Hoehnea 51: e602023, 2024 http://dx.doi.org/10.1590/2236-8906e602023

Apocynaceae Juss. in the Núcleo Curucutu, Parque Estadual Serra do Mar, São Paulo State, Brazil

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How to cite: Vasconcelos, B.C., Vaz, L.M.C., Bianchi, J.M. & Affonso, P. 2024. Apocynaceae Juss. in the Núcleo Curucutu, Parque Estadual Serra do Mar, São Paulo State, Brazil. Hoehnea 51: e602023. http://dx.doi.org/10.1590/2236-8906e602023

ABSTRACT – (Apocynaceae Juss. in the Núcleo Curucutu, Parque Estadual Serra do Mar, São Paulo State, Brazil). This paper consisted of the taxonomic survey of Apocynaceae in the Núcleo Curucutu. For better identification of the species, identification key, morphological descriptions, illustrations, geographical distribution and phenological data are provided. The family is represented in the area by eight species: *Ditassa gracilis* Han.-Mazz., *Mandevilla atroviolacea* (Stadelm.) Woodson, *M. fragrans* (Stadelm.) Woodson, *M. funiformis* (Vell.) K.Schum., *Orthosia scoparia* (Nutt.) Liede & Meve, *Oxypetalum insigne* (Decne.) Malme, *O. pachyglossum* Decne., and *Peplonia axillaris* (Vell.) Fontella & Rapini.
Keywords: *Ditassa, Mandevilla, Orthosia, Oxypetalum, Peplonia*

RESUMO – (Apocynaceae Juss. no Núcleo Curucutu, Parque Estadual Serra do Mar, Estado de São Paulo, Brasil). Este trabalho consistiu no levantamento taxonômico de Apocynaceae no Núcleo Curucutu. Para melhor identificação das espécies, são fornecidas chave de identificação, descrições morfológicas, ilustrações, distribuição geográfica e dados fenológicos. A família está representada na área por oito espécies: *Ditassa gracilis* Hand.-Mazz., *Mandevilla atroviolacea* (Stadelm.) Woodson, *M. fragrans* (Stadelm.) Woodson, *M. funiformis* (Vell.) K.Schum., *Orthosia scoparia* (Nutt.) Liede & Meve, *Oxypetalum insigne* (Decne.) Malme, *O. pachyglossum* Decne. e *Peplonia axillaris* (Vell.) Fontella & Rapini.
Palavras-chave: *Ditassa, Mandevilla, Orthosia, Oxypetalum, Peplonia*

Introduction

Apocynaceae is a family of the order Gentianales Berchtold & J. Presl, distributed across all continents except Antarctica, predominantly found in the pantropical region, with some representatives in the temperate region. The family comprises 378 genera and 5,350 species. In Brazil, there are 96 genera, five of which are endemic, totaling 977 species, with 438 being endemic. In São Paulo State, 46 genera and 186 species are reported (Stevens 2017, Endress *et al.* 2018, Apocynaceae *in* Flora e Funga do Brasil).

Representatives of the family exhibit various habits such as herbs, subshrubs, shrubs, trees, or frequently lianas. They typically contain latescent, usually white latex, less frequently translucent, yellowish, or reddish. The leaves are often opposite, simple, and lack stipules. The inflorescence is racemose or cymose, occasionally reduced to a single flower. The flowers are bisexual, with a pentamerous calyx that may be dialysepalous or gamosepalous. The corolla is also pentamerous and gamopetalous. The stamens are isostemonous, epipetalous, with filaments smaller than the anthers. Nectary glands are often arranged around the ovary, though occasionally absent. The gynoecium is 2-carpellate, dialicarpellate with united styles, or less frequently gamocarpellate. The ovary is superior, rarely inferior. The fruit is a follicle, dry, or rarely fleshy, and may be a capsule, drupe, or berry. Seeds often have a comose structure, sometimes with wings or enveloped by a fleshy aril. (Kinoshita 2005, Souza & Lorenzi 2012, Stevens 2017, Endress *et al.* 2018, Apocynaceae *in* Flora e Funga do Brasil).

