nearly spreading, not at all hiding the scape; inflorescence simple when growing under arid condition to densely bipinnate at base when growing in mesophytic condition, densely strobilate, erect, 5- or 6-flowered and ca. 2 cm long in simple inflorescences, to 20–flowered and 5–6 cm long in bipinnate inflorescences (excluding the petals), 1.5–2.5 cm in diameter (excluding the floral bracts), apparently not producing vegetative shoots; primary bracts foliaceous to subfoliaceous, much exceeding the fascicles; fascicles 2 to 7, densely arranged even the basal ones, subflabellate, subcomplanate, 16–18 × ca. 10 mm (excluding the petals), 2-flowered; floral bracts those of the basal fascicles, narrowly triangular, acuminate, 10–14 × ca. 8 mm, pale reddish-bronze, densely white lepidote, distinctly recurved and shorter than the sepals, carinate, membranous toward the base, margins minutely spinulose, spines less than 0.5 mm long, irregularly curved, those of the simple part of the inflorescence subfoliaceous, reddish-bronze colored, much exceeding (the basal to medium ones) to slightly shorter (the upper ones) than the flowers, suberect to subspreading, finely nerved abaxially, subcoriaceous to coriaceous, 20–40 × 6–10 mm, subdensely to densely and coarsely white-floccose mainly abaxially, trichomes with shortly fimbriate margins, at least adaxially not at all obscuring bracts color, margins laxly to densely spinulose, spines narrowly subtriangular-uncinate, retrorse, 0.5–2 mm long, 2–4 mm apart. Flowers 22–24 mm long (with extended petals), sessile, erect to suberect, densely arranged, odorless; sepals slightly symmetrical, narrowly ovate-lanceolate, apex long acuminate-caudate, 11.5–12.5 × ca. 4 mm including the 2.5–6 mm long caudate apex, reddish-rose, membranous mainly along the margins, subdensely to densely white-lepidote with lacerate-fimbriate trichomes, the abaxial one ecarinate to obtusely carinate, the adaxial ones carinate; petals subspatulate, narrowly obtuse to slightly emarginate and remotely apiculate, but appearing acute, slightly cucullate, 18–19 × ca. 4.5 mm, free, erect at anthesis except for the suberect apex, green throughout to greenish-white toward the apex, bearing 2 irregularly long lacerate, predominantly upwardly oriented, utriculose appendages ca. 3 mm above the base, as well as 2 conspicuous longitudinal callosities which nearly equal the anthers; filaments terete, the antesepalous ones free, ca. 13 mm long, the antepetalous ones ca. 11 mm long, adnate to the petals for ca. 7 mm; anthers ca. 1.5 mm long, greenish-yellow, base obtuse, apex subacute and remotely apiculate, laterally flattened mainly toward the apex, dorsifixed at 1/3 of its length above the base; pollen ellipsoidal, sulcate, exine microreticula, lumina polygonal; stigma conduplicate, ca. 1.5 mm in diameter, blades suberect to subspreading, crenulate; ovary ca. 2.5 mm long, ca. 4 mm in diameter, subtrigonous and complanate, white-lanate; epigynous tube inconspicuous; placentation apical; ovules obtuse, greenish. Fruits enlarged from the ovary, globose, ca. 6 mm in diameter, whitish.

Material examinado: BRAZIL. CEARÁ: Tamboril, Serra do Açudinho, 04°50'14.9"S, 40°09'39"W, 8.I.2008, fl., *F.J.S. Monteiro 126,* fl. cult. VI.2009 (RB); Catunda, Serra do Olho D'Água, 04°45'59.5"S, 40°07'53.3"W, 9.I.2008, fl., *F.J.S. Monteiro 135*, fl. cult. (RB).

Orthophytum cearense is a member of the "scapose inflorescence complex", "subcomplex disjunctum". When compared to *O. disjunctum*, this new species differs by the shorter habit when in bloom (7–20 cm vs. 20–57 cm high), shorter peduncle (3–6 cm vs. 10–25 cm compr.), inflorescence simple or densely strobiliforme-compound, with primary fascicles densely arranged (vs. the basal ones laxly arranged, 1–3 cm apart from each other) and bearing fewer flowers (2 vs. 4 to 14) and by the petals larger (18–19× ca. 4.5 mm vs. 14–17×3–3.5 mm), and green throughout to greenish-white toward the apex (vs. distally white at 1/3 of their length). It can be also compared to *O. triunfense*, being distinguished by the propagation by means of short basal shoots (vs. propagating by slender rhizomes), leaf blades shorter and narrower (5–14 × 0.8–2 cm vs. 11–20 × 2–3.5 cm), adaxially glabrescent toward the apex (vs. densely white lepidote throughout), and by the petals green throughout to greenish-white toward the apex (vs. distally white at 2/5 of their length), with obtuse and emarginate apex (vs. acute).

The living holotype and paratypes descendant (cult. *E. Leme 7700*, *7339* and *F.J.S. Monteiro 135*, respectively) are cultivated in the living collection of the Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro.

Orthophytum cearense is the first *Orthophytum* record from the State of Ceará, Northeast Brazil, broadening considerably the geographical distribution of the genus and establishing a new northernmost limit, which until now were the States of Pernambuco (*O. disjunctum* and *O. triunfense*) and Paraíba (*O. disjunctum* and *O. jabrense* Baracho & J.A. Siqueira).

Orthophytum cearense was encountered growing terrestrially amidst rock outcrops in residual, disturbed, secondary Decidual Tropical Forest (mata seca) in a greatly destroyed montane area, called Serra da Mata, covering the counties of Catunda, Monhenhor Tabosa and Tamboril, in the central-western region of Ceará State, with the higher part, at Pico da Serra Branca, at 1,154 m elevation. The populations of the new species are also residual, with small groups of plants growing under dry conditions, on soil accumulated amidst rock outcrops, in partially shaded high-elevation sites in Pico do Oeste and Pico da Serra Branca.

Despite living today under dry ecological conditions, which may be, at least in part, the result of the microclimatic changes caused by original forest destruction, when growing in mesophytic condition (*e.g.* cultivated specimens), *Orthophytum cearense* may grow to triple its regular size as seen in the semiarid habitat, and develop a distinctly branched inflorescence. This increased growth potential may reflect past adaptation for survival in more humid sites that were probably available in the past, when larger traits of more humid Atlantic forest covered vast lands of the northeast territory of Brazil.

The name of this new species is a clear reference to the State of Ceará, Northeastern Brazil, where a member of the genus *Orthophytum* was discovered for the first time.

Pitcairnia L'Hér.

This genus is considered the largest in the subfamily Pitcairnioideae. According to Luther (2008), it comprises 376 taxa (including species, varieties and forms; not including members of the genus *Pepinia* Brongn. ex André, *sensu* Varadarajan & Gilmartin 1988); or it involves 423 taxa in the broad concept of Smith & Downs (1974), including all species of *Pepinia* (*sensu* Taylor & Robinson 1999). *Pitcairnia* contains a large and diverse array of species, most are rupicolous or terrestrial but a few are epiphytic. There are two main centers of diversity for the genus, the Guyana shield, where most of the species of subgenus *Pepinia* occur, and the Andes with extensions into Central America (Smith & Downs 1974).

Eastern Brazil is relatively poor in diversity of *Pitcairnia* species, with only 18 species reported for the Brazilian Atlantic coast, (Martinelli & Forzza 2006; Leme *et al*. 2009), but it contains some very peculiar taxa, most of which are restricted endemics. Despite its inexpressive occurrence in eastern Brazil, it is possible to recognize in the Atlantic Forest domain of Rio de Janeiro and Espírito Santo States, a complex of white to yellowish-white flowered *Pitcairnia* species originally composed of *P. albiflos* Herb. and *P. suaveolens* Lindl., according to Tatagiba (2003), and the latter one includes *P. flammea* var. *pallida* L.B. Sm. as synonym. More recently, Tatagiba *et al.* (2004) added two new taxa to this complex, *P. insularis* F. Tatagiba & R.J.V. Alves and *P. wendtiae* F. Tatagiba & B.R. Silva, both growing on rocky walls facing the ocean on oceanic islands or along the coastline of Rio de Janeiro State. Finally, Leme *et al* (2009) included another new species in the same complex, *P. abyssicola* Leme & L. Kollmann.

In the complex of white to yellowish-white flowered taxa, *Pitcairnia. albiflos* and *P. insularis* can be grouped by their flowers with actinomorphic corolla, along with the red-flowered *P. staminea* Lodd. Moreover, *P. suaveolens* and *P. wendtiae* can be easily recognized by their flowers with zygomorphic corolla, along with the red-flowered *P. flammea* Lindl., and its closer relatives.

In herbaria, and even in published articles and taxonomic treatments (*e.g.* Smith & Downs 1974) diverse specimens have been misidentified as *Pitcairnia flammea* var. *pallida*, when, after careful, deep analysis, some of these specimens are found to be distinct, restricted endemic, new taxa (*e.g.* Tatagiba *et. al.*, 2004). The new species described below is not an exception.

