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Anthurium elsieae (Araceae), A New Species from the Eastern Amazon Domain †

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Abstract

A new species, *Anthurium elsieae*, from the Amapá State Forest in the Eastern Brazilian Amazon is described and illustrated. Belonging to the *Anthurium* sect. *Schizoplacium*, the species differs from its Amazonian congeners, *A. pentaphyllum* and *A. eminens*, by a unique combination of morphological characters, including a short petiole (10–13 cm), inconspicuous venation with a marginal collective vein, and a notably short spadix (ca. 1.7 cm long). Detailed morphological descriptions, habitat information, and diagnostic features are provided. The species appears to be narrowly distributed, occurring at approximately 30 m elevation in *terra firme* forest. An identification key to the species of *Anthurium* sect. *Schizoplacium* is also presented. The discovery of this species highlights the relevance of continued taxonomic and floristic efforts for improving biodiversity knowledge in the Amazon domain and supporting conservation planning.

Keywords: Amazon rainforest; Brazilian flora; singleton; species discovery; taxonomy

1. Introduction

Anthurium Schott is the largest and most diverse genus in the family Araceae, comprising approximately 1500 species [1,2]. It is distributed from Southern Mexico through Central America and across tropical South America, with its center of diversity in the Andean region and the Amazon basin [3]. The genus is characterized by its enormous morphological variability, particularly in leaf shape (ranging from entire to deeply lobed or compound) and inflorescence structure, consisting of a spike-like spadix subtended by a modified leaf-like spathe [4].

The infrageneric classification of *Anthurium* has been historically complex. Engler [5,6] established a sectional system based largely on Schott's earlier "greges" [7], which, despite its artificial nature, has remained the foundational framework. Recent molecular phylogenies have begun to clarify relationships, recovering several monophyletic groups [8]. One such group is section *Schizoplacium* (Schott) Engl., which, following recent nomenclatural adjustments, has priority over the synonymous sect. *Dactylophyllium* (Schott) Engl. when the two are treated as synonyms [9]. This section comprises species characterized by palmately divided leaves, which may be either simple and lobed (palmatifid) or truly com-

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pound with free leaflets (palmatisect or pedatisect) [10,11]. It is a predominantly lowland Amazonian group, with some species extending into Central America and the Antilles [11].

Brazil is home to a significant diversity of *Anthurium*, with approximately 164 species recorded, many of which are endemic to the Atlantic Forest (103 species) and Amazon biomes (30 species) respectively [12,13]. The state of Amapá, in the Eastern Brazilian Amazon, is recognized as one of Brazil's best-preserved regions, with a large percentage of its territory protected by conservation units [13]. However, its flora remains understudied, and new collections frequently yield taxonomic novelties.

During a floristic inventory of Araceae in terra firme forest near the Amapá State Forest (Flota Amapá), in the Ramal do Piquiá area (municipality of Amapá, Amapá state, Brazil), a distinctive *Anthurium* specimen was collected. Morphological analysis and comparison with type materials and protologues confirmed that it represents an undescribed species. The new species is described based on a singleton—a single fertile individual collected at the type locality—as no additional specimens were found despite targeted searches [14]. Although based on a single collection, its morphological distinctiveness from all closely related species of section *Schizoplacium* clearly supports its recognition as a new species. This study aims to formally describe this new species, compare it with its closest relatives, and provide an updated identification key for the species of *Anthurium* sect. *Schizoplacium* in the Amazon domain.

2. Materials and Methods

2.1. Study Area

The specimen was collected in the Ramal do Piquiá area, within *terra firme* (non-flooded upland) forest in the municipality of Amapá, Amapá state, Brazil. This area is located outside the official polygon of the Floresta Estadual do Amapá (Flota Amapá) but in its immediate vicinity, in a sustainable-use conservation unit. The vegetation is characterized by *terra firme* forest with a canopy height of 25–35 m and a species-rich understory.