Regarding economic aspects, the family exhibits ornamental potential, with noteworthy species such as *Catharanthus roseus* (L.) Don (periwinkle), *Nerium oleander* L. (oleander), and *Plumeria rubra* L. (frangipani) due to their attractive flowers (Souza & Lorenzi 2012). In terms of food use, *Hancornia speciosa* Gomes (mangabeira) produces highly appreciated fruit. In the realm of folk medicine, *C. roseus* yields leucocristine and vincristine, substances utilized in cancer treatment. Additionally, in other economic sectors, *Aspidosperma polyneuron* Müll. Arg. (peroba) and *A. australe* Müll.Arg. (guatambu) provide high-quality wood, employed in construction and the production of furniture and tools (Rapini 2000).

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The current study is a component of the Flora of Núcleo Curucutu project, carried out through collaboration between Universidade Santo Amaro (UNISA) and the PMSP herbarium. Within the order Gentianales, this marks the second research endeavor within the study area, the first was conducted on Gentianaceae (Pscheidt & Affonso 2008). Additional investigations encompass some asterid families, such as Ericaceae (Takeuchi & Affonso 2009) and Gesneriaceae (Affonso *et al.* 2014).

To advance the taxonomic study of Apocynaceae in the Núcleo Curucutu, we conducted collections, identifications, illustrations, descriptions, an identification key, geographic distribution analysis, and phenological data assessment. This effort contributes to enhancing our understanding of the local flora, the São Paulo State, and the Atlantic Forest.

Material and methods

The Núcleo Curucutu, situated at 23°59'09.7"S and 46°44'32.5"W, was established in 1977 concurrently with the Parque Estadual Serra do Mar. It encompasses a total area of 37,512 hectares, spanning the municipalities of Itanhaém, Juquitiba, Mongaguá, and São Paulo (PESM 2022).

The region comprises cloud forest and grassland vegetation. It receives an annual precipitation of 2000-3000 mm/year and experiences a temperate rainy climate characterized by hot and rainy summers, as well as milder winters (Bellato & Mendes 2002, Mofatto *et al.* 2005).

Visits to the study area were conducted in 2015 for data collection. Procedures for material preparation and conservation adhered to the methodology outlined by Fidalgo & Bononi (1989). The specimens under examination are in the collection of the UNISA and the PMSP herbarium, representing collections made both prior to and during this study. In support of our research, we consulted the herbaria collections of PMSP, SP, SPF, and SPSF (acronyms according to Thiers [continuously updated]).

For identifications and descriptions, specialized literature was consulted (Pereira 2005, Kinoshita 2005, Monguilhot & Mello-Silva 2008, Villagra 2008, Matozinhos & Konno 2011). Morphological terms from Harris & Harris (1994), Kinoshita (2005), and Gonçalves & Lorenzi (2011) were utilized. Illustrations were hand-drawn with the assistance of a stereomicroscope and finalized by the illustrator Felipe Martins Guedes. Flowering and fruiting data were extracted from the labels in the exsiccates.

Results and Discussion

For the Núcleo Curucutu, eight species of Apocynaceae were recorded: *Ditassa gracilis* Hand.-Mazz., *Mandevilla atroviolacea* (Stadelm.) Woodson, *M. fragrans* (Stadelm.) Woodson, *M. funiformis* (Vell.) K.Schum, *Orthosia scoparia* (Nutt.) Liede & Meve, *Oxypetalum insigne* (Decne.) Malme, *O. pachyglossum* Decne., and *Peplonia axillaris* (Vell.) Fontella & Rapini.