Pitcairnia capixaba Fraga & Leme, *sp. nov*. Type: BRAZIL. ESPÍRITO SANTO: Vargem Alta, Alto Pombal, 20º35'42.9"S, 40º58'13.3"W, 892 m elev., 2.III.2003, *B.R. Silva*, *C. Morado* & *R. Couto 988*, fl. cult., II.2004 (holotype RB!). Figs. 9 h-i, 10 a-m

A Pitcairnia suaveolens Lindl. *cui affinis, laminis foliorum angustioribus, scapus glabrus, bracteis floriferis distincte brevioribus altitudinem pedicellorum brevioribus vel leviter superantibus,*

floribus haud odoriferis, pedicellis brevioribus, sepalis glabris et petalis acuminatis differt; a Pitcairnia wendtiae F. Tatagiba & B.R. Silva, *cui similis, rhachidi glabra bracteis floralibus brevioribus, pedicelis glabris, sepalis longioribus ecarinatisque, petalis acuminatis et longioribus differt.*

Plant rupicolous, flowering 80–100 cm tall, propagating by stout basal shoots. Leaves ca. 10, fasciculate, monomorphic, persistent, suberect-arcuate, chartaceous; sheaths triangular, ca. 4 × 2.5 cm, light green to castaneous, sparsely covered by cinereous trichomes on both surface, entire; blades narrowly sublinear-triangular, canaliculate, slightly narrowed near the base, entire, 70–80 × 1–1.5 cm, green, sparsely and inconspicuously cinereous-lepidote on both sides, apex attenuate, acuminate-caudate. Peduncle erect, 50–60 cm long, ca. 6 mm in diameter, light green, glabrous; peduncle bracts the basal ones foliaceous and distinctly exceeding the internodes, the upper ones sublinear-lanceolate, 25–80 × 5–8 mm, equaling to shorter than the internodes, chartaceous, light green, sparsely white-lepidote abaxially, glabrous adaxially, entire, apex acuminate-caudate; inflorescence racemose, simple, erect, distinctly exceeding the leaves, 30–40 cm long, laxly to subdensely flowered, bearing at apex an inconspicuous coma of sterile bracts, rachis straight, light green, obtusely if at all angulose, glabrous; floral bracts narrowly triangular to ovate-triangular, margin denticulate, cirrose apex, 5–18 × 2–7 mm, suberect, slightly shorter to slightly exceeding the pedicels, chartaceous, green except for the yellowish-green apex, glabrous. Flowers 38 to 50, suberect to subspreading, 6–9 cm long, odorless, polistically disposed, the basal ones laxly arranged, the upper ones subdensely arranged, pedicels upwardly curved, terete, 8–20 × 1–1.5 mm, green to greenish-yellow, glabrous; sepals narrowly triangular, symmetrical, erect, apex acuminate, 27–34 × 4.5–8 mm, free, ecarinate, glabrous, chartaceous, completely yellow or sometimes greenish-yellow near the apex, the 1/3 distal segment not imbricate; petals sublinear-lanceolate, membranous, apex acuminate, 60–71 × 9.5–12.5 mm, glabrous, pale yellow near the base and yellowish-white toward the apex, erect except for the unilaterally upwardly suberect apex at anthesis, convergent over the stamens and forming a zygomorphic corolla, unappendaged; stamens included, slightly shorter than petals, 48.5–60 mm long; filaments, terete at base, slightly complanate toward the apex, yellowish-white, free; anthers linear dorsifixed near base, 8–9 mm long, yellow, base sagittate with conspicuously, acuminate lobes, apex apiculate and slightly curved; ovary 1/2 superior, ca. 6 mm long, ca. 4 mm in diameter; style 42–57 mm long; stigma conduplicate-spiral, ellipsoidal-clavate, 2.5–3 × ca. 1.5 mm, yellow, lobes ciliate-papilose; ovules caudate, ca. 0.4 mm long. Capsules unknown. **Material examinado**: BRAZIL. ESPÍRITO SANTO: Vargem Alta a Fruteira, 5.XII.1956, *E. Pereira 2291* (MBML, RB, US).

This new species is closely related to *Pitcairnia suaveolens*, differing from it by its narrower leaf blades (1–1.5 cm vs. 2–3 cm wide), glabrous scape (vs. lepidote), floral bracts distinctly shorter (5–18 mm vs. 40–70 mm long) and slightly shorter to slightly longer than the pedicels (vs. distinctly exceeding the pedicels), odorless flowers (vs. flowers fragrant), shorter flower pedicels (8–20 mm vs. 20–30 mm long), glabrous sepals (vs. lepidote), and by the acuminate petals apex (vs. broadly acute to obtuse). On the other hand, *P. capixaba* is somewhat related to *P. wendtiae*, however, it can be distinguished from it by its inflorescence with glabrous rachis (vs. densely lepidote), shorter floral bracts (5–18 mm vs. 20–40 mm long), flower pedicels glabrous (vs. subdensely lepidote), sepals longer (27–34 mm vs. 16–19 mm long) and ecarinate (vs. carinate), and by the longer petals (60–71 mm vs. 43–46 mm long) with apex acuminate (vs. subacute to rounded).

The living holotype descendant (cult. *E. Leme 6182*) is cultivated in the collection of the Rio de Janeiro Botanic Garden, as well as in Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro.

Pitcairnia capixaba is restricted to the vicinity of Vargem Alta, occurring in Semidecidual Tropical Forest in the south of Espírito Santo State, where it grows on rocky outcrops fully exposed to solar radiation. In contrast, *P. suaveolens* occurs as rupicolous along montane rivers in the vicinity of Serra dos Órgãos, in the Atlantic Rain Forest of the Rio de Janeiro State, and so protected from the direct sun light, while, according to Tatagiba *et al.* (2004), *P. wendtiae* is restricted to the vicinity of Cairuçu Peak, in the country of Paraty, south region of Rio de Janeiro State, growing nearly sea level and always on granitic outcrops exposed direct solar radiation. The species flowers in December to February, fruiting in March and April.

The specific epithet is a Brazilian Portuguese name, "capixaba", of indigenous origin, meaning fertile land and it is usually used to refer to people born in the State of Espírito Santo.

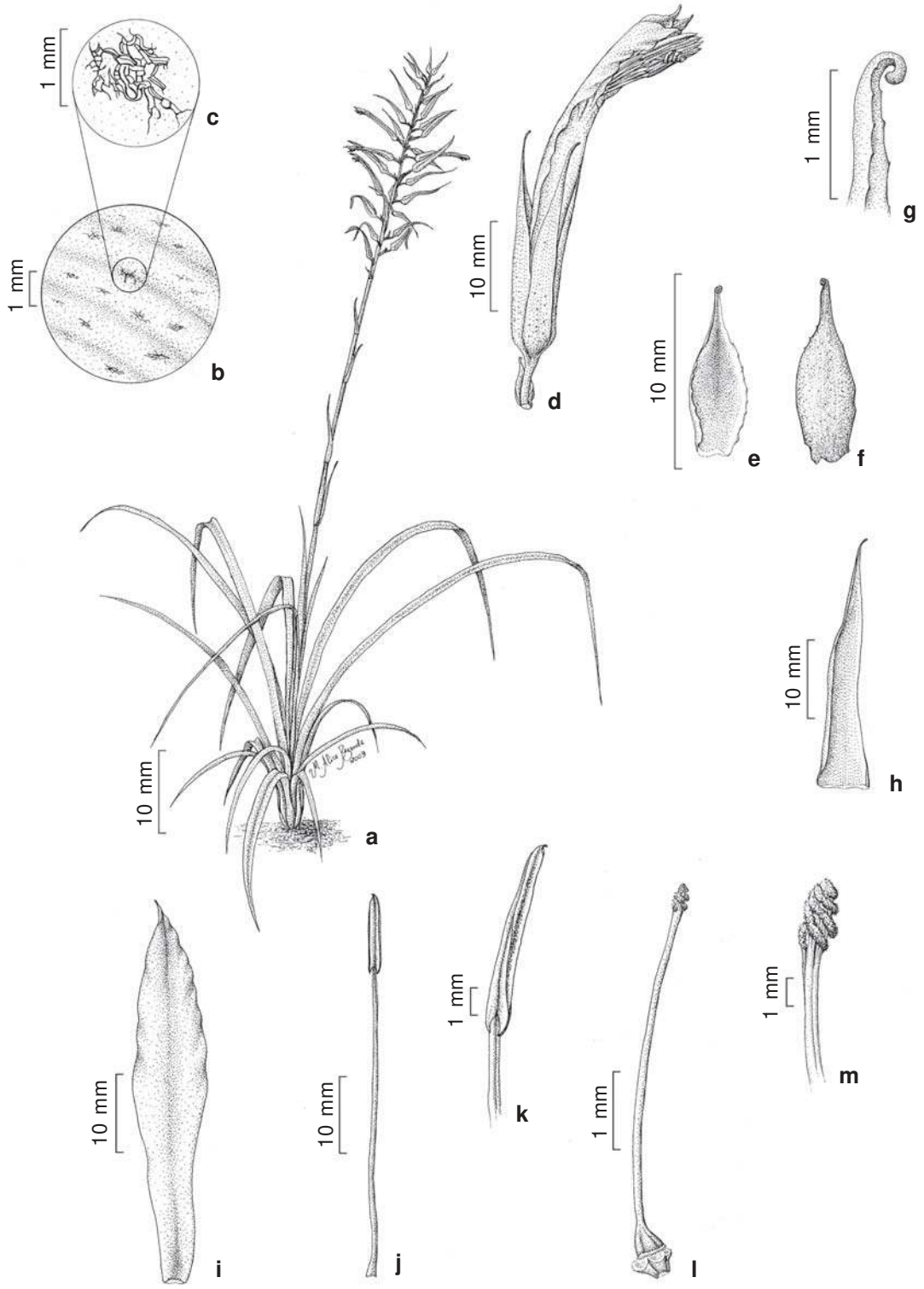

Figure 10 – *Pitcairnia capixaba* Fraga & Leme – a. habit and inflorescence; b. detail of adaxial surface of the leaf; c. detail of lepidote trichome; d. flower in side view; e. floral bracts, from above; f. floral bracts, from below; g. detail of floral bracts apex; h. sepal, from below; i. petal, from above; j. stamen, from above; k. detail of anther, from below; l. pistil; m. detail of stigma. (a-m *Silva 988*).

