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A new species of *Anthurium* Schott (Araceae) in a seasonal semideciduous forest in Espírito Santo State, Brazil

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Abstract

The state of Espírito Santo is located in Southeastern Brazil and occupies 45,597 km² within the Atlantic Forest domain. The flora of the state is still in progress, and families such as the Araceae represent groups that have not yet been representatively sampled. Sampling efforts in the Southern areas of the state revealed the existence of a new species of *Anthurium*, related to *A. cleistanthum*, *A. truncatum* and *A. molle*. Here, we describe and illustrate this species and present a comparative analysis with the most similar species. To date, the species is known only from the type locality, occurring in forests that cover limestone outcrops.

Key words: Atlantic Rain Forest, conservation, fragmentation, flora

Introduction

The Atlantic Forest is composed of different forest types, which are determined by environmental climatic variation over different latitudinal gradients (IBGE 2012). One of them is the seasonal semideciduous forest, which responds to a seasonal climate with a semideciduous foliage (Veloso *et al.* 1991). This forest type is represented today in Espírito Santo state by a few remaining fragments (Assis 2007). In the southern region, the most representative example comprises the Floresta Nacional Pacotuba and the Reserva Particular do Patrimônio Natural Cafundó. Apart from these two conservation units, there are hundreds of forest fragments smaller than 100 ha in particular areas, known as legal reserves of permanent preservation (SOS Mata Atlântica & INPE 2014). However, these fragments are under different stages of regeneration and represent historical uses for pastures and agricultural development (IPEMA 2005).

Regions with steep slopes comprise important sources of diversity by representing part of the original vegetation that once constituted the seasonal semideciduous forest (IPEMA 2005). Typical components of these regions are *Anthurium* Schott (1829: 828) species, belonging to the most diverse genus of the Araceae family with about 900 species (Boyce & Croat 2012). Species of *Anthurium* occur in various environments such as forests, wetlands and rocky areas (Coelho *et al.* 2009). Although still poorly studied in Espírito Santo state, preliminary studies suggest a high rate of endemism for the genus (Coelho *et al.* 2014). This is a general pattern shared by several other taxa, which together account for 552 species endemic to the state (Lista de Espécies da Flora do Brasil 2014).

Several new species of the Araceae have been recognized and described in the last 10 years for Espírito Santo state (Gonçalves 2005, Coelho 2010a, Sakuragui 2012, Calazans & Sakuragui 2013). Surveys for the family were conducted at Reserva Natural Vale in Linhares (Coelho 2010b) and in Southern Restinga vegetation (Valadares *et al.* 2010). Apart from revealing the richness in different latitudinal bands in the state, these studies highlighted the lack of information, as well as the urgent need for intensive sampling throughout the territorial area of the state.

As a result of the sampling effort regarding the “Flora do Estado do Espírito Santo” project, we found a new species of *Anthurium* in the southern region, in the municipality of Cachoeiro de Itapemirim. Here, we describe this new species with comments on its delimitation, ecology, distribution and conservation.

Methodology

The study included an analysis of material from herbaria collections (MBML, R, RB, VIES), image analysis of *Anthurium* types and a review of the literature. The analysis of morphological characters was performed using a stereoscopic microscope. The coloration of vegetative and reproductive structures was observed in fresh material in the field and in cultivated material at the Universidade Federal do Espírito Santo. The description of vegetative and floral characters followed Croat & Bunting (1979), Stearn (1993) and Mantovani et al. (2009).