Identification key for Apocynaceae of Núcleo Curucutu

1. Flowers provided of corona and gynostegium
   2. Branches bilaterally pubescent; blade elliptic to oblong, apex mucronate; corona double ..... *Ditassa gracilis*
   2. Branches glabrous, unilaterally pubescent or villous; blade lanceolate, elliptic or oblong-lanceolate, apex acuminate or acute; corona single
      3. Pedicel glabrous or pubescent
         4. Inflorescence 1-4-flowered, pedicel pubescent ..... *Orthosia scoparia*
         4. Inflorescence 10-21-flowered, pedicel glabrous ..... *Peplonia axillaris*
      3. Pedicel pubescent, villous or tomentose ..... *Oxypetalum*
         5. Base of the adaxial face of the blade with 2 colleters; 3-4-flowered; pedicel pubescent to villous; corolla lobes twisted; corona segments do not extend beyond anthers; retinaculum oblong, caudicles horizontal .... *Oxypetalum insigne*
         5. Base of the adaxial face of the blade with 4 colleters; 10-20-flowered; pedicel tomentose; corolla lobes erect; corona segments extend beyond anthers; retinaculum linear, caudicles descending .... *Oxypetalum pachyglossum*
1. Flowers devoid of corona and gynostegium ..... *Mandevilla*
   6. Flowers zygomorphy, lacinia of the calyx with 1 colleter, corolla yellowish ..... *Mandevilla funiformis*
   6. Flowers actinomorphic, lacinia of the calyx with 4 to 5 colleters, corolla white or red
      7. Lacinia of the calyx oval-lanceolate, 4 colleters; corolla white, lobes slightly recurved ..... *Mandevilla fragrans*
      7. Lacinia of the calyx lanceolate, 5 colleters; corolla vinaceous, lobes erect ..... *Mandevilla atroviolacea*

Ditassa gracilis Hand.-Mazz., Denkschr. Kaiserl. Akad. Wiss, Wien Math.-Naturwiss. Kl. 79: 2. 1910.
Figures 1 a-c, 3 a-c

Subshrub volute; branches bilaterally pubescent. Leaves opposite, discolors, 2 colleters on the adaxial face at the base of the midrib; petiole 2-6 mm long, glabrous; blade 3-2.5 × 2-9 mm, elliptic to oblong, apex mucronate, base cuneate or acute, margin revolute, hairiness on the margin, at the apex and base of the blade. Inflorescence umbelliform, axillary, 2-6-flowered; peduncle 1.5-6 mm long, glabrous to sparsely pubescent. Pedicels 2-3 mm long, glabrous; sepals 0.6-1 × 0.5 mm long, not exceeding the throat of the corolla, ovate, glabrous; corolla white, campanulate, tube 0.63-0.78 mm long, lobes 1-1.2 × 0.8 mm, erects, ovate to