Tillandsia L.

Tillandsia is the largest genus in subfamily Tillandsioideae, with about 725 taxa (Luther 2008). According to the phylogenetic investigation conducted by Barfuss *et al.* (2005), the genus belongs to the tribe Tillandsieae, together with the genera *Guzmania* Ruiz & Pav., *Mezobromelia* L.B. Sm., *Racinaea* M.A. Spencer & L.B. Sm. and *Viridantha* Espejo. *Tillandsia* has six subgenera: *Tillandsia*, *Allardtia* (A. Dietr.) Baker, *Anoplophytum* (Beer) Baker, *Diaphoranthema* (Beer) Baker, *Phytarrhiza* (Vis.) Baker, and *Pseudalcantarea* Mez.

The genus is characterized by plants of a wide geographical distribution, varying greatly in habitat, size, and leaf and flower architecture. They invariably have entire leaf margins, free petals of no appendages (except for the recently transferred grayish white *Vriesea*), stigma usually conduplicate-spiral or simple-erect, rarely coralliform or with convolute blades, ovary superior, ovules generally long-caudate and seeds plumose with a straight basal appendages.

Tillandsia castelensis Leme & W. Till, *sp. nov.* Type: BRAZIL. ESPÍRITO SANTO: Castelo, proximity of the State Park of Forno Grande, ca. 1100 m elev., IX.2009, fl., *R. Vasconcelos* s.n. (holotype RB 495805!; isotype HB!). Figs. 11 a-h, 12 a-b

Species nova a Tillandsia grazielae Sucre & R. Braga*, cui affinis, foliis plus numerosis*, *basin versus manifeste angustioribus*, *laminis foliorum apicem versus filiforme-subulatis*, *bracteis floriferis glabris, rubellis*, *sepalis ecarinatis albis vel fere et petalis rubro-violaceis obtuse-emarginatis differt.*

Plant rupiculous, shortly caulescent, flowering 15–18 cm long. Leaves ca. 60, densely arranged, suberect-recurved, slightly secund, subcoriaceous toward the base; sheaths inconspicuous and not differentiated from the blades; blades narrowly triangular, canaliculate toward the base and filiform-subulate toward the apex, 6–7 cm long, ca. 0.5 cm wide at the base, distinctly shorter than the peduncle, densely and coarsely white-lepidote on both sides with trichomes adpressed and completely obscuring the color of the blades, apex long filiform-caudate. Peduncle suberect, ca. 7 cm long, ca. 0.2 mm in diameter, green, glabrous; peduncle bracts the basal ones foliaceous, the upper ones narrowly elliptic-lanceolate, apex filiform-caudate, 25–35 × 5–6 mm, including the 5–10 mm long filiform apex, base truncate, ecarinate, rose, densely to subdensely white-lepidote, membranous, finely nerved, imbricate, distinctly exceeding the internodes; inflorescence once branched, 4.5–6.5 cm long, ca. 1.5 cm in diameter, rachis slender, terete, glabrous, covered by the bracts and branches, greenish, internodes ca. 5 × 1.5–2 mm; primary bracts narrowly elliptic to obovate-elliptic, acute, apiculate-caudate (basal ones) to shortly apiculate (upper ones), ca. 25 ×9 mm, ecarinate, rose, subdensely to sparsely white-lepidote toward the apex, membranous, finely nerved, erect with the branches, equaling 1/2 to 2/3 of the branches length; branches 5 to 7, sublinear, complanate, 35–40 × 5–6 mm, erect to slightly suberect-secund, densely arranged, bearing 2 or 3 flowers, stipes ca. 4 × 2 mm, greenish, glabrous; floral bracts narrowly elliptic-lanceolate, apex acute and minutely apiculate, 20–25 × ca. 8 mm, base truncate, ecarinate, rose, glabrous, membranous, finely nerved, equaling to exceeding the petals, imbricate before anthesis and afterwards. Flowers ca. 23 mm long, anthesis diurnal, odorless, erect, distichously arranged, pedicels inconspicuous, ca. 1.5 mm long, green, glabrous; sepals narrowly lanceolate, acute, ca. 14 × 4 mm, glabrous, whitish, finely nerved, ecarinate, membranous, the adaxial ones connate at base for ca. 2 mm, the abaxial one free; petals sublinear, slightly broader toward the apex, apex obtuse-emarginate, suberect-recurved at anthesis, 21 × 2.7–ca. 3 mm, free, reddish-purple in the visible parts, naked. Stamens slightly shorter than the calyx; filaments flat, membranous, hyaline, not plicate at anthesis; anthers linear, ca. 2 mm long, base and apex obtuse, dorsifixed near the base; pollen ellipsoid, sulcate, exine reticulate, lumina polygonal, muri narrowed; stigma conduplicate, hyaline-whitish. Capsules unknown.

Tillandsia castelensis is a member of subgenus *Anoplophytum*, closely related to *T. grazielae.* However, based on the data provided by Sucre & Braga (1975) and Ehlers (1997), this new species differs from the closer relative by the more numerous leaves (ca. 60 vs. ca. 25), distinctly narrower toward the base (ca. 0.5 mm vs. ca. 1.5 mm wide at base), leaf blades filiform-subulate toward the apex (vs. triangulate and acute), glabrous floral bracts (vs. white lepidote), rose, sepals ecarinate (vs. carinate) and white or nearly so (vs. rose) and by petals reddish-purple (vs. lilac-rose) and obtuse-emarginate (vs. subacute to rounded).

Tillandsia castelensis grows as a rupicolous in full exposed, vertical rock surfaces in the domain of the Atlantic Forest of Castelo, Espírito Santo

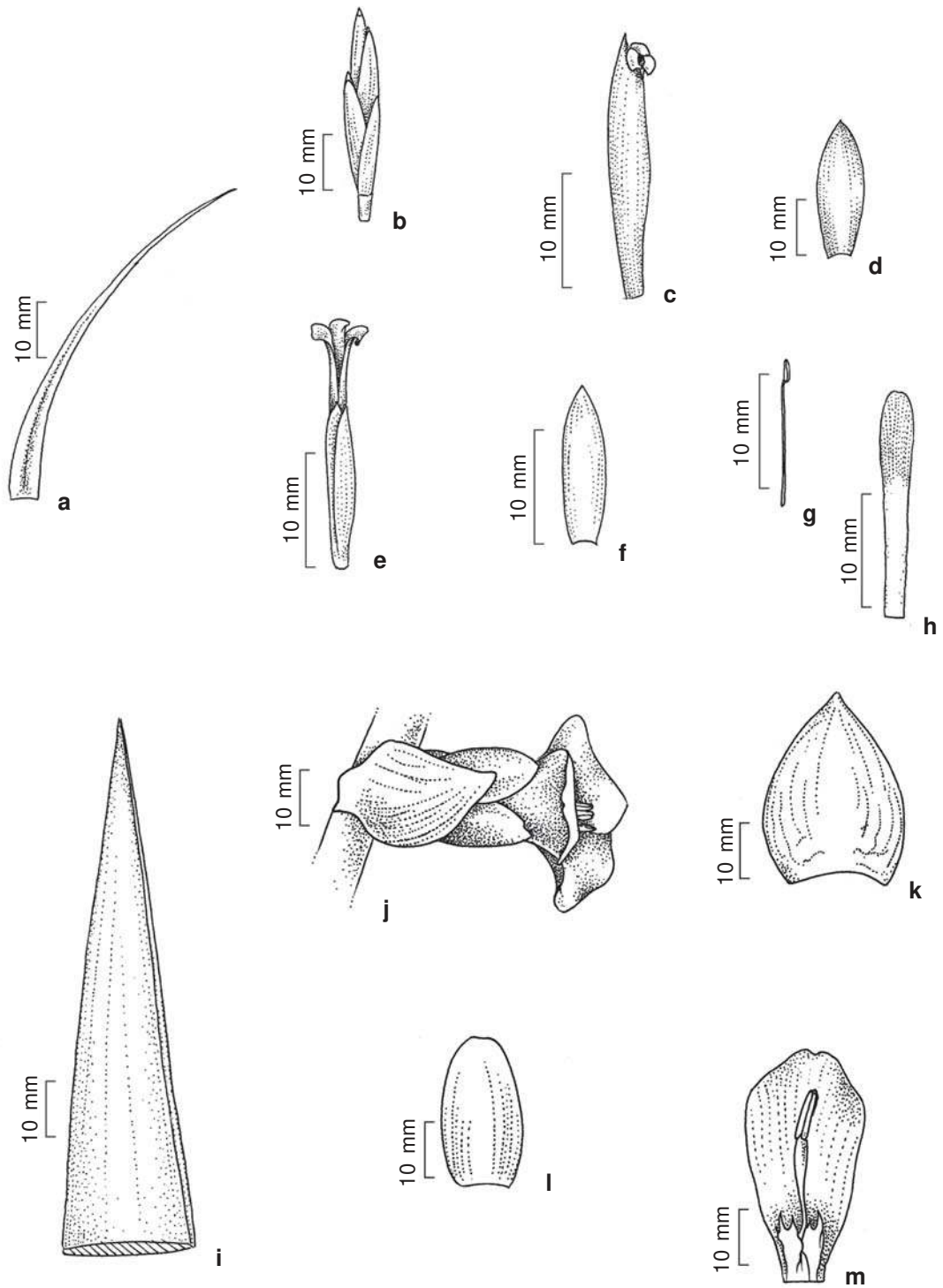

Figure 11 – a-h. *Tillandsia castelensis* Leme & W. Till. – a. leaf, adaxial view; b. basal primary bract; c. inflorescence; d. branche of the inflorescence, and flower in side view; d. floral bracts, from above; e. flower in side view; f. sepal, from below; g. stamen in side view; h. petal, from above. i-m. *Vriesea euclidiana* Leme & G. K. Br. – i. leaf apex, adaxial view; j. floral bracts, from below; k. flower in side view; l. sepal, from above; m. petal and stamen, from above. (a-h *Vasconcelos s.n.* (RB 495805); i-m *Colnago s. n.* (HB)).

