

Alcantarea galactea (Bromeliaceae), a New Giant Bromeliad from Brazil, with Populations Seen from the Sky

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Communicating Editor: Bente Bang Klitgaard

Abstract—*Alcantarea galactea* (Bromeliaceae, Tillandsioideae), a new species of giant bromeliad from the inselbergs of the state of Espírito Santo, southeastern Brazil, is described and illustrated. A distribution map and a table with the main characteristics used to distinguish the new species from its morphologically similar relatives are presented. *Alcantarea galactea* is among the largest species of this genus, differing from related taxa by its larger habit, leaves densely covered by a thick layer of white epicuticular wax, and spreading stamens. So far, the species is only known from Alfredo Chaves municipality. The areas nearby the type locality have been strongly disturbed by grazing, logging, expansion of coffee plantations, and granite mining. This species may be considered as endangered. Nevertheless, both populations so far known are large enough to be seen from great distances, including aerial photos, and this is one of the motivations for the epithet chosen here, together with the white pulverulent leaves.

Keywords—Atlantic rainforest, endangered species, endemism, epicuticular wax, Espírito Santo, inselberg.

The genus *Alcantarea* (E. Morren ex Mez) Harms belongs to the subfamily Tillandsioideae and includes nearly 30 species, all endemic to eastern Brazil (Versieux 2009). Most species occur on gneiss-granitic inselbergs in the Atlantic rainforest domain, with subsequent colonization of the inland rocky savanna-like habitats of the Espinhaço mountain chain (Versieux et al. 2012b). Most species present macro- and micro-morphological adaptations to survive on the bare rock surfaces (Versieux et al. 2010). The naturally fragmented distribution across isolated rocky outcrops (mainly inselbergs) (e.g. Versieux et al. 2012a) may be responsible for the high degree of narrowly endemic species observed in this genus. *Alcantarea* species are key elements on inselbergs, as they are usually represented by large populations and are able to hold a considerable amount of water inside their well-developed tanks (phytotelmata). Thus, these plants provide particular microhabitats for several animals, such as frogs (e.g. Silva and Alves-Silva 2011), spiders (e.g. Gonçalves-Souza et al. 2011), and even aquatic plants (e.g. Versieux and Wanderley 2009), contributing to the overall high biodiversity in this stressful kind of environment.

Based on new collections from the State of Espírito Santo, and on the taxonomic revision of *Alcantarea* (Versieux 2009), a new endemic species of this genus is described and illustrated here. Remarks on diagnostic characteristics of this new taxon, its affinities, and a geographical distribution map are also provided. Conservation assessment for the new species is presented based on field observation, applying the IUCN red list category criteria (IUCN 2001).

RESULTS

***Alcantarea galactea* Coser & Versieux sp. nov.**— TYPE: BRAZIL. Espírito Santo: Mun. Alfredo Chaves, gneiss-granitic inselberg in the Atlantic rainforest domain, 20°37'01"S, 40°47'20"W, 300 m a. s. l., 26 February 2012, T. S. Coser & D. M. T. Francino 587 (holotype: MBML!; isotype: R!; UFRN!; US!).

Alcantarea galactea Coser & Versieux resembles *Alcantarea odorata* (Leme) J. R. Grant, but differs by the larger habit, inflorescence shape and size, by the shorter and broadly ovate peduncle bracts, by the primary bracts much shorter than the sterile base of the lateral peduncles, by the fewer inflorescence branches, and by the spreading stamens. It is also different from *Alcantarea patriae* Versieux & Wand. due to the larger inflorescence, with fewer branches, shorter bracts and flowers, and by the spreading stamens.