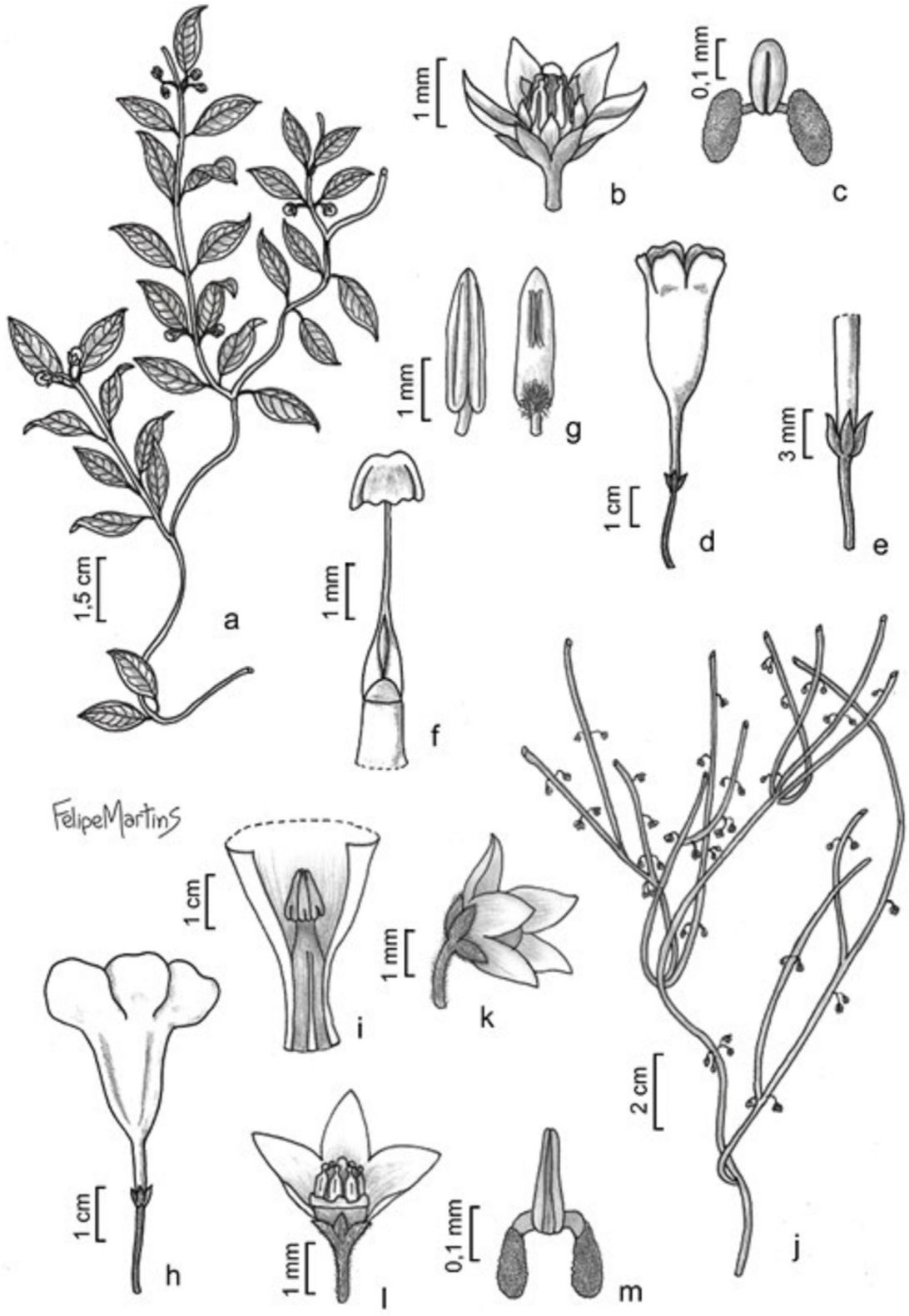

Figure 1. a-c. *Ditassa gracilis* Hand.-Mazz., a. Branches. b. Flower with gynostegium. c. Pollinarium. d-e. *Mandevilla atroviolacea* (Stadelm.) Woodson. d. Flower. e. Sepals. f-g. *Mandevilla fragrans* (Stadelm.) Woodson. f. Gynoecium and nectary. g. Anther. j-m. *Orthosia scoparia* (Nutt.) Liede & Meve. j. Branches. k. Flower. l. Gynostegium. m. Pollinarium.

ovate-lanceolate, externally glabrous, internally papillose; corona double, segments welded together at the base, the external ones inserted into the corolla tube and attached internally to the internal segments that are attached to the gynostegium, segments external of corona ca. 1 × 0.8 mm, exceeding the gynostegium, apex slightly tridentate, the internal ca. 0.5 × 0.2 mm, welded at the base of anthers, smaller than gynostegium, strait-triangulate, apex truncate. Gynostegium sessile; appendage membranaceous ca. 0.2 mm long, suborbicular, 20 locules situated along the gynostegium, locular part of the anthers ca. 1 mm long, subrectangular, wings longer than the dorsal part; retinaculum ca. 0.16 × 0.06 mm, oblong, caudicles ca. 0.06 mm long, horizontal, inserted laterally to pollinia, flattened with reticulated expansions, pollinia ca. 0.16 × 0.06 mm, oblong; style appendage ca. 0.3 mm long, umbilicate. Follicles 2.9-3.5 cm long, fusiform, green and striated; coma 1.9-2.4 cm long; seeds 0.7 × 0.25 cm, lanceolate, warty.

Examined material: BRAZIL. São Paulo: São Paulo, Parque Estadual Serra do Mar - Núcleo Curucutu, Trilha do Mirante, fl., fr., 28-III-1996, *G.M.P. Ferreira 63* (SPF); Trilha do Campo, fl., 12-VI-1996, *R.J.F. Garcia 904* (PMSP); Trilha do Mirante, fl., fr., 20-XII-1996, *R.J.F. Garcia 992* (PMSP); Trilha do Campo, fl., 15-XI-1997, *R.J.F. Garcia 1367* (UNISA, PMSP); Trilha do Mirante, fl., 07-III-1998, *P. Affonso 206* (UNISA, PMSP); Trilha do Campo, fl., 19-IX-1998, *J.R. Pirani 4431* (SPF); Trilha à direita do marco da Trilha do Campo, fl., 29-IV-1999, *L.C.Q.M.P. Sampaio 178* (UNISA); Trilha do Mirante, fl., 21-XII-1999, *P. Affonso 429* (UNISA); Trilha à direita do marco da divisa São Paulo-Itanhaém, fl., 16-III-2000, *M. Alves 1923* (PMSP).