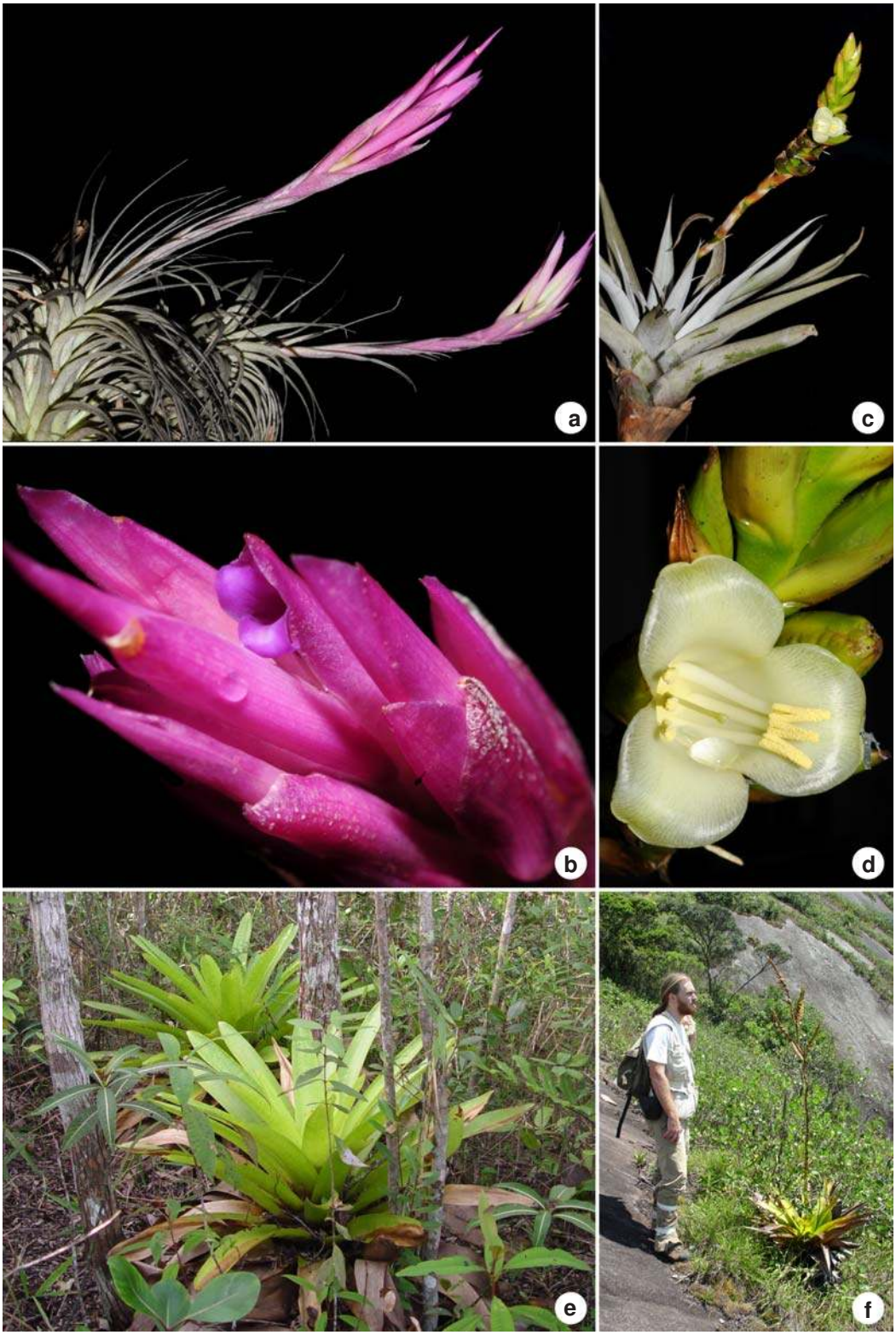

Figure 12 – Habit and detail of the inflorescence and flowers. a-b. *Tillandsia castelensis* Leme & W. Till. c-d. *Vriesea euclidiana* Leme & G.K. Br. e-f. *V. fontanae* Fraga & Leme – e. in the field; f. habit and inflorescence of *V. fontanae* and the botanist André Paviotti Fontana honored with the name of this new species (Pictures: a-d. E. Leme; e. A. Fontana; f. C. Esgario).

State, not far from the State Park of Forno Grande. Its populations is scattered in the area, with few to many individuous forming relatively sparse to dense group of plants. The presence of this new species in the limits of the State Park of Forno Grande, despite probable, is yet not known.

The specific name of *Tillandsia castelensis* is a reference to the county of Castelo, Espírito Santo, where it was originally discovered.

Vriesea Lindl.

This genus is the second largest in subfamily Tillandsioideae, with 306 taxa (Luther 2008). Barfuss *et al*. (2005) included the genus *Vriesea* in tribe *Vrieseae* W. Till & Barfuss, together with the genera *Alcantarea* (E. Morren ex Mez) Harms and *Werauhia* J. R. Grant. Brazil is the home of the largest number of *Vriesea* species, from Amazon to the southern part of the country.

Vriesea is characterized by plants with entire leaves, ovary superior or nearly so, petals free or shortly connate at the base, usually bearing two well-developed petal appendages. It is presently organized into sections *Vriesea* and *Xiphion* (E. Morren) Wawra ex Wittm., *sensu* Smith & Downs (1977). The typical section is characterized by plants with diurnal anthesis, bracts and calyces bright colored, odorless flowers, tubular corolla usually associated with bird pollination, and stamens often exserted. Section *Xiphion* includes species with nocturnal anthesis, pale colored bracts and calyces, scented flowers, campanulate corolla associated to bat pollination, and stamens often included.

Vriesea euclidiana Leme & G.K. Br., *sp. nov.* Type: BRAZIL. ESPÍRITO SANTO: Colatina, Itapina, near to Rio Doce bank, VI.2003, fl., *E. Colnago s.n.* (holotype HB!; isotype RB 477704!).

Figs. 11 i-m, 12 c-d

Species nova a Vriesea harrylutheri Leme & G.K. Br., *cui proxima, laminis foliorum suberecto-arcuatis vel patentibus et basin versus distinctly canaliculatis, inflorescentia breviora, apice acuminato, bracteis floriferis medio sepalorum aequantibus differt; a* Vriesea appariciana E. Pereira & Reitz *cui affinis, laminis foliorum albo-cinereis, inflorescentia longiora, floribus majoribus, sepalis et petalis longioribus differt.*

Plant lacking rhizomes, flowering 60–80 cm tall. Leaves 15 to 20, rosulate, thickly coriaceous, forming a broad funnelform rosette at base; sheaths ovate-elliptic to broadly elliptic, suberect, 11–13 × 9–12 cm, very densely brown-lepidote on both sides, pale to dark castaneous; blades narrowly triangular, acuminate-caudate, canaliculate toward the base, suberect-arcuate to spreading, 25–30 cm long, 5–6 cm wide at base, white-cinereous due to the green color completely obscured by a dense layer of coarsely white-cinereous trichomes on both sides, finely nerved mainly abaxially, margins distinctly truncate, ca. 2 mm thick, densely and coarsely white-lepidote. Peduncle nearly erect, 30–45 cm long, 0.8–1 cm in diameter, green, glabrous, not sulcate at anthesis; peduncle bracts the basal ones subfoliaceous, the upper ones broadly ovate, acuminate-caudate to acute and shortly acuminate, 3.5–4.5 × ca. 2 cm, erect, distinctly exceeding the internodes, imbricate, densely and coarsely white-lepidote toward the apex and outside, strongly nerved-sulcate at anthesis, castaneous toward the base, stramineous toward the apex; inflorescence simple, sublinear before anthesis, suberect-ascending, the upper portion forming an angle of ca. 45° in relation to the scape, linear in outline with apex acute before and at anthesis, 20–25 × 3–4 cm, distichously 15- to 21-flowered; rachis 8–10 mm in diameter, stout, flexuous, green to dark purple, glabrous, angled, sulcate after anthesis, internodes 10–13 mm long; floral bracts broadly ovate, acuminate to acute, 30–35 × 25–26 mm, densely white-lepidote near the apex only, ecarinate, not imbricate and secund with the flowers at anthesis, divergent-arranged and slightly inbricate before anthesis, coriaceous, lustrous toward the base, greenish toward the base before anthesis, mainly the basal ones strongly and coarsely corrugate-sulcate at anthesis, stramineous after anthesis, bearing decurrent auricles at base, about equaling 1/2 of the sepals length. Flowers ca. 50 mm long, anthesis nocturnal, producing a mucilagenous material which partially covers its base and dry, as well as a fruit-like fragrance, very densely and divergent-erect before anthesis, densely arranged and distinctly secund at anthesis, pedicel ca. 10 mm long, ca. 9 mm in diameter at apex, stout, green, glabrous; sepals oblong-elliptic, distinctly emarginate, 25–29 × 14–15 mm, green except for the purplish-red margins and apex, glabrous outside, inconspicuously and minutely lepidote inside and producing an abundant mucilaginous substance, ecarinate, thickly coriaceous near the base, apical margins somewhat membranous; petals obovate, apex broadly emarginate, spreading-recurved at anthesis, ca. 42 × 19–21 mm, greenish-

