Philodendron luisae (Araceae), a new species from Rio de Janeiro State, Brazil

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Abstract

**Background:** Philodendron is the second largest genus of Araceae, with nearly one third of the Brazilian species occurring in Southern Brazil, particularly in Rio de Janeiro state. During a local inventory in Silva Jardim municipality, we found a peculiar population of Philodendron growing in lowland rainforest.

**Results:** After morphological analysis and comparisons with similar species, the population proved to be a new undescribed species of subgenus Philodendron section Macrobelium.

**Conclusions:** The new species, named Philodendron luisae, is here described, illustrated and compared to morphologically close species.

**Keywords:** Aroids; Taxonomy; Conservation; Atlantic forest; Silva Jardim

**Background**

Philodendron Schott is the second largest genus of Araceae, with ca. 480 exclusively Neotropical species (Boyce and Croat 2014). The genus is highly diverse in tropical rainforests, such as the Atlantic Forest of coastal Brazil. Despite the elevated levels of deforestation in the Atlantic Forest (Fundação SOS Mata Atlântica – Instituto Nacional de Pesquisas Espaciais 2014), this biome accounts for ca. 12% of the genus diversity in its overall range and 40% of the genus diversity in Brazil (Sakuragui et al. 2014). These numbers are being constantly increased by the recognition of new species, especially from southeastern Brazil (e.g. Buturi et al. 2014, Calazans and Sakuragui 2013, Coelho 2010, Gonçalves 2011).

In Rio de Janeiro state, Southern Brazil, the genus is represented by an impressive number of species, despite the reduced geographical range and high levels of habitat fragmentation (Sakuragui et al. 2011). Of the 168 Brazilian species, 30 occur in the Rio de Janeiro state (Sakuragui et al. 2014). Although efforts to catalogue the regional flora dates back to the eighteenth century, many localities remain poorly known or even uncollected, especially outside the metropolitan area of the Rio de Janeiro City, justifying intensive sampling efforts.

Here we describe Philodendron luisae sp. nov., an only recently collected and recognized species from Rio de Janeiro State’s lowlands.

**Methods**

During a flora inventory conducted in the Atlantic Forest remnants in Silva Jardim municipality, Rio de Janeiro State, we found an indeterminable Philodendron species. It was recognized as belonging to subgenus Philodendron section Macrobelium and analyzed through the two more comprehensive and updated keys of the section (Croat 1997, Sakuragui et al. 2005). The species was also compared with the type specimens and descriptions of morphologically similar species. The descriptive terminology follows Stearn (2004) and Mayo (1991). Morphological analyses of fresh and dry materials were performed with the aid of a stereoscopic microscope. The extent of occurrence and area of occupancy were calculated using the GeoCAT tool (Bachman et al. 2011).

**Results and discussion**

*Philodendron luisae* Calazans, sp. nov. (Figures 1 and 2).

**Type:**—BRAZIL. Rio de Janeiro: Silva Jardim, road RJ-126, Sítio Além do Horizonte, 22° 32′ 47.8″ S, 42°...
27° 54.1″ W, 07 November 2013, N.G. Antas 181 (holotype, RB; isotypes, NY, K).