Ditassa gracilis is endemic to Brazil, occurring in the Atlantic Forest in the States of Rio de Janeiro and São Paulo (Apocynaceae *in* Flora e Funga do Brasil). It blooms in February, March, June, September, November, and December (Pereira 2005). Flowering observations at Núcleo Curucutu indicate occurrences in March, April, June, September, November, and December, with fruiting observed in March and December.

Ditassa gracilis can be confused with *D. conceptionis* Fontella, it differs in that its outer corona segments are tridentate at the apex and its inner segments are narrow-triangular. In contrast, *D. conceptionis* has entire outer segments of the corona and inner segments reduced to small folds (Pereira 2005).

The species can be distinguished from others found in Núcleo Curucutu by the presence of bilaterally pubescent branches, leaves with a mucronate apex, and pilosity on the margin, apex, and base of the blade.

Mandevilla Lindl.

Lianas, branches glabrous, the olders volute or not, the lateral erects, short, leafy or not. Leaves opposite; blade elliptic, oblong or oblong-elliptic, apex acuminate or long-acuminate, base attenuate, rounded to truncate, margin flat, glabrous, face adaxial sharp; 1-2 colleters at the base of the midrib from the adaxial face; venation brochidodromous, barely visible on both sides. Inflorescence racemose, axillary, pauciflora, 2-4-flowered. Flowers actinomorphic to lightly zygomorphic, showy; lacinia of the calyx lanceolate, oval-lanceolate or triangular-lanceolate, colleters opposite to the inner face of each lacinia; corolla vinaceous, white to yellow, infundibuliform, throat yellow to reddish, lobes slightly recurved to erect, obovate; stamens included, base of anthers tomentose, anthers attached to the stigma, base cordate; 2 nectaries alternate to the carpels, ovary ovoid, superior, apocarpous, 2-locular, glabrous, style long, stigma umbraculiform, with 5 longitudinal projections along its entire length, appendage apical bifid. Follicles fusiform or cylindrical; seeds comose.

Mandevilla is a neotropical genus comprising approximately 100 species. It is distributed in North America (only in Mexico), Central America (including the Antilles), and South America. In Brazil, the genus is found throughout all States, consisting of 71 species, with 44 being endemic. In São Paulo State, 23 species are recorded. (Sales 1993, Koch & Kinoshita 1999, Apocynaceae *in* Flora e Funga do Brasil).

Mandevilla atroviolacea (Stadelm.) Woodson, Ann. Missouri Bot. Gard. 20(4): 724-725. 1933.
Figures 1 d-e, 4 a-b

Branches older volute, short and leafy. Petiole 0.5-1.1 cm long, glabrous; blade 2-4 × 1-2.5 cm, elliptic, apex acuminate, base attenuate; 1-2 colleters at the base of the midrib of the adaxial face. Inflorescence 3-flowered; peduncle 2.4-2.8 cm long, glabrous. Flowers actinomorphic 5.1-6.3 cm long; pedicels 1.3-1.7 cm long, glabrous; lacinia of the calyx 0.3-0.4 × 0.15-0.18 cm, lanceolate, 5 colleters arranged in series internally; corolla vinaceous to atroviolaceous, tube inferior 1.4-1.9 × 0.2-0.3 cm, tube superior 2-2.5 × 1.5-1.7 cm, cylindrical, throat yellow, lobes 1.4-1.5 × 1.2 cm, erects, darker than the tube; anther ca. 1.3 cm long; ovary ca. 0.2 cm long, style 1.5 cm long, stigma ca. 0.2 cm long. Follicles ca. 13.5 cm long, cylindrical incurved; coma ca. 0.8-1.5 cm long; seeds ca. 0.3-0.5 cm long, oblong, less often ovoid.

Examined material: BRAZIL. São Paulo: São Paulo, Parque Estadual Serra do Mar - Núcleo Curucutu, Trilha do Campo, fl., fr., 15-XI-1997, *R.J.F. Garcia 1364* (PMSP, UNISA); Caminho do Mirante, fl., 02-XII-1998, *R.J.F. Garcia 1677* (SP); Trilha do Rio Embu-Guaçu, fl., fr., 29-X-1999, *R.J.F. Garcia 1777* (PMSP, UNISA).