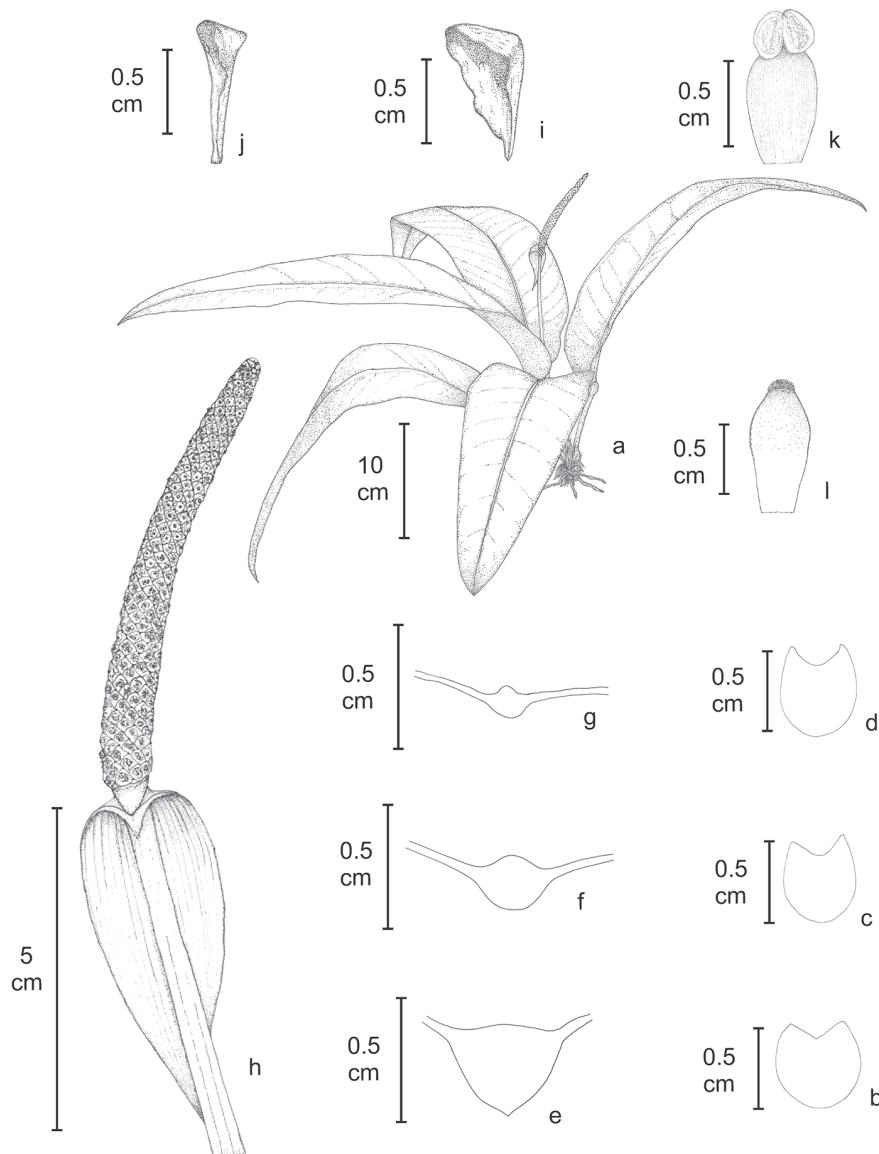


FIGURE 1. *Anthurium cacheirensis* Theófilo & Sakur. sp. nov. (A) habit, (B) proximal petiole in cross section, (C) mid petiole in cross section, (D) distal petiole in cross section, (E) proximal midrib in cross section, (F) mid midrib in cross section, (G) distal midrib in cross section, (H) inflorescence, (I) lateral tepal in front view, (J) anterior tepal in front view, (K) stamen in front view.

Taxonomy

Anthurium cacheirensis Theófilo & Sakur. sp. nov. (Figs. 1, 2)

Anthurium cacheirensis is most similar to *Anthurium molle* Gonçalves & Jardim (2009: 715), but differs by having much more primary lateral veins (28–31 pairs) and by the spathe's shape ovate to lanceolate.

Type:—BRAZIL. Espírito Santo, Município de Cachoeiro de Itapemirim (41°07'28"W; 20°46'03"S), 16 January 2013, R.T. Valadares 1.117 (holotype: RB!; isotype: VIES!).



FIGURE 2. *Anthurium cacheirensis* Theófilo & Sakur. sp. nov. (A) Habit, (B) Detail of the petiole and peduncle, (C) inflorescence.

Terrestrial; stem elongated and erect; internodes 0.5–0.7 cm long; prophylls and cataphylls greenish when young, brownish when old, slightly decomposed to decomposed in fibers at the apex, decomposed into fibers at the stem base, 2.4–3.9 cm long; sheath 1.3–1.5 cm long; petiole $7.5\text{--}8.2 \times 0.50\text{--}0.55$ cm, green covered with white speckles, sulcate adaxially with acute margins, rounded abaxially; geniculum greenish, thicker than the petiole, slightly grooved with sharp acute adaxially, rounded abaxially, 0.8–0.9 cm long; blade elliptical to lanceolate, subchartaceous, drying chartaceous, apex acute, base obtuse to truncated, greenish, shiny on both sides, strongly contrasting colors on the two surfaces, upper surface dark-green, lower surface light green, $39.5\text{--}41.5 \times 9.8\text{--}11.0$ cm; midrib flat adaxially at