white, thicker toward the base, bearing at base 2 subspatulate, irregularly long-dentate, ca. 13 × 3 mm appendages, basally adnate to the petals for ca. 6 mm, corolla ca. 35 mm in diameter; filaments free, ca. 25 ×2 mm; anthers 7–8 mm long, dorsifixed near the base, base sagittate and apex obtuse, 3 of them disposed on each lateral side of the corolla at anthesis; pollen ellipsoid, sulcate, exine reticulate, lumina broadly rounded, muri narrowed; stigma tubolaciniate, margins long digitate-laciniate, ca. 1.5 mm in diameter, green; ovules caudate. Capsules unknown.

Material examinado: BRAZIL. ESPÍRITO SANTO: Colatina, Itapina, 19º31'42"S, 40º51'33"W, 15.VIII.2003, fl., *E. Leme et al. 5919* (HB, RB).

Vriesea euclidiana is a member of the *V. appariciana* complex, being closely related to *V. harrylutheri*, differing from it by the leaf blades suberect-arcuate to spreading (vs. strongly reflexed), distinctly canaliculated toward the base (vs. flat toward the base), inflorescence shorter (20–25 cm vs. ca. 35 cm) with an acuminate apex (vs. apex composed by an obtuse crest of bracts), and by floral bracts about equaling the midpoint of the se pals (vs. equaling 2/3 of sepals length). It is possible to point out some resemblance with *V. appariciana*, but the new species can be distinguided by leaf blades white-cinereous (vs. grayish-green), inflorescence longer (20–25 cm vs. 12–20 cm long), flowers longer (ca. 50 mm long vs. ca. 40 mm long), sepals longer (25–29 mm vs. 20–23 mm long), and by petals longer (ca. 42 mm vs. 32–35 mm long).

The living holotype descendant (cult. *E. Leme 5712*) is cultivated in the collection of the Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro.

This new species occupies habitats similar to those of its closest relatives, forming large populations that are rupicolous on steep rock walls in the Atlantic Forest. Known populations, despite being relatively close to the large river, Rio Doce, are comparatively dry, and the amazing white-cinereous leaves of *Vriesea euclidiana* appear to be an adaptation to full sun-light exposure and severe water stress. It shares its habitat with species of Cactaceae, as well as large population of *Alcantarea* sp. and *Orthophytum estevesii* (Rauh) Leme.

Vriesea euclidiana is named after the bromeliad and orchid collector, Euclidio José Colnago, who has introduced in cultivation many new and unusual bromeliad species, mainly from the State of Espírito Santo where he lives and keeps a biologically rich living collection.

Vriesea fontanae Fraga & Leme, *sp. nov.* Type: BRAZIL. ESPÍRITO SANTO: São Roque do Canaã, Alto Misterioso, floresta ombrófila densa altomontana com inselbergue, 19°48'11.8"S, 40°46'13.7"W, 1143 m elev., 19.III.2004, *C.N. Fraga; A.P. Fontana & L. Kollmann 1164* (holotype RB!; isotype MBML!). Figs. 13 a-k, 12 e-f

Species nova a Vriesea hydrophora Ule*, cui proxima, laminis foliorum apice mucronatis pungentibusque, ramis lateralibus manifeste longioribus, bracteis floriferis majoribus, floribus plus numerosis, pedicellis papillosis differt.*

Plant saxicolous or terrestrial, heliophyte, flowering ca. 2 m high. Leaves ca. 25, densely rosulate, suberect, forming a crateriform rosette; sheaths elliptic, 20–21 × ca. 16 cm, densely and minutely castaneous-lepidote on both sides, coriaceous, dark castaneous on both sides; blades sublinear, attenuate toward the apex, 48–67 × 11.8–12.5 cm, not narrowed at base, greenish-glaucous with darker green irregular cross-veins mainly by transmitted light, thinly coriaceous, sparsely and inconspicously white-lepidote and covered on both sides by a thin layer of white wax, apical margins not revolute, apex subacute and mucronate, pungent. Peduncle stout, ca. 145 cm long, 1.5–2.5 cm in diameter, erect, glabrous or nearly so, greenish to wine colored; peduncle bracts the basal ones subfoliaceous, the upper ones broadly ovate to sub-orbiculate, acuminate to acute and mucronate, 5–10 × 5–5.5 cm, suberect and enfolding the peduncle, exceeding to shorter than internodes, green to castaneous toward the apex on both sides, inconspicuously and sparsely white-lepidote inside; inflorescence paniculate, densely bipinnate, ca. 90 cm long, 45–50 cm in diameter, erect, rachis flexuous, 1–1.5 cm in diameter, glabrescent, greenish to wine colored, internodes 6–8 cm long; primary bracts suborbicular, 4.5–5 × 4–4.6 cm, greenish-yellow to yellow, suberect, equaling to slightly exceeding the stipes; branches 5 to 9 in number (including the terminal one), the lateral ones 23–34 × 3–4.5 cm (excluding the petals), suberect, densely flowered at anthesis, bearing 16 to 22 flowers, rachis straight, stout, ca. 0.5 × 0.8 cm, green, inconspicuous sparsely white-lepidote, obtusely angulose, partially covered by the bracts mainly before anthesis, stipes 8.5–11 × 0.5–0.6 cm, subcomplanate, green, glabrous, bearing 2 sterile bracts greenish-yellow at the base and a single sterile bract at apex, the terminal branch erect, 13–15 cm long, 15 to 28-flowered, basal peduncle 13–15 × 0.7–0.8 cm, stout,

straight, green, inconspicuous sparsely white-lepidote, bearing 3 sterile bracts almost covering the stipe; floral bracts suborbicular, 35–39 × 22–27 mm, apex acuminate to acute and mucronate, castaneous at the base to yellow toward the apex, inconspicuously and sparsely white-lepidote inside, lustrous and glabrous outside, not completely enfolding the sepals and about equaling 1/2 to 3/4 of its length, distinctly convex, distichous, bearing an apical protruded central nerve and appearing carinate toward the apex. Flowers distichous and strongly downwardly secund at nocturnal anthesis, densely arranged, 58–60 mm long, pedicels stout, 10–12 mm long, 9–10 mm in diameter at apex, green, papillate; sepals elliptic-lanceolate, apex acute, 35–36 × 12–14 mm, inconspicuously white-lepidote inside, glabrous outside, free, ecarinate, yellow, distinctly convex, thinly coriaceous toward the apex, thick at base; petals narrowly elliptic, apex narrowly emarginate, 39–41 × 13–15 mm, connate at base for 4–5 mm, yellowish, erect to slightly suberect and forming a tubular corolla ca.10 mm in diameter at apex, bearing at base 2 suboblong to obovate, acute, subobtuse to obtusely and irregularly bidentate, 6–9 × 1.7–2 mm appendages, adnate to the petals for 4–5 mm; stamens included in the petals; filaments subcomplanate and slightly delated near the apex, yellowish, adnate to the petals for 4–5 mm; anthers linear, 10–11 mm long, base sagittate and apex obtuse, fixed near the base, gynoecium the same size of the petals; ovary ovate, 5–6 mm long, ovules numerous; style terete, 34–35 mm long; stigma convolute-bladed, densely papillose, yellow, 1–1.5 mm in diameter; ovules long caudate. Capsules narrowly ovoid, acuminate, 38–40 × 0.9–1 mm.

Material examinado: BRAZIL. ESPÍRITO SANTO: Santa Leopoldina, Luxemburgo, 15.III.2005, fl. e fr., *A.P. Fontana et al. 1147* (MBML). Santa Teresa, Distrito de 25 de Julho, 29.IV.2005, fr., *A.P. Fontana et al. 1411* (MBML). Valsugana Velha, propriedade do Dr. Pedro, 2.VIII.2005, fr., *A.P. Fontana & C. Esgario 1638* (MBML). São Roque do Canaã, Alto Misterioso, 19°48'10.3"S, 40°46'19.2"W, 30.I.2007, fl. e fr., *C. Esgario et al. 127* (MBML).

This new specie resembles *Vriesea hydrophora* due to its flowering size ca. 2 m high, leaves ca. 90 cm long, inflorescence ca. 145 cm long and flowers with included stamens. However, *V. fontanae* differs from its closer relative by leaf blades with subacute, mucronate and pungent apex (vs. apex subrounded, broadly apiculate and soft in texture), inflorescence with longer lateral branches (23–34 cm long vs. ca. 20 cm long) and more numerous flowers (16 to 22 vs. 14 to 16), stipes bearing 2 sterile bracts (vs. 1 sterile bracts), terminal branch with stipes bearing 3 sterile bracts (vs. 2 sterile bracts), floral bracts longer (35–39 mm vs. ca. 34 mm long), flowers with papillate pedicels (vs. smooth and glabrous pedicels), and sepals 35–36 mm long (vs. 34 mm long).