**Herb** hemi-epiphytic. **Internodes** 4.7–11(−15) cm long, usually shorter in flowering shoots, 3–4–angular, keeled, greenish becoming light brown, drying often cracked with rhytidome-like layers; **intravaginal squamules** up to 3 per node, inconspicuous, deciduous, becoming dark. **Prophyll** 6.8–10 × 0.1–1.5 cm, triangular, deciduous, slightly keeled, smooth, yellowish becoming cream, drying brown. **Petiole** 11–17 × 0.4–0.6 cm, adaxially flattened, abaxially rounded, glossy green, slightly striated, drying dark brown; **leaf blade** 16–20 × 9–11.3 cm, triangular to cordate-sagittate, smooth, glossy green, abaxially paler, drying membranous, striated, olive-green, strongly discolorous, margin entire, apex acuminate, acumen 1–2 cm long, sometimes curved, base cordate; **anterior division** 12–15.5 cm long, midrib impressed on both faces, drying dark brown, **primary lateral veins** 3–4 pairs, arising from midrib at 70°, 40° and 25–35° angle respectively from the base to the apex, arcuate to margin, impressed on both faces, drying discrete adaxially, dark brown abaxially, **secondary veins** indistinct, parallel to primary veins, numerous, drying evident on both faces, prominent adaxially; **posterior divisions** 3.5–5 cm long, cordate, primary acroscopic veins 2(−3), basal denudation absent. **Inflorescence** solitary; **peduncle** 1.52–2.5 cm long, cylindrical; **spathé** 10–11 cm long, olate, acuminate, acumen ca. 1 cm long, constriction not evident, externally green becoming cream towards the apex, striated, internally cream, reddish at the base, resin canals internally visible; **stipe** absent; **spadix** 8–9 cm long, slender; apical sterile zone 1.3–2.1 cm long, yellowish; fertile male zone 3–3.6 cm long, yellowish; intermediate sterile zone 0.6–0.8 cm long, cream; female zone 3–4.3 cm long, light green; apical staminodes ca. 1 mm long, prismatic; stamens ca.

![Figure 1](https://example.com/philodendron-luisae.jpg)

**Figure 1 Philodendron luisae.** A. Habit, x ½. B. Inflorescence, x 1. C. Apical staminode. D. Stamen. E. Intermediate staminode. F. Gynoecium G. Longitudinal cut of gynoecium and the basal placentation (detail). A from Antas et al. 188 (RB); B-G from Antas 181 (RB).
1 mm long, prismatic; intermediate staminodes ca. 1.5 mm long, prismatic; gynoecium 1.5–2.0 mm long, ovary ca. 1.5 mm long, barrel-shaped, (6)–7–8–locular, 3–4–ovulate, placentation basal, stylar region ca. 0.75 mm long, as wide as the ovary, stigmatic region ca. 0.75 mm long. Berries unknown. Seeds unknown.

Phenology
Collected in flower in November.

Etymology
The species is named in memory of the Biology undergraduate student Luisa Pinho Sartori, who inspired the conservation and educational initiatives promoted by Sartori family.

Distribution and ecology
Only known from three records in reduced Atlantic Ombrophilous Dense Submontane Forest fragments in Silva Jardim municipality, a rural zone of Rio de Janeiro state (Figure 3). The species can be found in small patches of submontane and seasonally flooded forests in areas of regeneration, growing mainly in primary Tabebuia formations associated to the phorophytes Tabebuia cassinoides (Lam.) DC. and Dicksonia sp.. This is indicative of the species’ tolerance to open habitats, which may be interesting
in reforestation projects. The species is also frequently found growing together with *P. nadruzianum* Sakur.

**Conservation**

Our data so far indicate the species as **critically endangered** (CR) - B1ab (ii, iii, iv) - following the categories and criteria of International Union for Conservation of Nature (2012), with extent of occurrence estimated in 32.2 km$^2$. In this category are inserted species facing a high risk of extinction in the wild, with extent of occurrence <100 km$^2$ and very fragmented, known from a single location, with continuing decline inferred for the number of individuals and habitat quality.

All records of *P. luisae* up to now are strongly related to stream margins, an area designated as permanently protected by Brazilian federal law in order to preserve the biodiversity and environmental resources in strategic areas. Additionally, the species is only known from particular properties within the Área de Proteção Ambiental da Bacia do Rio São João/ Mico-Leão-Dourado, a conservation unity of sustainable use (Ministério do Meio Ambiente – Instituto Chico Mendes de Conservação da