proximal direction becoming prominent and rounded at distal direction, acute abaxially at proximal direction becoming prominent and rounded at distal direction, lighter as the blade adaxially; primary lateral veins obscure or barely visible adaxially, darker than the blade abaxially, drying prominent, little differentiated from the finer veins, 28–31 on each side, forming an angle of 18–35° at the base of the blade and towards the middle, 32–45° at the apex, infra-marginal collective vein starting from the leaf base or, more rarely up to 4.3 cm above it, 0.4–1.0 cm from margin; peduncle 1–2-carinate, green covered with white speckles, 23.1–31.1 × 0.35–0.40 cm; spathe membranaceous, greenish with purplish hues, boat-shaped, deflexed at anthesis, reflexed in post-anthesis, ovate to lanceolate, apex acute, forming an acute angle with the peduncle, 6.2–7.5 × 0.9–2.0 cm, decurrent 0.45–0.48 cm long; spadix sessile, rarely stipitate, greenish at anthesis, brownish in post-anthesis, cylindrical, tapered, 6.0–7.2 × 0.6–0.8 cm, stipe vinaceous, 0.2–0.3 cm long; 6–7 flowers per principal spiral and 9–10 per alternate spiral; tepals greenish until anthesis, brownish at the apex, becoming whitish towards the base post anthesis, hooded, dorsally acute, internally convex, lateral tepals 2.0–2.1 × 1.0–1.2 mm, anterior and posterior tepals 1.9–2.0 × 0.9–1.0 mm, filaments flattened, striated, 1.4–1.5 × 1.0–1.3 mm, anthers dorsifixed, extrorse, 0.8–0.9 × 0.4–0.6 mm, pistils greenish, cylindrical to obovoid, mesophyll with raphid cells, stigma sessile, ovary 2-locular, one ovule per locule, placentation axial, funicle glabrous, 1.8–2.4 × 1.0–1.2 mm; infructescence unknown.

Etymology:—The epithet honors Cachoeiro de Itapemirim, the type locality of the new species.

Habitat and distribution:—The occurrence of *A. cachoeirense* has only been recorded for the type locality, at an altitudinal range between 300–400 m, located at latitude 20°S, in a fragment of semideciduous forest, which was once part of the extension of the Serra da Mantiqueira in this state (Figure 3). The species occurs in areas that are in an advanced stage of regeneration and can be found forming the herbaceous layer together with Marantaceae and Bromeliaceae species, as well as on exposed rocks within the forest.