2.2. Collection and Morphological Analysis

The type specimen was collected in 2023. We collected two samples: one for cultivation and one for the herbarium. A living plant was cultivated ex situ in a shade house at the Universidade do Estado do Amapá (UEAP), Macapá. After collection, vegetative and reproductive structures were measured from fresh material and dried herbarium specimens. Morphological descriptions followed standardized terminology for Araceae, and colors of vegetative and reproductive structures were recorded according to [15,16]. The fertile material, including inflorescences, was prepared following standard herbarium techniques [17]. The holotype was deposited at the Herbário AMAPA from Universidade do Estado do Amapá (UEAP). Comparisons were made with herbarium specimens of species from *Anthurium* sect. *Schizoplacium* and was consulted their protologues (including type images available online at JSTOR Global Plants and Specieslink), with taxonomic revisions [8–12]. The sectional placement follows the updated nomenclatural treatment [9], recognizing *Anthurium* sect. *Schizoplacium* as the correct name for the clade including the former *Anthurium* sect. *Dactylophyllium*.

2.3. Geographic Distribution

Geographic distribution was mapped using QGIS v. 3.28 [18]. Shapefiles of the Guiana Shield and Brazil, as well as country boundaries of South America, were obtained from the Instituto Brasileiro de Geografia e Estatística [19]. The Flota do Amapá (FLOTA-AP) shapefile was added according to SEMA/AP [20].

3. Results

Anthurium elsieae L.A.Pereira, Carv.-Silva & Camelo. **TYPE:** Brazil: Amapá. Município de Amapá, Ramal do Piquiá, Assentamento do Incra, 30 m.a.sl, 23 April 2023, fl., *L.A. Pereira* et al. *3050* (holotype: AMAPA0001!) (Figures 1 and 2).