Rupicolous herbs, flowering 2.8–4.2 m high, propagating vegetatively by basal shoots. Rosette 1.1–1.5 × 1.5–1.8(–2.6) m, infundibuliform. Leaves 40–50 in number, suberect, the lower ones arcuate; leaf sheath 23–32 × 14–20 cm, broadly elliptic to ovate, pale brown, densely brown lepidote on both surfaces, coriaceous; blades 100–141 × 10–13 cm, linear to linear-triangular, green, concolorous, densely covered by a thick layer of white epicuticular wax, subdensely brown lepidote abaxially, glabrescent adaxially, canaliculate, coriaceous, distinctly nerved; blade apex acute, green, recurved, slightly twisted. Peduncle 1.5–2.2 m long, 1.8–4.5 cm diam, erect to slightly suberect, stout, green, glabrous, internodes 4–8(–15) cm long; peduncle bracts: the basal ones subfoliaceous and suberect; the middle and distal ones ovate to broadly ovate, apex acute, long–attenuate, 8.5–20 × 5–7.5 cm, green, inconspicuously wine-brown along the base, densely covered by a thick layer of white wax, suberect to recurved, canaliculate, densely brown lepidote abaxially, glabrescent adaxially but brown lepidote toward the apex. Inflorescence 0.9–1.6 × 1.2–1.6 m, compound, paniculate, ellipsoidal, erect; main axis with 5–7(–8) × 0.7–3 cm internodes; primary bracts (3)4–7(–9.5) × 2.6–5.5(–6.3) cm, ovate to broadly ovate, apex acute and slightly acuminate, green at the central portion and brown along the base, covered by a thick layer of white epicuticular wax, densely brown lepidote on both surfaces, shorter than the lateral peduncles; inflorescence branches (12)15–18, (10–)15–25–flowered, suberect, patent or slightly pendulous; lateral peduncles 14–27 × 0.6 cm, green, glabrous; sterile bracts 2.1–2.5 × 1.2–1.4 cm, 2–4 in number, elliptic to slightly