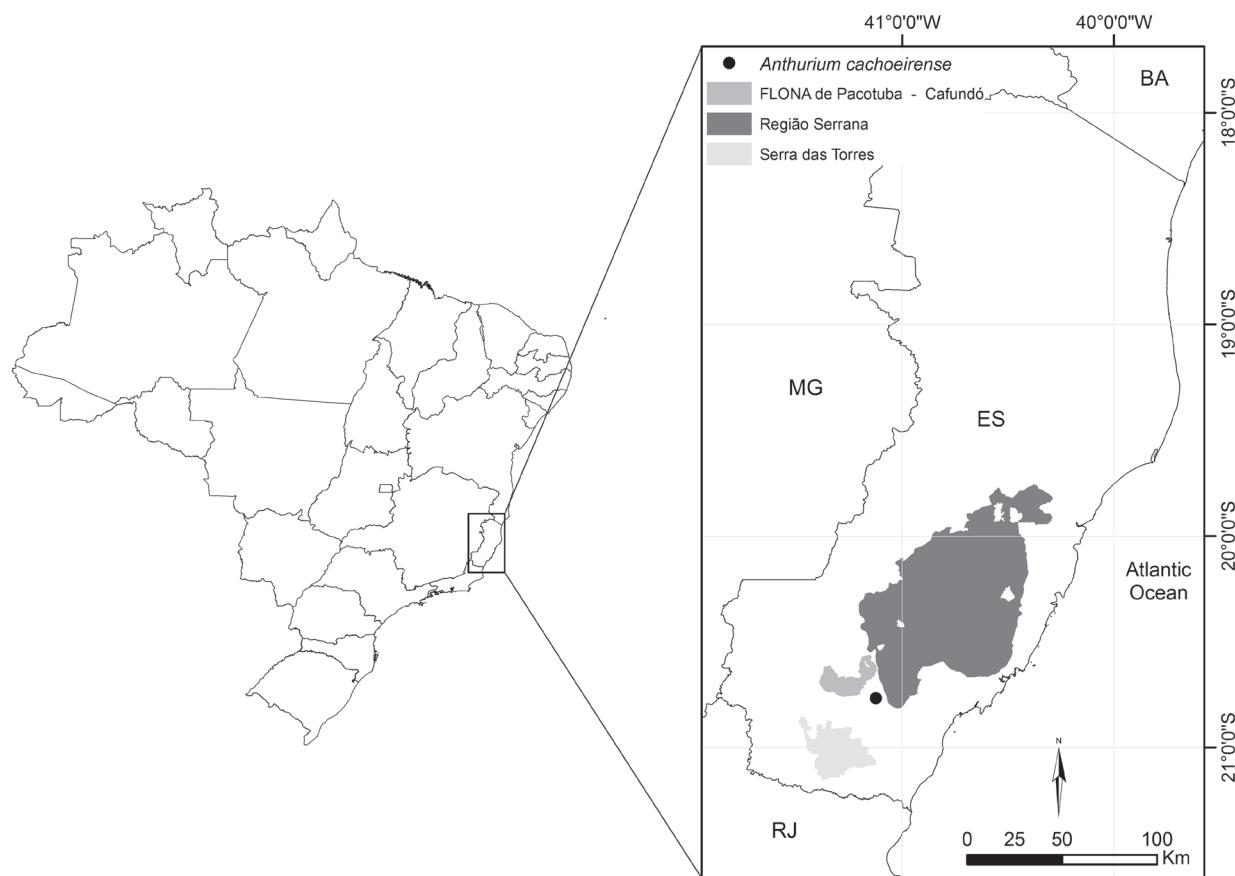


FIGURE 3. Type locality of *A. cachoeirense*. Adapted from Brasil (2007).

Despite intense effort to collect the new species in other areas of semideciduous forest (Floresta Nacional de Pacotuba and Reserva Particular do Patrimônio Natural Cafundó), no other populations were found.

Relationships:—*Anthurium cachoeirense* can be recognised as a member of the section *Urospadix* Engl., subsection *Obscuréviridia* Engl. (Engler 1898) by the presence of a subchartaceous leaf blade and obscure to barely visible primary lateral veins.

TABLE 1. Key morphological traits in *A. cachoerense* and closely related taxa.

Species	Shape of petiole adaxially	Leaf colour	Leaf base	Peduncle	Primary lateral veins	Spathae
<i>A. truncatum</i>	Flat with obtuse margins	Pale green	obtuse to truncate	< than the petiole, completely terete	>20	Ovate
<i>A. cleistanthum</i>	Sulcate with acute margins	Pale green	acute	< than the petiole, completely terete	>20	Ovate to lanceolate
<i>A. molle</i>	Sulcate with acute margins	Shiny green	obtuse to truncate	> than the petiole, completely terete to 1-carinate	15–16	Elliptic
<i>A. cachoerense</i>	Sulcate with acute margins	Shiny green	obtuse to truncate	> than the petiole, 1–2-carinate	28–31	Ovate to lanceolate

Anthurium cacheirensense is close to *A. molle* Gonçalves & Jardim (2009: 715), a restricted species of Serra do Teimoso, Bahia, which has fewer primary lateral veins and an elliptical spathe (Table 1). It can also be confused with *A. cleistanthum* Barroso (1957: 97) and *A. truncatum* Gonçalves (2011: 115). The former occurs in mountainous and restinga areas in the states of Bahia, Espírito Santo and Minas Gerais (Valadares *et al.* 2010, Coelho *et al.* 2014) and the latter is restricted to Espírito Santo and occurs at altitudes between 700–900 m (Gonçalves 2011). *Anthurium cacheirensense* differs from both by its glossy leaves, petioles that are shorter than peduncles and two-carinate peduncles.

Conservation:—Data available for the new species are still sparse and insufficient to assess it as to their conservation status. The species is considered as Data Deficient (IUCN 2001) until more information becomes available.

The only record for the species is within priority areas for conservation in Espírito Santo state (Brasil 2007). Its location is close to three important areas for the state economy: the Serrana region and Flona Pacotuba-Cafundó in the North, and the Serra das Torres in the South of the type locality. In these areas, the priority action for conservation is the supervision of mining, which is responsible for much of the Espírito Santo Southern economy (DNPM 2012). The occurrence of *A. cacheirensense* in limestone forests makes it fragile, due to the high demand for limestone as a constituent of cement used in construction.

Brazilian environmental legislation (Brasil 2006) allows the removal of vegetation in cases of extraction of minerals, if it is in the public interest. Thus, based on our field observations, we suggest that this species can be used as an indicator for environmental studies and licensing processes. To contribute to its conservation, we suggest a program that prioritizes the identification of populations in the field, as well as the rescue and replanting of individuals at institutions occupied with the study of native flora, in particular the Araceae family. We emphasize that the collection efforts that focus on regional flora will continue to run in parallel and we hope to provide new population records in the near future.

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