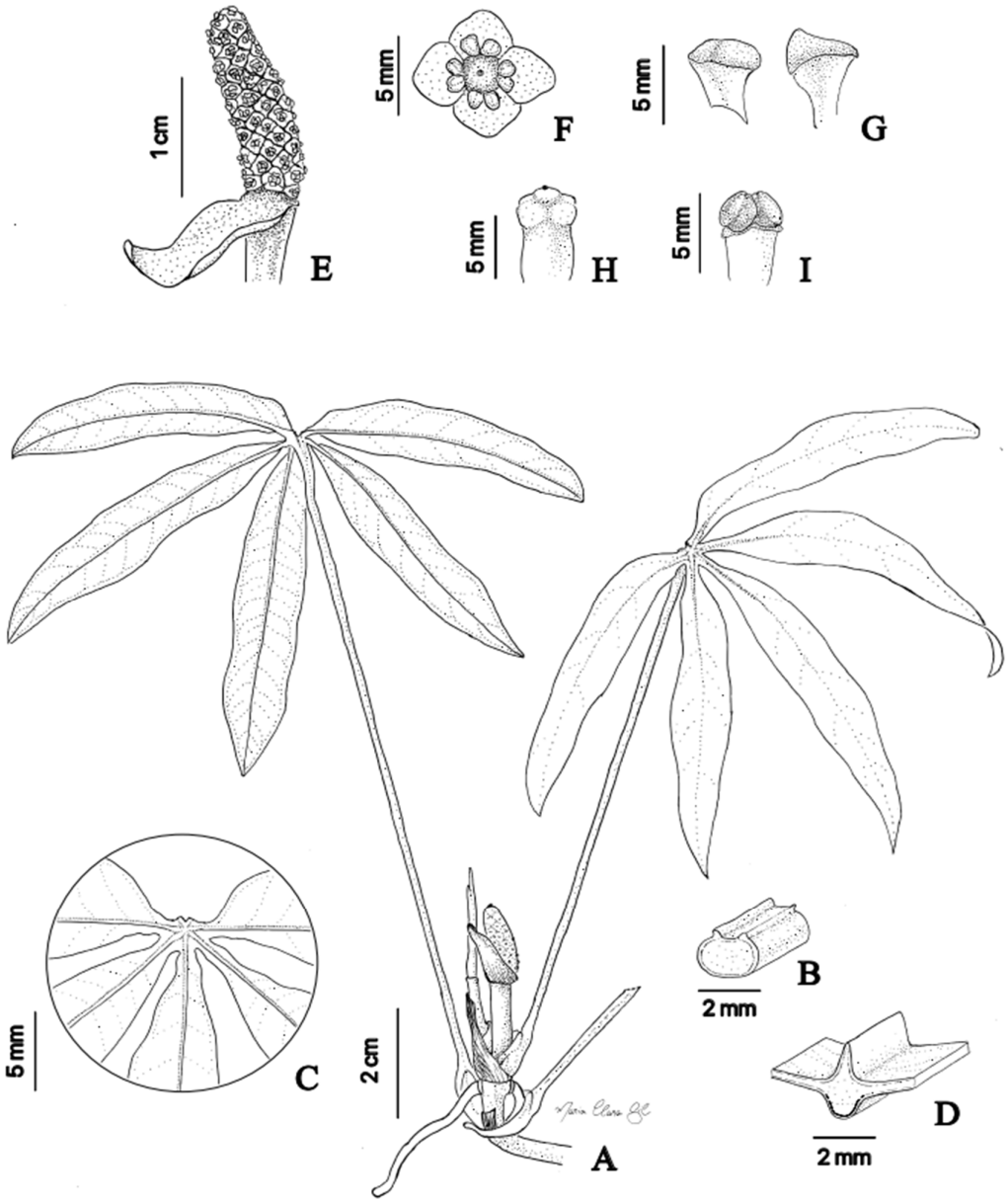

Figure 1. Line drawing of *Anthurium elsieae*. (**A**)—Habit; (**B**)—cross-sectional of petiole (**C**)—detail of the leaf base showing pedatisect division; (**D**)—cross-sectional of midrib; (**E**)—erect inflorescence with patent spathe; (**F**)—detail of one tepal in front view; (**G**)—detail of tepals in side view; (**H**)—Gynoecium; (**I**)—stamen. Drawn by Maria Clara Gil Laydner.