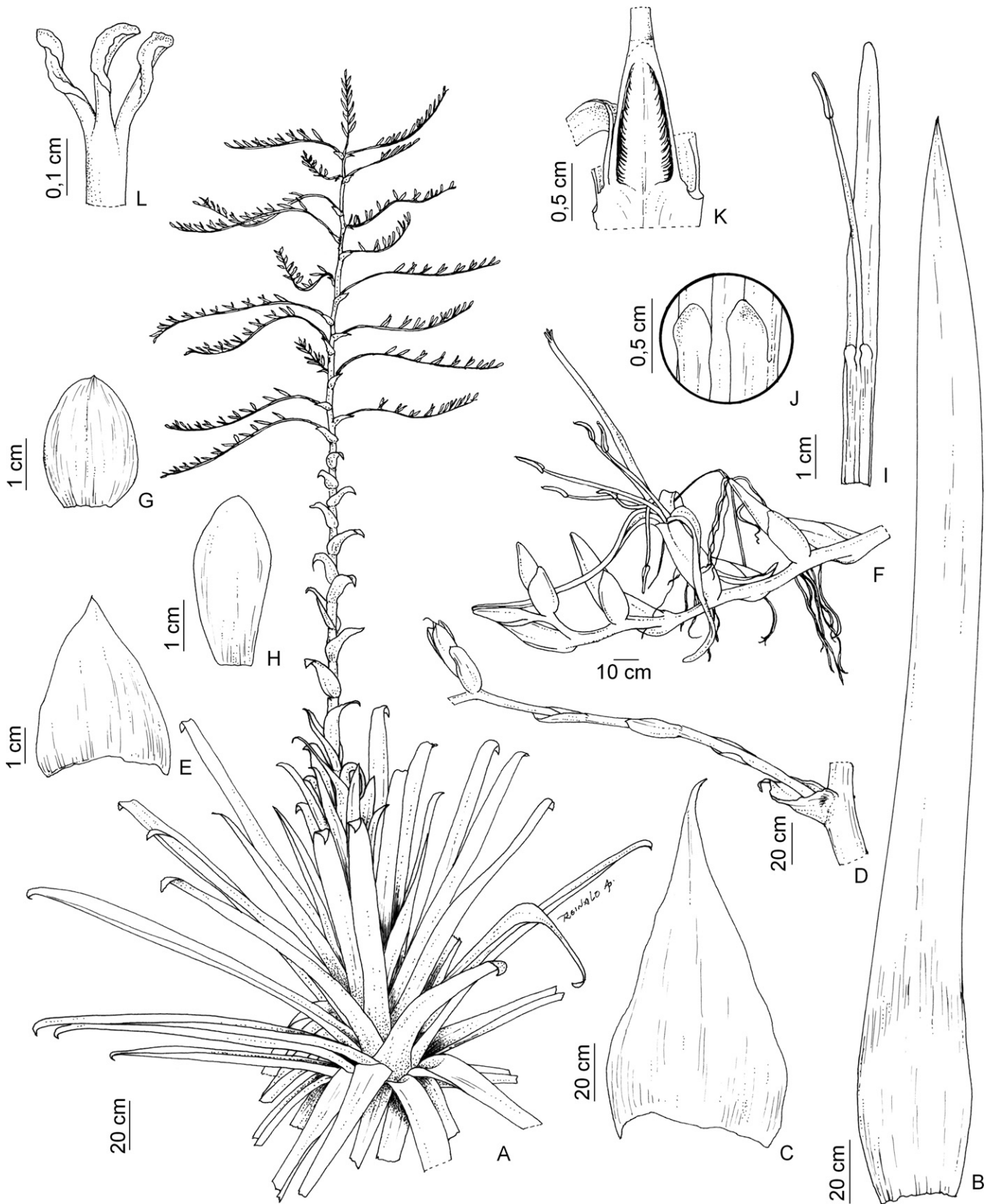


FIG. 1. *Alcantarea galactea*. A. Habit. B. Leaf. C. Peduncle bract. D. Branch with sterile bract. E. Primary bract. F. Flowering branch. G. Floral bract. H. Sepal. I. Petal and antipetalous stamen. J. Detail of the petals appendages. K. Ovary (longitudinal section). L. Stigma. (From the holotype).