Vriesae fontanae grows in the same ecological condition of the *V. hydrophora*, being confined to the higher parts of the mountain, 900–1,400 m elevation, where the saxicolous vegetation mats on inselbergs. In contrast, the distribution of *V. hydrophora* is centered in the mountainous region of the Rio de Janeiro State (Teresópolis and Nova Friburgo), while the distribution of *V. fontanae* is located in the mountainous region of the Espírito Santo State (São Roque do Canaã, Santa Leopoldina and Santa Teresa).

The name of the new species honors the botanist André Paviotti Fontana, who has made very important contributions to the knowledge of the flora of Espírito Santo State, Brazil.

Vriesea multifoliata Leme & G.K. Br., *sp. nov.* Type: BRAZIL. ESPÍRITO SANTO: Serra, próximo a BR 101, Morro do Vilante, 20º06'13"S, 40º19'30"W, ca. 290 m elev., *R. Oliveira s.n.*, fl. cult. IX.1997 (holotype RB 495804!; isotype MBML!).

Figs. 14 a-g, 15 a-b

Species nova a Vriesea harrylutheri Leme & G.K. Br. *et* Vriesea appariciana E. Pereira & Reitz, *quibus affinis, foliis plus numerosis, laminis foliorum angustioribus, marginibus haud distincte truncatis, bracteis floriferis ecarinatis, medium sepalorum aequantibus, ovulis caudatis differt.*

Plant lacking rhizomes, flowering 45–60 cm tall. Leaves 28 to 45, densely rosulate, subcoriaceous, forming a narrow funnelform rosette at base; sheaths narrowly elliptic, suberect, 6–7.5 ×4–4.5 cm, densely brown-lepidote; blades narrowly triangular, acuminate-caudate, distinctly canaliculate, suberect to spreading at anthesis, 17–25 cm long, 2–2.5 cm wide at base, dark green but color almost completely obscured by a very dense layer of cinereous trichomes mainly abaxially, margins not truncate and less than 0.5 mm thick. Peduncle suberect to nearly spreading, 35–40 cm long, 0.5–0.6 cm in diameter, dark-green, glabrous; peduncle bracts the basal ones foliaceous, the upper ones ovate, acute and apiculate, 2.7–3 × ca. 2 cm, erect and almost completely enfolding the scape, slightly exceeding the internodes, inconspicuously white-lepidote, distinctly nerved-sulcate, dark brown

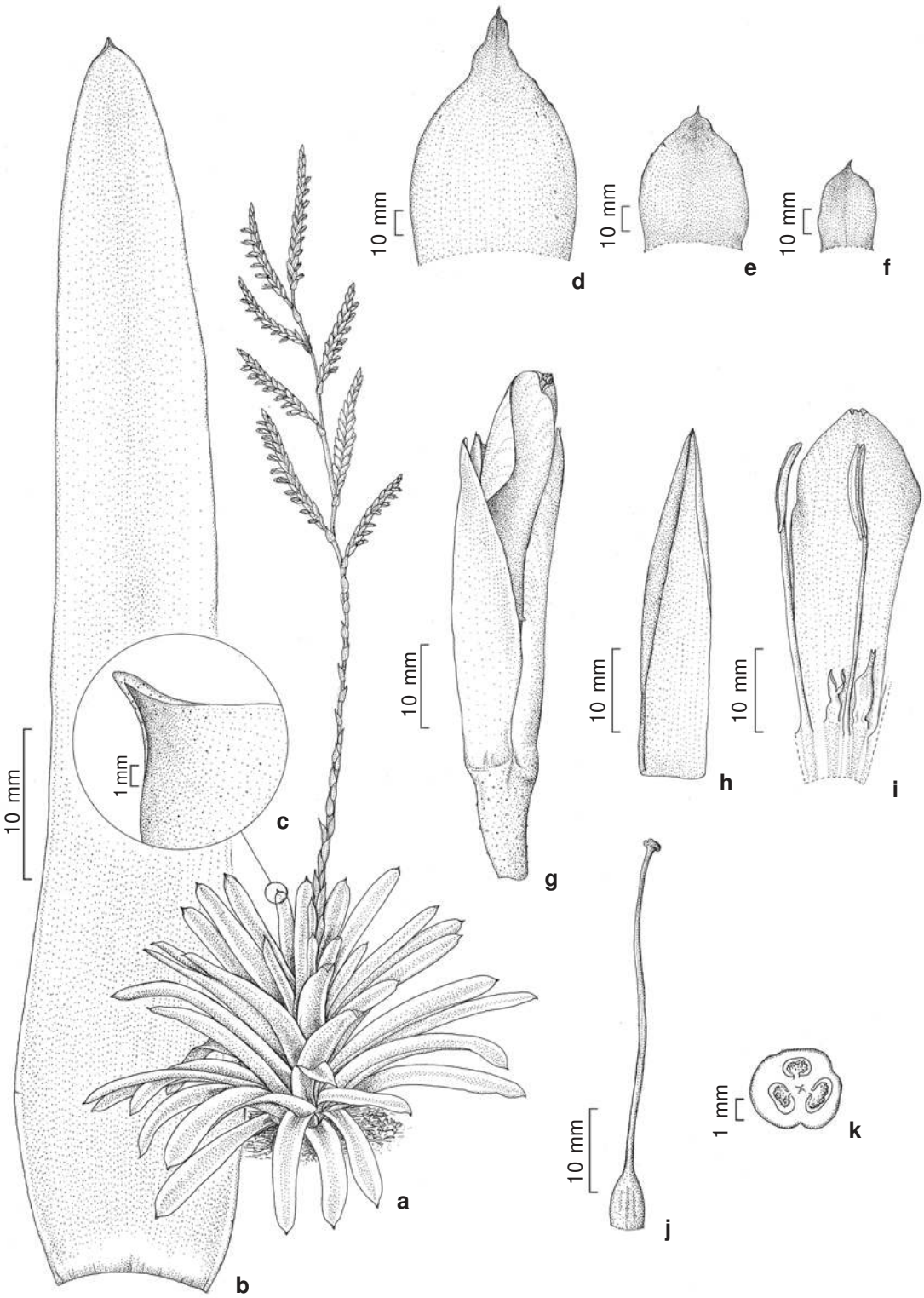

Figure 13 – *Vriesea fontanae* Fraga & Leme – a. habit and inflorescence; b. leaf, adaxial view; c. detail of leaf apex; d. peduncle bracts, from above; e. primary bracts, from above; f. floral bracts, from above; g. flower in side view; h. sepal, from below; i. petal and stamens, from above; j. pistil; k. cut of ovary. (a-k *Fraga 1164*).

toward the base, paleaceous toward the apex; inflorescence simple, suberect-ascending toward the apex, sublinear, 10–15 × ca. 2.5 cm, distichously 9- to 11-flowered, rachis ca. 6 mm in diameter, stout, flexuous, slightly angled, green, glabrous; floral bracts broadly ovate, acute, 26–30 × ca. 23 mm, sparsely and minutely white-lepidote to glabrous, ecarinate, slightly incurved and secund with the flowers, dark purplish-green, strongly sulcate mainly toward the apex in late anthesis, without decurrent auricles at base, about equaling the midpoint of the sepals. Flowers 40–45 mm long, anthesis nocturnal, producing an odor somewhat related to garlic, densely arranged and divergent-erect before anthesis, subdensely arranged and distinctly secund at anthesis, pedicel 8–9 mm long, stout; sepals elliptic, emarginate, 24–25 × 13–15 mm, green with purplish margins, glabrous adaxially, very inconspicuously lepidote abaxially, ecarinate, thick near the base; petals obovate, apex broadly emarginate, spreading at anthesis, 37–38 × 17–18 mm, pale yellowish-green, bearing at base 2 slightly asymmetric, subobovate, long acuminate to bidentate, ca. 11 × 2.5–3 mm appendages basally adnate to the petals for ca. 5 mm, corolla 27–30 mm in diameter; filaments free, slightly complanate, 23–27 × ca. 1.5 mm; anthers 6–8 mm long, dorsifixed near the base, base and apex obtuse, 3 of them disposed on the basal portion of the corolla and the other 3 on the lateral side of the corolla at anthesis or 3 of them disposed in opposite sides of the corolla; pollen ellipsoid, sulcate, exine reticulate, lumina broadly rounded, muri narrowed; stigma tubolaciniate, irregularly and minutely crenulate, green, ca. 2 mm in diameter; ovules caudate. Capsules unknown.

As a member of the *Vriesea appariciana* complex, *V. multifoliata* is a closer relative of *V. harrylutheri* and *V. appariciana*, but can be easily distinguished from them. In comparison to *V. harrylutheri*, this new species differs by the more numerous leaves (28 to 45 vs. 18 to 29), distinctly narrower leaf blades (2–2.5 cm vs. ca. 6.5 cm wide at base) with margins not truncate and less than 0.5 mm thick (vs. margins truncate, ca. 2 mm thick), floral bracts ecarinate (vs. obtusely carinate), equaling 1/2 of sepals length (vs. equaling 2/3), and by the caudate ovules (vs. apiculate to shortly caudate). When compared to *V. appariciana*, this new species is distinguished by the more numerous leaves (28 to 45 vs. 20 to 22), distinctly narrower leaf blades (2–2.5 cm vs. 3.5–5 cm wide at base) with margins not truncate (vs. margins truncate, ca. 1 mm thick), floral bracts ecarinate equaling 1/2 of sepals length (vs. equaling 2/3), and by the caudate ovules (vs. apiculate to shortly caudate).