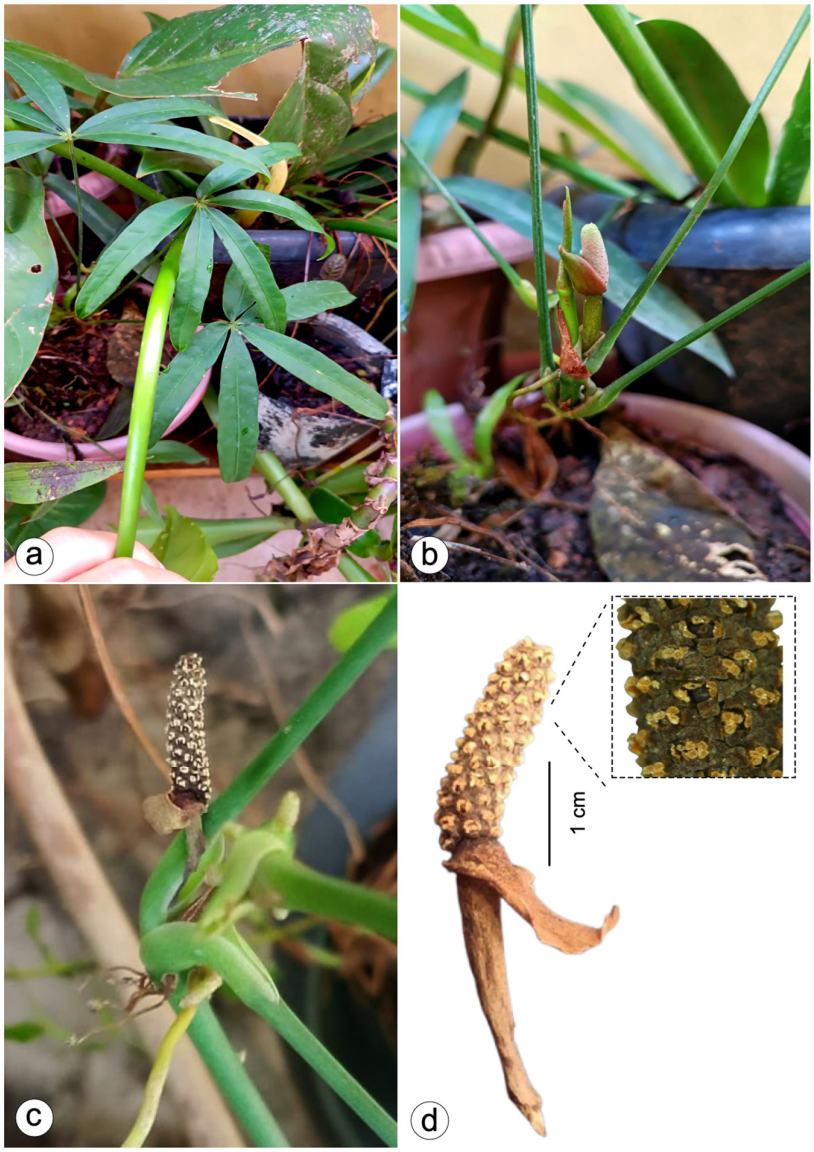

Figure 2. Photographs of *Anthurium elsieae.* (**a**) Detail of the leaf blade underside showing inconspicuous venation (cultivated). (**b**) Inflorescence in pre-anthesis with erect spathe (cultivated). (**c**) Inflorescence at anthesis with reflexed spathe (cultivated). (**d**) Close-up of the short spadix and flowers detail (herbarium specimen (AMAPA0001!)). Photos by L.A. Pereira.

Diagnosis: *Anthurium elsieae* differs from its morphologically closest Brazilian species of section *Schizoplacium* Schott (Engl.)—namely, *A. brevipedunculatum* Madison; *A. pentaphyllum* (Aubl.) G.Don; *A. eminens* Schott; *A. petiolicarinatum* Nadruz, Mantovani & Carlsen; and *A. zalesskii* Popovkin & Nadruz—by the unique combination of petiole 10–13 cm long, spadix 1.6–1.9 cm long, pale green to whitish spadix, protologues collective vein positioned ca. 2 mm from the leaflet margin, and sessile leaflets (petiolules absent). It further differs from *A. brevipedunculatum* by its lanceolate to ovate, pale green spathe with pinkish margin at anthesis, reflexed, and deciduous (vs. triangular to ovate, deep purple to maroon, persistently erect spathe). From *A. petiolicarinatum*, it differs by its terete petiole and smooth leaf blade (vs. multi-ridged petiole and bullate blade). From *A. zalesskii*, it differs by its longer leaflets (15–22 cm vs. 9–12 cm). From *A. pentaphyllum* and *A. eminens*, it differs by its pale green spathe with pinkish margin at anthesis (vs. green to yellowish or green to purple). *Anthurium elsieae* is compared morphologically with its closest relatives in the updated key (Table 1).

Table 1. Morphological comparison of *Anthurium elsieae* sp. nov. with the morphologically closest Brazilian species of section *Schizoplacium*.

Character	*A. elsieae*	*A. brevipedunculatum*	*A. pentaphyllum*	*A. eminens*	*A. petiolicarinatum*	*A. zalesskii*
Petiole (cm)	10–13	8–12	>15	50–100	15–35	8–15
Petiolule (cm)	<0.2 (sessile)	0.5–1.5	(0.5–)1.0–6.0	1.0–3.0	0.5–2.0	0.2–1.0
Collective vein (mm from margin)	ca. 2	3–5	3–8	5–10	2–5	3–6
Leaf blade surface	Smooth	Smooth	Smooth	Smooth	Bullate	Smooth
Petiole shape	Terete	Terete	Terete	Terete	Multi-ridged	Terete
Spathe shape	Lanceolate to ovate	Triangular to ovate	Lanceolate to ovate	Lanceolate to ovate	Lanceolate to ovate	Lanceolate to ovate
Spathe color (anthesis)	Pale green with pinkish margin	Deep purple to maroon	Green to yellowish	Green to purple	Green to vinaceous	Pale green
Spathe position	Reflexed, deciduous	Persistently erect	Reflexed, deciduous	Reflexed, deciduous	Reflexed, deciduous	Reflexed, deciduous
Spadix length (cm)	1.6–1.9	2.0–3.5	2.3–14	25–45	2.5–4.0	3.0–5.0
Spadix color	Pale green to whitish	Yellowish green	Green to yellowish	Green to purple	Yellowish green	Pale yellow