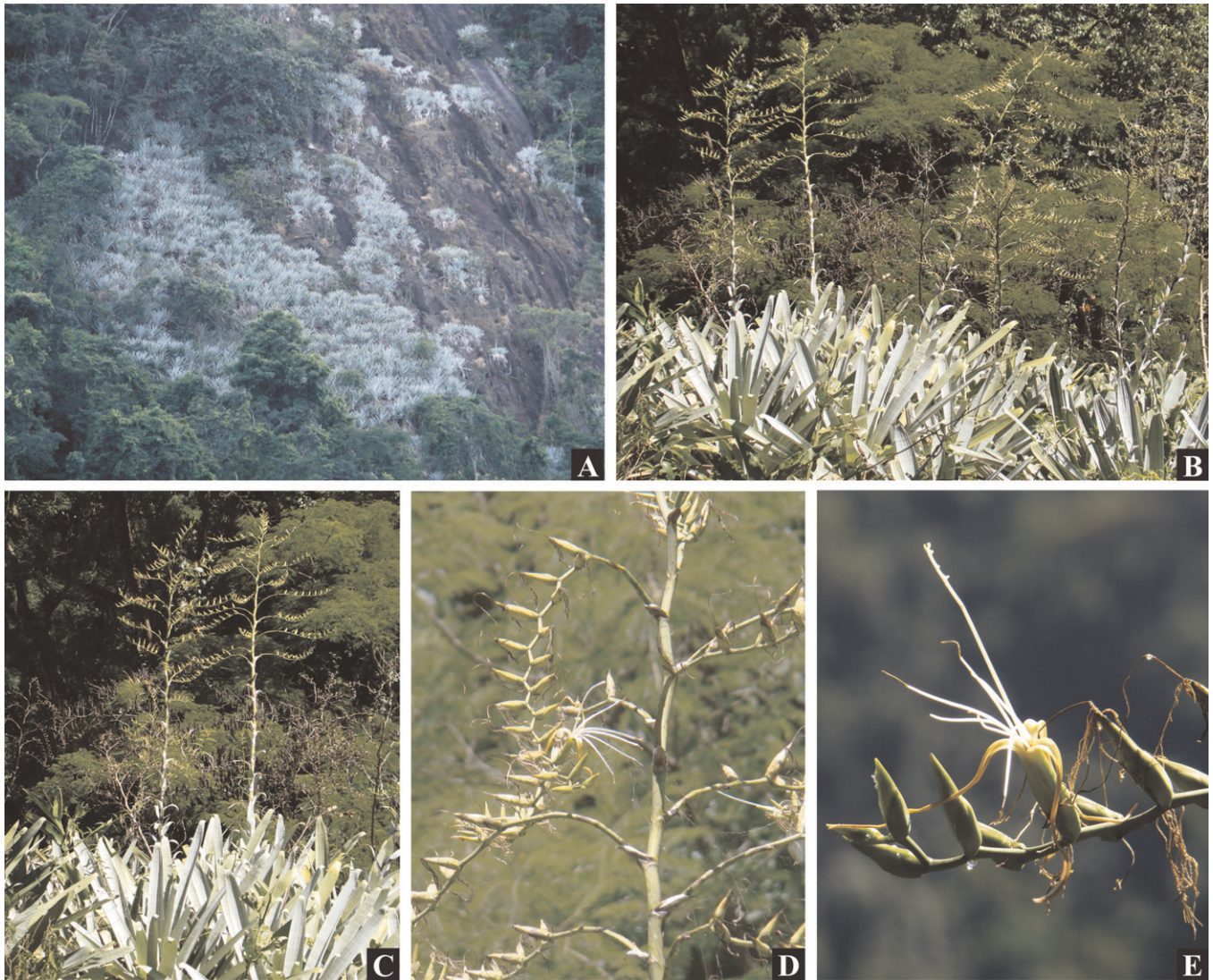


FIG. 2. *Alcantarea galactea*. A. Population growing on inselberg. B–C. Detail of blooming specimens. D. Detail of the inflorescence and a flower with spreading stamens. E. Close-up of post-anthesis flower, depicting the strongly recurved petals.

ovate, apex obtuse, green, sometimes paleaceous, remote, brown lepidote on both surfaces, inconspicuously carinate near the apex, coriaceous, margins membranaceous; rachilla 35–65(–73) cm, geniculate, green, glabrous, internodes 1.2–4 × 0.2–0.5 cm; floral bract (1.7–)2.2–2.4 × 1.5–1.8 cm, broadly ovate, apex rounded, green, glabrous abaxially, brown lepidote adaxially, smooth and carnose in the central portion, ecarinate, margins membranaceous. Flowers ca. 11 cm long, distichous, suberect at anthesis; sepals (2–)2.7–3.3 × 1.2–1.4 cm, elliptic to obovate, apex obtuse, exceeding the floral bracts in 1.8–2.2 cm, green, glabrous abaxially, brown lepidote adaxially, carnose, ecarinate, margins membranaceous; petals 9–10 × ca. 0.8 cm, ligulate, apex rounded, yellow, strongly recurved at anthesis and weakly spiraling from the apex toward the base; petal appendages ca. 27 × 3 mm, 2, ligulate, adnate to the petal for ca. 24 mm, apex obtuse; stamens spreading; filaments 8–10 × ca. 0.2 cm, terete, complanate, white; anthers 8–12 mm long, linear, yellow, dorsifixed near the base; ovary ca. 9 × 0.7–1 mm, narrowly ovate, hypanthium ca. 8 mm, ovules numerous; style 9–11 × 0.2 cm, cylindrical, white; stigma lobes ca. 2 × 1 mm, suberect. Capsule ca. 5.3 × 1.2 cm,

fusiform, brown, seeds ca. 7 mm long, numerous, basal coma ca. 6 mm long, whitish, apical coma ca. 16 mm long, pale brown. Figures 1–3.

Paratypes—BRAZIL. Espírito Santo: Mun. Alfredo Chaves, gneiss-granitic inselberg in the Atlantic rainforest domain, 20°37'01"S, 40°47'20"W, 300 m. a. s. l., 26 February 2012, T. S. Coser & D. M. T. Francino 588 (R!; RB!; VIES!).

DISCUSSION

Alcantarea galactea is the second largest species found in the genus. This species is distinct from other related taxa due to its large vegetative and reproductive dimensions as well as its whitish color, which is a result of the wax covering the leaves and primary and peduncle bracts (Figs. 1, 2). Regarding the reproductive and vegetative characteristics, the species shows some affinities with *A. odorata*, especially if only dried material from herbaria is analyzed. Nevertheless, both species show differences, given that *A. galactea* has larger leaves and inflorescence, smaller and different shaped primary bracts and peduncle bracts, fewer inflorescence