The living holotype descendant (cult. *E. Leme 3484*) is cultivated in the collection of the Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro.

Vriesea multifoliata grows in the same ecological conditions as its closer relatives, being rupiculous on steep rock surfaces in the Atlantic Forest, in the county of Serra, Espírito Santo State. Not far from the habitat where this new species was collected, a huge population of *V. harrylutheri* was observed sharing its habitat with *V. plurifolia* Leme.

The name chosen for *Vriesea multifoliata* is a reference to its unusual number of leaves per rosette, which allows the easily identification of the species.

Vriesea sanctateresensis Leme & L. Kollmann, *sp. nov.* Type: BRAZIL. ESPÍRITO SANTO: Santa Teresa, Toma Vento, ca. 910 m elev., 14.VIII.2001, *L. Kollmann & E. Bausen 4350* (holotype HB!; isotype MBML!). Figs. 14 h-n, 15 c-d

A Vriesea fontellana Leme & G.K. Br., *cui affinis, planta duplo breviore, foliis parum numerosis, laminis foliorum brevioribus, bracteis floriferis late ovatis, apice acutis apiculatisque differt.*

Plant lacking rhizomes, flowering 25–30 cm tall. Leaves 10 to 12, densely rosulate, subcoriaceous, forming at base a narrow funnelform rosette; sheaths broadly obovate, suberect, ca. 7 × 5.2 cm, dark colored mainly adaxially, densely brown lepidote; blades narrowly subtriangular, acute and distinctly apiculate-caudate, suberect with spreading apex, slightly canaliculate, 7–9 × 2.5–3 cm, densely to subdensely covered by white trichomes on both sides, obscuring the green to reddish-green color of the blades, margins inconspicuously truncate, ca. 0.5 mm wide, reddish. Peduncle erect to suberect, 17–19 cm long, ca. 0.4 cm in diameter, dark greenish-purple, glabrous; peduncle bracts erect, broadly ovate, acute and apiculate, green to greenish-purple near the apex, laxly to subdensely white-lepidote near the apex, glabrous elsewhere, exceeding the internodes, the upper ones slightly inflated toward the apex; inflorescence simple, suberect, sublinear in outline, ca. 7 × 1.8 cm, distichously 6-flowered, rachis ca. 5 mm in diameter, flexuous, slightly angled, green, glabrous; floral bracts broadly ovate, acute and apiculate, 27–30 × 21–22 mm, glabrous, lustrous, smooth or nearly so at anthesis, ecarinate, slightly convex, thin in texture, green, truncate at base, equaling to exceeding the sepals but not enfolding

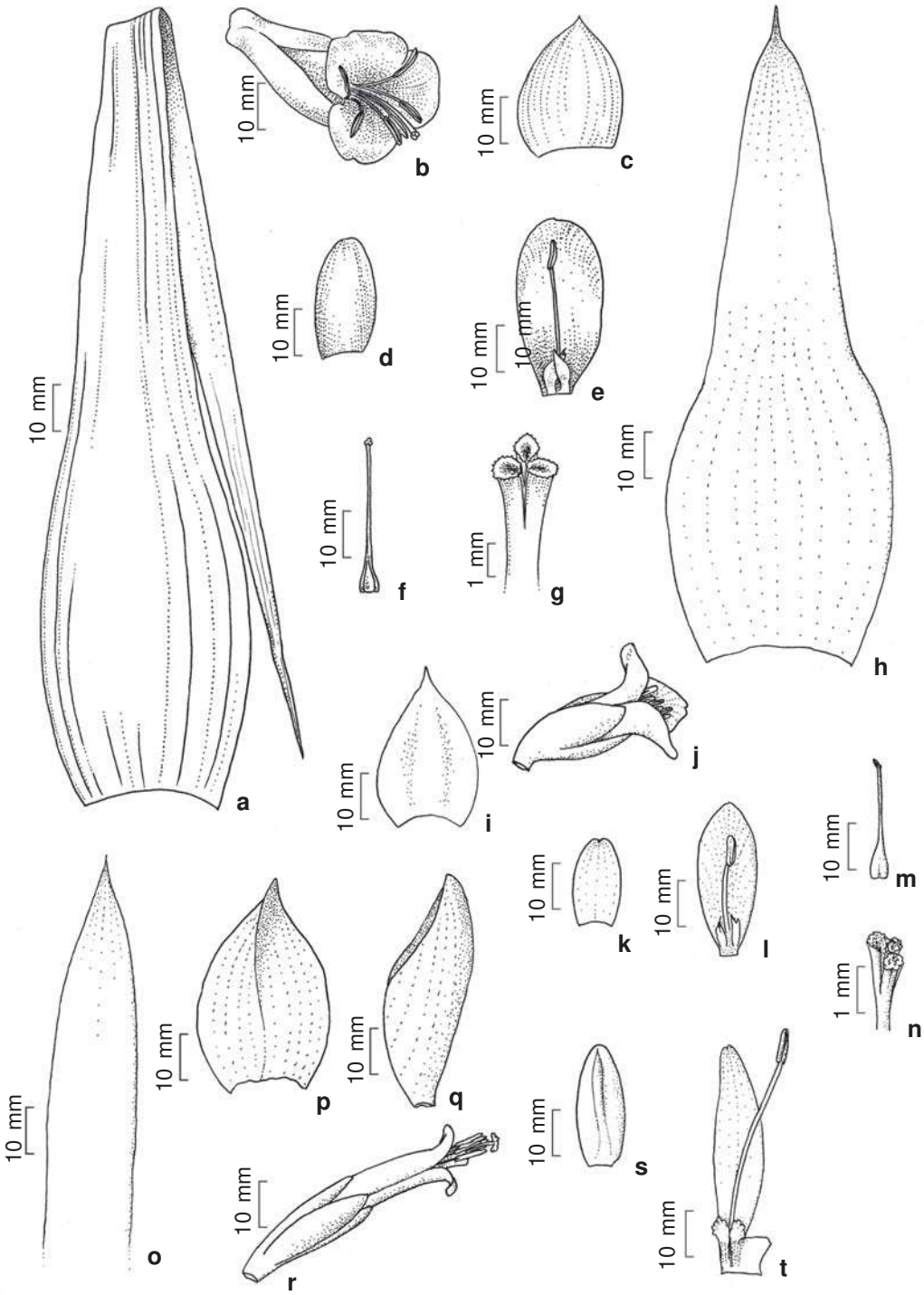

Figure 14 – a-g. *Vriesea multifoliata* Leme & G.K. Br. – a. leaf, adaxial view; b. flower in side view; c. floral bracts, from above; d. sepal, from below; e. petal and stamen, from above; f. pistil; g. detail of the stigma. h-n. *V. sanctateresensis* Leme & L. Kollmann – h. leaf, adaxial view; i. floral bracts, from above; j. flower in side view; k. sepal, from above; l. petal and stamen, from above; m. pistil; n. detail of the stigma. o-t. *V. teresopolitana* Leme – o. leaf apex, adaxial view; p. floral bracts, from below; q. floral bracts in side view; r. flower in side view; s. sepal, from below; t. petal and stamen, from above. (a-g *Oliveira s.n.* (RB 495804); h-n *Kollmann 4350*; o-t *Leme 6224*).