Hemiepiphytic herb, evergreen. **Stem** scandent, climbing, cylindrical, slightly nodose, smooth, dark green when fresh, becoming grayish-brown with age; internodes 1.0–2.5 cm long, 0.4–0.8 cm diam.; aerial roots emerging from the nodes, forming a six-pointed crown, light brown to cream; cataphylls lanceolate, 3.0–5.0 cm long, brown, persisting as semi-intact fibers. **Cataphyll** brown. **Petiole** 10–13 cm long, 0.2–0.3 cm diam., terete to slightly sulcate adaxially, obtuse abaxially, smooth, glabrous, dark green; geniculum 0.8–1.2 cm long, slightly thicker than petiole. **Leaf blade** pedatisect divided leaves, coriaceous, 18–25 cm long, 20–28 cm wide, divided into 5 leaflets; central leaflet 15–22 cm long, 3.0–4.5 cm wide, oblanceolate to elliptic, apex acuminate with a short apiculum, base cuneate, sessile or with a very short petiolule (<0.2 cm); lateral leaflets similar in shape but gradually smaller, the outermost leaflets 8–12 cm long, 1.5–2.5 cm wide, often with a slightly inequilateral base; all leaflets with margin entire to slightly undulate, unequal at base, glabrous, dark green; midrib prominently raised abaxially, flat to slightly impressed adaxially; primary lateral veins 6–8 per side, weakly impressed on both surfaces, arising at a 40–50° angle; collective vein arising from the base, running very close (1–2 mm) to the margin, inconspicuous. **Inflorescence** erect, shorter than leaves; peduncle sessile, emerging directly from the branch, 4.5–7.0 cm long, 0.15–0.2 cm diam., terete, green. **Spathe** lanceolate to narrowly ovate, at anthesis pale green with pinkish margin, becoming brownish at post-anthesis, 1.0–3.0 cm long, 0.5–0.9 cm wide, reflexed at anthesis, deciduous in fruit. **Spadix** sessile, cylindric, tapering slightly toward apex, 1.6–1.9 cm long, 0.4–0.5 cm diam., brownish-green at anthesis, flowers light brown to cream. **Flowers** perfect, perigoniate, dimerous, principal spiral 4–6 flowers, secondary spiral 6–8 flowers; tepals greenish white, prominently glandular, lateral tepals 1.0 × 0.5 mm; anterior and posterior tepals 1.0 × 0.5 mm; stamens exserted, 0.2 × 0.2 mm, filaments flattened, anthers yellow; gynoecium 1.2 × 0.4 mm. **Fruits** not seen.

An updated key to the Brazilian species of *Anthurium* section *Schizoplacium* (Schott) Engl. morphologically similar to new species, *A. elsieae* [9–12].

1. Spathe triangular to ovate, deep purple to maroon, persistently erect; berries rostrate ***A. brevipedunculatum*** Madison.

1′. Spathe lanceolate to ovate, greenish to whitish or vinaceous, reflexed at anthesis, deciduous or rarely persistent; berries not rostrate 2.

2. Petiole prominently multi-ridged or carinate abaxially; leaflet blades bullate, with primary lateral veins strongly impressed adaxially . . . ***A. petiolicarinatum*** Nadruz, Mantovani & Carlsen.

2′. Petiole terete to obtusely sulcate abaxially; leaflet blades smooth, primary lateral veins weakly impressed 3.

3. Petiole < 10 cm long; spadix < 2 cm long (ca. 1.7 cm); collective vein inconspicuous, located < 2 mm from leaflet margin . . . ***A. elsieae*** L.A.Pereira, Carv.-Silva & Camelo.

3′. Petiole > 10 cm long; spadix > 2.5 cm long; collective vein conspicuous or not, located > 2 mm from margin 4.

4. Leaf blade pedatisect (leaflets joined at the base) 5.

4′. Leaf blade palmately compound (leaflets free to the base) 6.

5. Petiolules 0.2–1.0 cm long; leaflets 9–12 cm long ***A. zalesskii*** Popovkin & Nadruz.

5′. Petiolules absent (leaflets sessile); leaflets 15–22 cm long. ***A. elsieae*** L.A.Pereira, Carv.-Silva & Camelo.