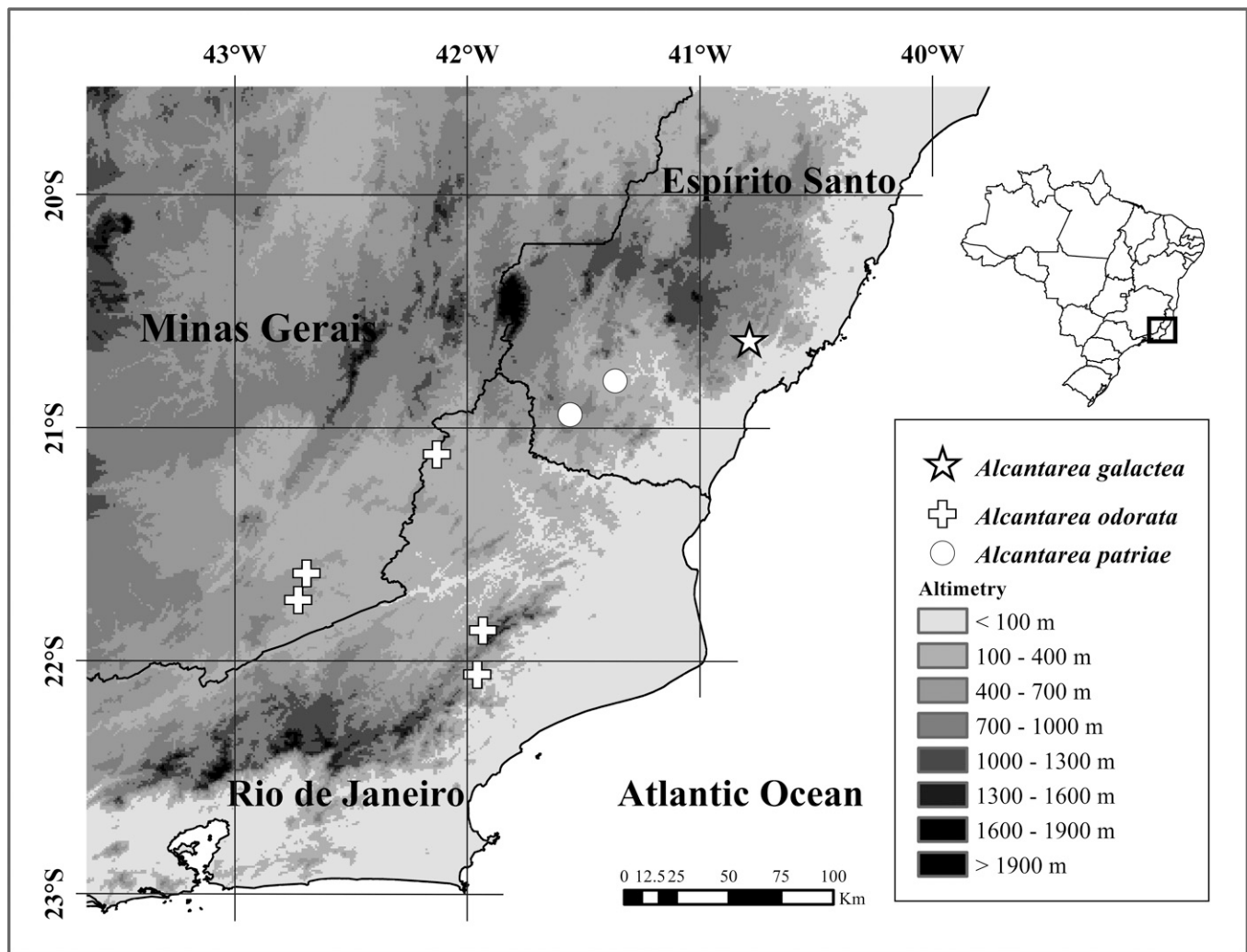


FIG. 3. Map showing the distribution of *Alcantarea galactea*, *A. odorata*, and *A. patriae* in eastern Brazil.

branches, and longer lateral peduncle, rachis, and petals (Table 1). *Alcantarea galactea* also shows some similarities to *A. patriae*, particularly for vegetative characters. However, *A. galactea* displays a longer peduncle, a broader inflorescence, fewer inflorescence branches, and shorter floral bracts and sepals (Table 1). The position of the stamens, a character that has been used as indicator of pollinator type (Versieux et al. 2012b), is also distinct among the species: *A. galactea* presents spreading stamens, characteristic of the ‘*Alcantarea extensa* complex,’ suggesting bat pollination, whereas *A. odorata* and *A. patriae* have bundled stamens, suggesting moth or hummingbird pollination (Versieux and Wanderley 2010). Moreover, the related species are geographically isolated. *Alcantarea galactea* occurs in southeastern Espírito Santo, while *A. patriae* occurs towards the south of this state, and *A. odorata* has records from the northern Rio de Janeiro and eastern Minas Gerais states (Fig. 3). It is worth mentioning that flowers with spreading stamens, floral bracts with half the length of the sepals, and green floral bracts and sepals are also seen in *Alcantarea regina* (Vell.) Harms; nevertheless, the latter species has pale yellow to white petals, lustrous leaves without epicuticular wax, shorter inflorescence branches and leaves, and primary bracts that exceed the length of the lateral peduncles.