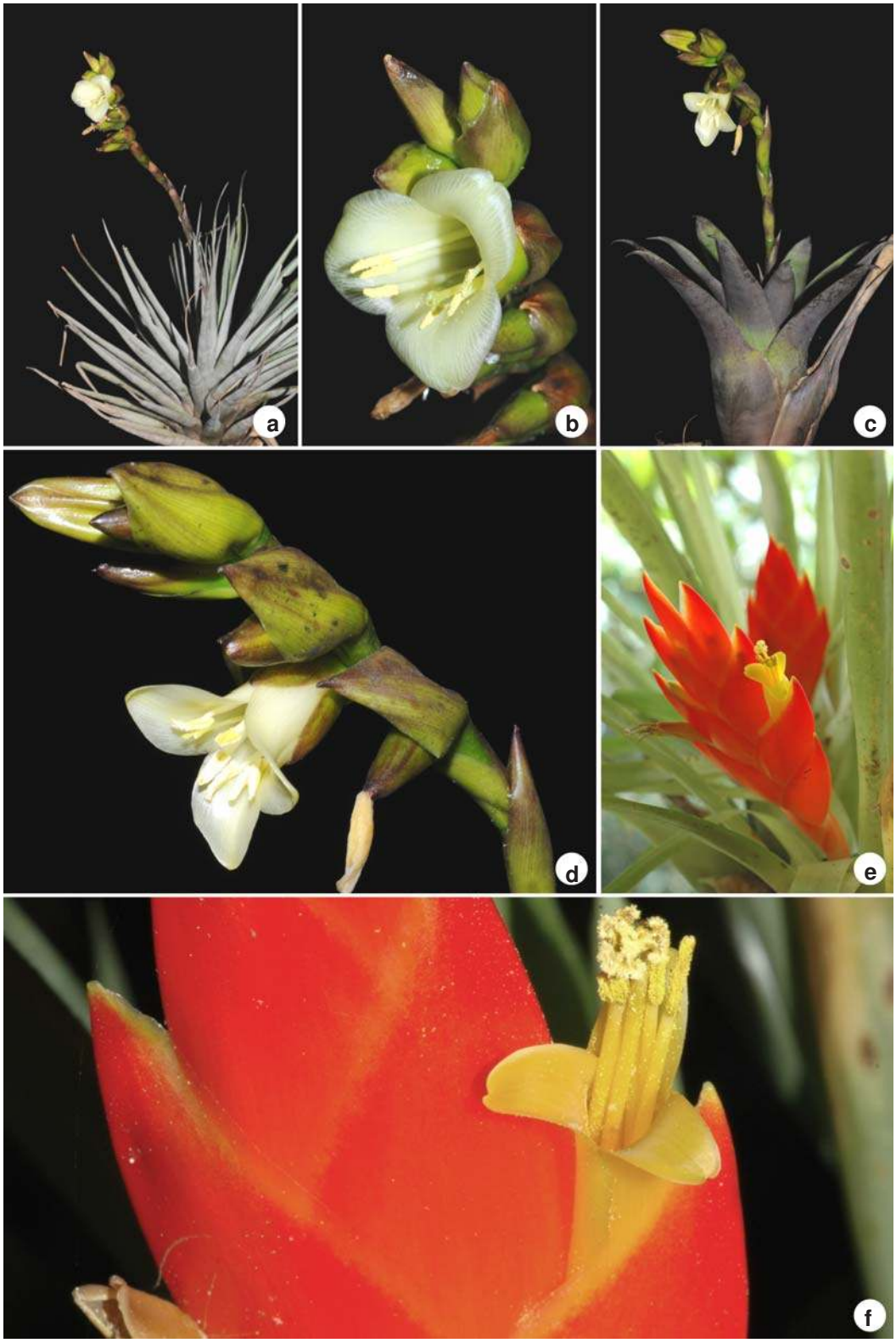

Figure 15 – Habit and detail of the inflorescence and flowers. a-b *Vriesea multifoliata* Leme & G.K. Br. c-d – *V. sanctateresensis* Leme & L. Kollmann. e-f *V. teresopolitana* Leme (photos: E. Leme).

them, slightly suberect-secund. Flowers ca. 40 mm long with petals extended, anthesis nocturnal, scented, densely arranged and secundly erect at anthesis, pedicels ca. 5 mm long, ca. 6 mm in diameter at apex, ca. 4 mm in diameter at base, green, lustrous; sepals oblong-elliptic, obtuse to emarginate, 17–18 × ca. 10 mm, green except for the dark purplish apex, glabrous, lustrous, strongly convex and cymbiform, ecarinate, thickly coriaceous toward the base; petals narrowly spatulate, apex obtuse-cucullate to slightly emarginate, ca. 33 × 12 mm, pale greenish-yellow, spreading at anthesis and forming a campanulate corolla ca. 25 mm in diameter, bearing at base two lanceolate, slenderly acuminate to bidentate, ca. 8 × 3 mm appendages, adnate to the petals for ca. 5 mm; stamens radially disposed at anthesis, shorter than the petals; filaments not dilated, ca. 1 mm in diameter, subterete, the antesepalous ones slightly if at all flexed about 1/3 of its length above the base, the antepetalous ones straight; anthers ca. 6 mm long, dorsifixed near the base, base and apex both obtuse, straight; stigma tubolaciniate, inconspicuously crenulate-denticulate, green; ovules shortly caudate. Capsules unknown.

Vriesea sanctateresensis is the smaller, more delicate species within the *V. appariciana* complex, closely related to *V. fontellana*. However, this new species differs from the closer parent by its distinctly smaller size (25–30 cm vs. ca. 70 cm high), the reduced number of leaves (10 to 12 vs. 20 to 30), shorter leaf blades (7–9 cm vs. 11–15 cm long), broadly ovate floral bracts (vs. orbicular or nearly so) with apex acute and apiculate (vs. obtuse).

The living type (cult. E. Leme 6706) is cultivated in the living collection of the Refúgio dos Gravatás, in Teresópolis, Rio de Janeiro.

The habitat of *Vriesea sanctateresensis* is similar to the members of *V. appariciana* complex. It lives as rupiculous on vertical granitic walls in humid watersheds in Atlantic Forest, in Morro do Toma Vento, in Santa Teresa, Espírito Santo.

The name of *Vriesea sanctateresensis* honors the city of Santa Teresa, where it was discovered.

Vriesea teresopolitana Leme, *sp. nov.* Type: BRAZIL. RIO DE JANEIRO: Teresópolis, Serra dos Órgãos, BR 262 (Rio-Bahia), km 87, near Granja Comary, ca. 1100 m elev., 10.IV.2004, *E. Leme* & *R. Oliveira 6224*, fl. cult. X.2006 (holotype HB!; isotype RB!). Figs. 14 o-t, 15 e-f

Species nova a Vriesea duvaliana E. Morren, *cui affinis, inflorescentia angustiora et breviora, altitudinem foliorum parum superante, bracteis floriferis per anthesim manifeste imbricatis latioribusque, rubris, apice haud distincte incurvatis et sepalis ecarinatis differt; a* Vriesea inflata (Wawra) Wawra, *cui proxima, laminis foliorum apice acuminato-caudatis, inflorescentia complanatis haud inflatis, angustiora, floribus pedicelis brevioribus differt.*

Plant epiphytic, flowering 22–30 cm tall with inflorescence extended, propagating by short basal shoots. Leaves 18 to 20, suberect, forming at base a narrow funnelform rosette; sheaths elliptic, 8.5–9.5 × 5–5.5 cm, sparsely and inconspicuously pale lepidote, greenish, nerved; blades sublinear, 14–19 × 1.5–2 cm, slightly narrowed toward the base, green, sparsely and inconspicuously white-lepidote to glabrous, apex acuminate-caudate. Peduncle decurved, 8–11 cm long, 4–5 mm in diameter, subrigid, whitish, glabrous; peduncle bracts elliptic-ovate, acute and slenderly apiculate, 30–35 × 14–19 mm, orange-red, erect, imbricate toward the apex and enfolding the scape, glabrescent, exceeding the internodes, the upper ones resembling the floral bracts; inflorescence simple, densely flowered, suberect, 10–12 ×3.5–4 cm, lanceolate, complanate, apex acute, shorter to slightly exceeding the leaf blades, rachis completely covered by the floral bracts, subangulose, slightly flexuous, whitish, glabrous, 3–4 mm in diameter, internodes ca. 14 mm long; floral bracts ovate, acute, 47–48× 30–34 mm, base truncate, suberect, slightly when incurved toward the apex, completely enfolding the flowers except for the apical portion of the corolla, laterally compressed, not inflated, strongly carinate toward the apex, thinly coriaceous, orange-red except for the yellowish membranous apical margins, glabrescent, holding inside a mucilaginous translucent substance, distinctly exceeding the sepals, strongly imbricate. Flowers 6 to 8 in number, anthesis diurnal, odorless, distichous, divergent, ca. 62 mm long, pedicels ca. 5 mm long, ca. 3 mm in diameter at base and ca. 5 mm in diameter at apex, yellowish-white; sepals oblong-elliptic, narrowly obtuse, 25–27 × 8–9 mm, very inconspicuously and sparsely white-lepidote inside, glabrous outside, yellow toward the apex, free, ecarinate, thinly coriaceous except for the membranous margins; petals 50–51 × 9–10 mm, connate at base for 8–9 mm, apex narrowly emarginate, forming a tubular corolla except for the suberect-recurved apex at anthesis, golden yellow except for the greenish extreme apex, bearing at base 2 obovate, obtuse, entire, ca. 12 × 3 mm appendages, adnate to

the petals for ca. 8 mm long. Stamens exceeding the petals and exerted at anthesis; anthers linear, ca. 6 mm long, base sagittate, apex obtuse, dorsifixed near the base; pollen sulcate, narrowly ellipsoid, exine reticulate, lumina rounded, muri narrowed; stigma convolute-bladed, yellow, densely papilose, ca. 4 mm in diameter; ovules long caudate. Capsules unknown.

Material examinado: BRAZIL. RIO DE JANEIRO: Teresópolis, Serra dos Órgãos, BR 262 (Rio-Bahia), 10.IV.2004, *E. Leme 6222* (HB).

Vriesea teresopolitana is closely related to *V. duvaliana*. The main morphological differences of the new species are: inflorescence narrower (3.5–4 cm vs. 5–6.5 cm wide.), and shorter, to slightly exceeding the leaves (vs. distinctly exceeding the leaves), floral bracts distinctly imbricate at anthesis and hiding the rachis (vs. rachis partially visible at anthesis), red (vs. red with the apical ½ greenish-yellow), broader with apex not distinctly incurved (vs. apex distinctly incurved), and by the ecarinate sepals (vs. carinate). When compared to *V. inflata*, this new species differs by the leaf blades with acuminate-caudate apex, complanate and not inflated inflorescence, which is narrower (3.5–4 cm vs. 5–7 cm wide), and by the flowers with shorter pedicels (ca. 5 mm vs. ca. 8 mm long).

Vriesea teresopolitana grows in a montane cloud Atlantic Forest, forming a large population as an epiphyte on tree trunks and branches in the forest understory. It shares its habitat with other typical understory species, like *Billbergia amoena* (Lodd.) Lindl., *Neoregelia carolinae* (Beer) L.B. Sm., *Nidularium fulgens* Lem., and *Vriesea longiscapa* Ule, to name few.

Vriesea teresopolitana honors the city of Teresópolis, Rio de Janeiro State, where it was discovered.

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