6. Spadix very long (>20 cm at anthesis); petiole robust, >40 cm long ***A. eminens*** Schott.

6′. Spadix shorter (<15 cm at anthesis); petiole slender, usually < 30 cm long ***A. pentaphyllum*** (Aubl.) G.Don.

Etymology: The specific epithet honors Dr. Elsie Franklin Guimarães, a researcher at the Rio de Janeiro Botanical Garden Research Institute. A distinguished botanist, she made significant contributions to the knowledge of the Brazilian flora, specializing in the genera *Piper* and *Peperomia*, describing 84 new plant species, and lending her name to the Herbário AMAPA.

Description of area, phenology, distribution, habitat and conservation status: *Anthurium elsieae* is known only from the type locality in the municipality of Amapá, Amapá state, Brazil (Figure 3). It grows in the understory of *terra firme* (non-flooded upland) forest at low elevations (ca. 30 m) and its part of the Amazon phytogeographical domain [21]. The species typically has a hemiepiphyte on tree trunks near small streams. The species was collected with flowers in June and September. Fruits were not observed in the type collections, and flowering in cultivation has not yet been documented.

Anthurium elsieae is currently known from a single location near the Flota Amapá sustainable-use conservation unit, but outside its official polygon. The area is an INCRA settlement and faces increasing pressure from illegal logging, hunting, and small-scale deforestation along access roads. No population size estimates are available, as only one fertile individual was found. Following the IUCN Red List Categories and Criteria [22] and given the lack of data on population size and geographic range, we recommend a classification of Data Deficient (DD). Further field studies are urgently needed to assess its conservation status accurately.

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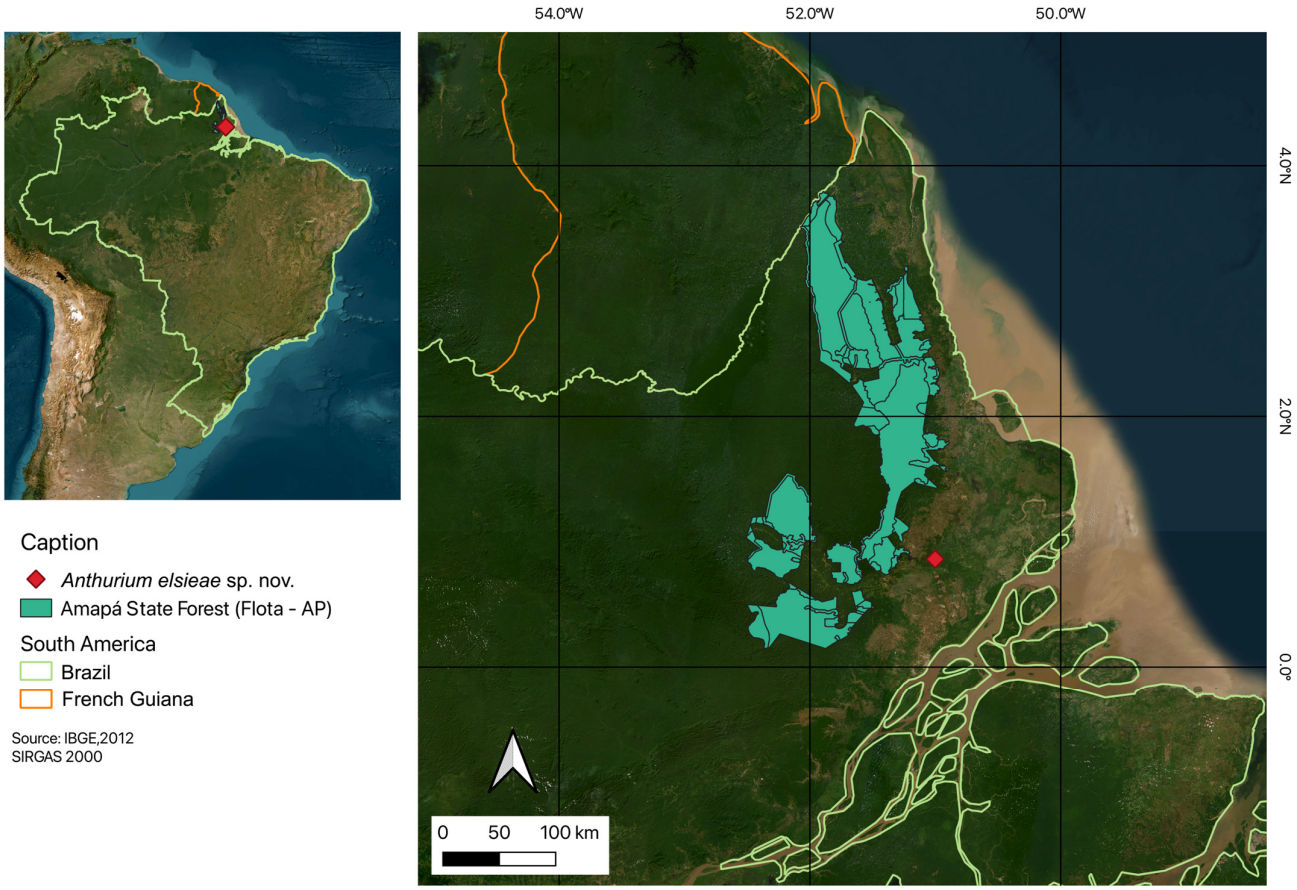