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**Table 1 Comparison between *P. luisae* and closely related species**

| Species            | Internodes dimension (cm) and shape | Extrafloral nectaries | Leaf dimension (cm) | Primary lateral veins | Inflorescences per sympodium | Apical sterile zone | Spathe color outside, constriction and opening at anthesis | Resin canals inside the spathe |
|--------------------|-------------------------------------|-----------------------|---------------------|-----------------------|-----------------------------|---------------------|----------------------------------------------------------|-----------------------------|
| *P. fragile*       | 1–5, terete absent                  | 15–37 x 9–24          | 4–5                | 1(−2)                 | absent                      | greenish becoming cream towards the apex, slightly constricted, moderately opened | not visible               |
| *P. luisae*        | 4.7–11(−15), markedly angular      | absent                | 16–20 x 9–11.3     | 3–4                   | present                     | green becoming cream towards the apex, not constricted, moderately opened | visible                   |
| *P. millerianum*   | 2.4–8.5, terete absent              | 20.2–21.7 x 4–11.1    | 4                   | 1                     | present                     | completely white, strongly constricted, slightly opened | not visible               |
| *P. simonianum*    | 2–4, terete absent                  | 36–42 x 14–20         | 3–4                | 3–4                   | present                     | completely white, not constricted, reflexed | not visible               |
| *P. tenuispadix*   | 3–4, terete present                | 51–59 x 24–27         | 6–8                | 1–3                   | present                     | completely green, slightly constricted, almost completely opened, but not reflexed | not visible               |

Information from *P. millerianum*, *P. simonianum* and *P. tenuispadix* according to the original publications (Coelho and Sakuragui 2007, Sakuragui 2001 and Gonçalves 2002, respectively); from *P. fragile* according to Sakuragui et al. (2005).
Biodiversidade 2008). The region suffered historical fragmentation due to selective extraction of timber and farming practices (Carvalho et al. 2006, Guedes-Bruni et al. 2006), however, the forest remnantss are very representative of the Atlantic Ombrophilous Dense Submontane Forest, being of high priority for conservation (Carvalho et al. 2006). These remnants compose the ecological corridor Mosaico Central Fluminense along with the conservation units Parque Estadual dos Três Picos, Parque Nacional da Serra dos Órgãos, Reserva Biológica Poço das Antas and Reserva Biológica União (Instituto Estadual do Ambiente 2013) (Figure 3). Probably, populations of P. luisae may be found in the lowlands of this ecological corridor, assured within protected areas.

The association between P. luisae and the phorophyte T. cassinooides is interesting from the conservational viewpoint since this tree is currently threatened and listed in the Red List of the Brazilian Flora (Lohmann et al. 2013). The tree has suffered an intensive selective extraction due to its high quality timber, used mainly for the manufacturing of shoes (Lohmann et al. 2013). This activity probably caused impact on the natural populations of P. luisae in the Tabebuia formation, contributing to the fragmented distribution currently known.

Paratype
Brazil, Rio de Janeiro: Silva Jardim, road RJ-126, Fazenda Novo Horizonte, 22° 33’ 08.0” S, 42° 29’ 49.6” W, 13 November 2013, N.G. Antas et al. 188 (MBML, RB, SPF).

Features and affinities
Philodendron luisae can be promptly recognized by its small and fragile leaves (often ripped when adult) and 3–4-angular, light brown colored stem. The overall leaf shape and inflorescence with apical sterile zone makes this species close to P. simonianum Sakur. and P. tenuispadix E.G.Gonç., but it differs by its longer internodes, smaller leaf blade, number of primary lateral veins, number of inflorescences per sympodium, absence of extrafloral nectaries and spathe features (Table 1). When the leaves are still young, P. luisae also resembles P. fragile Nadruz & Mayo and P. millerianum Nadruz & Sakur. by its triangular and fragile leaves without well developed posterior divisions, but the species show a number of differences between them (Table 1).

Moreover, among these related species, P. luisae is the unique known to grow in swamp forest, a vegetation formation frequently more open and exposed to seasonality than the humid and shaded forests where the most of Philodendron species occurs.

Conclusions
Philodendron luisae is a new species easily recognizable and well supported and represents the 31st species record for Rio de Janeiro State. The species, only known from one locality, exemplifies the importance and urgency of local and regional floras to a broader knowledge of the Brazilian biodiversity.

Competing interests
The authors declare that they have no competing interests.

Authors’ contributions
LSBC, NGA and CMS collected and discovered the new species; LSBC carried out the morphological analyses; NGA provided the floristic information; all authors prepared, read and approved the final manuscript.

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