Future molecular work should indicate better its taxonomic relationships, however it will possibly be placed within the clade named “core *Alcantarea* and *Alcantarea extensa* complex” as defined by Versieux et al. (2012b).

Etymology—*Alcantarea galactea* has been given this name due to the visibility of the population over the inselberg from great distances (Fig. 2). Even in aerial photos, the populations may be clearly distinguished (Google Earth™ service of the map). The dense whitish epicuticular wax that covers the leaves, primary bracts and peduncle bracts highlights the foliage and bracts of this plant among other species within inselberg vegetation. Additionally, *galactea*, a word from the Greek, means “milky,” which is used here as a reference to the whitish color of the leaves and bracts.

Distribution, Ecology and Conservation—*Alcantarea galactea* is a rupicolous species that is found on gneiss-granitic inselbergs between 300–630 m, under full sun. Along the type locality, the population is large, counting in the hundreds of individuals. So far, the species is only known to exist in Alfredo Chaves municipality, being observed at two other inselbergs close to the type collection place. It is important to mention that the areas surrounding the inselberg where this new taxon was found have been greatly altered for coffee plantations and creation of pastures; as well, some of the rocky

TABLE 1. Morphological comparison among *Alcantarea galactea*, *A. odorata*, and *A. patriae*. ¹Data from Versieux (2009), and from ²Versieux and Wanderley (2007).

	<i>A. galactea</i> (N = 2)	<i>A. odorata</i> ¹ (N = 7)	<i>A. patriae</i> ² (N = 2)
Plant height (m)	2.8–4.2	2–2.5	2–3.5
Leaf sheath (cm)	23–32 × 14–20	14–21 × 9–12	30–43 × 15–21
Leaf blades (cm) and shape	100–141 × 10–13, linear to linear-triangular	70–100 × 4.5–7, narrowly triangular	(90–)100–120 × 9–10, linear to linear-triangular
Peduncle (m)	1.5–2.2	0.9–1.1	0.8–1.3
Peduncle bract (cm) and shape	8.5–20 × 5–7.5, ovate to broadly ovate	20–30 × ca. 2, narrowly triangular	35 × 6, ovate
Inflorescence (cm)	90–160 × 120–160	40–140 × 26–70	45–100 × 25–50
Primary bract (cm)	(3)4–7(–9.5) × 2.6–5.5(–6.3), shorter than the lateral peduncles	(2.4–)9–32 × 1.5–2.5, longer than the lateral peduncles	4–13.5 × 2.8–5.5, shorter than the lateral peduncles
Inflorescence branches (number)	(12–)15–18	20–41	20–27
Lateral peduncle (cm)	14–27 × 0.6	(2–)7–11 × 0.5–0.7	(4–)12–22 × 0.7–0.9
Sterile bract (cm)	2.1–2.5 × 1.2–1.4	(1–)2.2–3 × (0.6–)1.5–2.5	3–3.8 × 1.5–2
Sterile bract (number)	2–4	0–2	2–4(6)
Rachis (cm)	35–65(–73)	(6–)20–30	25–50
Floral bract (cm) and shape	(1.7–)2.2–2.4 × 1.5–1.8, broadly ovate	2–3 × 1–2.8, broadly ovate	3.5–4 × 4.5–5.3, suborbicular
Sepals (cm)	(2.2–)2.7–3.3 × 1.2–1.4	2.8–3.5 × 1.8–2	3.2–3.7 × 2.3–2.7
Petals (cm)	9–10 × ca. 0.8	7.5–8.1 × 0.5–0.8	8.5–9 × 0.9–1

outcrops along this area are now being mined for granite extraction. As highlighted by Barbará et al. (2007), the loss of forest patches that surround inselbergs may compromise the survival of floral visitors that act as pollinators of rupicolous species of *Alcantarea*. So, according to the criteria established by the IUCN (2001), *A. galactea* may be considered an endangered species, being sorted into the endangered category (EN) due to its restricted area of occurrence, small population size, and the possible decline in the quality of habitat (IUCN red list criteria, B2 a, biii).

ACKNOWLEDGMENTS. The authors thank the Brazilian Research Council (CNPq) for the research funding and the doctoral scholarship granted to Thiago S. Coser, as well as productivity grants to Tânia Wendt. We also thank Reinaldo. A. Pinto for preparing the illustration, Ítalo C. Coutinho for reviewing English and Dayana M. T. Francino for field assistance. This research was funded by grant PROTAX 562182/2010-1.

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