Figure 3. Occurrence map of *Anthurium elsieae* sp. nov. in Amapá state, Brazil. Source: IBGE, 2012. Software: QGIS.org. Map by M.d.C.C.

4. Discussion

The discovery of *A. elsieae* in the Guiana Shield region of the Brazilian Amazon is biogeographically significant. The Guiana Shield is known for its high levels of endemism and its role as a refugium during Pleistocene climatic fluctuations [23]. Several *Anthurium* species, are widespread across this region, including *A. clavigerum* Poepp, while others, like the newly described *A. elsieae*, appear to be micro-endemics [3,11]. The Amapá coastal region, where the species was found, is a transition zone between Guianan and Brazilian Amazonian floras, and its botanical diversity is still poorly sampled [24].

The description of *A. elsieae* from a site near the Flota Amapá (outside its official polygon) highlights the importance of surveying areas adjacent to protected units, as these may harbor undocumented biodiversity. The species is described as a singleton (based on a single fertile individual), and the "Data Deficient" status recommended here highlights a critical gap in knowledge, particularly regarding its reproductive biology and fruiting period. Targeted field surveys are needed to determine its actual geographic range, population size, and specific ecological requirements. Given the increasing threats to Amazonian ecosystems from deforestation, fires, and climate change [23,24], documenting and describing new species like *A. elsieae* is a first step toward developing effective conservation strategies. Its presence underscores the importance of maintaining and properly managing protected areas in the "arc of deforestation" frontier.

5. Conclusions

Anthurium elsieae is described as a new species endemic to the terra firme forests of Amapá in the Eastern Brazilian Amazon. It is morphologically distinct from its congeners

in sect. *Schizoplacium* by characters such as its short petiole (10–13 cm), inconspicuous collective vein positioned close to the leaflet margin (ca. 2 mm), sessile leaflets, short spadix (1.6–1.9 cm), pale green to whitish spadix, and pale green spathe with pinkish margin at anthesis. This discovery adds to the known diversity of *Anthurium* in the Amazon domain and highlights the relevance of continued taxonomic research in underexplored regions. More broadly, these findings emphasize the central role of taxonomy in documenting biodiversity and supporting conservation strategies in a context of rapid environmental change.

Author Contributions: Conceptualization, data curation, data analysis, formal analysis, software, investigation, validation, M.d.C.C.; Methodology, investigation, data curation, M.C.-S.; Methodology, investigation, supervision, resources, funding acquisition, project administration. L.A.P. Writing—original draft, writing—review and editing: M.d.C.C., M.C.-S. and L.A.P. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement: All data supporting the findings of this study are available within the article. Occurrence data used for the GeoCAT (version BETA) analyses derive from the voucher specimen deposited in the AMAPA Herbarium with their respective collection numbers and can be accessed through the herbarium's online platform. As only a single individual was collected, duplicates could not be prepared for deposition in other herbaria.

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Conflicts of Interest: The authors declare no conflicts of interest.

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