Additional examined material: BRAZIL. São Paulo: Campinas, fl., fr., 06-XI-1938, *S. Trevisan s/n* (SP); São Paulo, Jaraguá, pico do morro, fl., fr., 22-XII-1912, *A.C. Brade 5690* (SP).

Mandevilla atroviolacea is endemic to Brazil, occurring in the Cerrado and Atlantic Forest. It is distributed in the States of Espírito Santo, Minas Gerais, Paraná, Rio de Janeiro, Santa Catarina, and São Paulo (Apocynaceae *in* Flora e Funga do Brasil). Flowering was recorded in November and December, with fruiting observed in September (Kinoshita 2005). In Núcleo Curucutu, it was found to flower and fruit between October and November.

Mandevilla atroviolacea displays similarities to *M. sellowii* (Müll.Arg.) Woodson, but it distinguishes

itself through the coloration of the corolla, ranging from vinaceous to atroviolaceous, whereas *M. sellowii* features a pinkish corolla (Monguilhot & Mello-Silva 2008).

In Núcleo Curucutu, the species is characterized by vinaceous flowers with yellow throat and lobes darker than the tube, and the presence of five colleters arranged internally to the sepals, thus differing from other species.

Mandevilla fragrans (Stadelm.) Woodson, Ann. Missouri Bot. Gard. 20(4): 713-714. 1933.
Figures 1 f-g, 4 e-g

Branches older volute, short and leafy. Petiole 0.6-1.3 cm long, tomentose; blade 2.1-4.5 × 1-2.6 cm, elliptic to oblong-elliptic, apex acuminate, base attenuate; 2 colleters at the base of the midrib of the adaxial face. Inflorescence 2-4-flowered; peduncle 2.2-3 cm long, tomentose. Flowers actinomorphic 4.7-7.1 cm long; pedicels 0.7-1.6 cm long, tomentose; lacinia of the calyx 0.4-0.6 × 0.1-0.2 cm, oval-lanceolate, 4 colleters arranged in series internally; corolla white, tube inferior 1.5-1.7 × 0.2-0.3 cm, tube superior 2-3 × 0.9-2 cm, throat yellow, lobes 1.5-2 × 1.2-1.3 cm, slightly recurved; anther ca. 0.8 cm long; ovary ca. 0.2 cm long, style ca. 1.7 cm long, stigma ca. 0.1 cm long. Follicles 11.7-12 cm long, cylindrical; coma 1.6 cm long; seeds ca. 0.3 cm long, strait-elliptic.

Examined material: BRAZIL. São Paulo: São Paulo, Parque Estadual Serra do Mar - Núcleo Curucutu, Trilha à direita do marco, a partir da trilha do campo, fl., 19-IX-1998, *R.J.F. Garcia 1589* (PMSP); Trilha da Mata Baixa, acompanhando linha de drenagem, à direita da estrada da entrada, fl., 28-X-1998, *R.J.F. Garcia 1614* (PMSP); Trilha do Rio Embu-Guaçu, fl., fr., 29-X-1999, *R.J.F. Garcia 1776* (PMSP, UNISA); Trilha do Rio Capivari, fl., 09-X-2007, *P. Affonso 1019* (UNISA).

Mandevilla fragrans is endemic to Brazil, with a distribution in the Atlantic Forest within the States of Rio de Janeiro and São Paulo (Apocynaceae *in* Flora e Funga do Brasil). Flowering occurrences were documented between January and April (Sales 1993, Kinoshita 2005). Within the Núcleo Curucutu, the species was observed in bloom during September and October, with fruiting observed in October.

Mandevilla fragrans can be confused with *M. permixta* Woodson, but it differs in its narrower leaves, measuring 1-2.6 cm wide, whereas *M. permixta* has broader leaves with 3.4-4 cm wide (Sales 1993).

The species exhibits a showy flower with an alveolate color and a yellow throat, lobes that are slightly recurved, and four colleters internally arranged on the sepals. These characteristics distinguish it from other species in the studied area.

Mandevilla funiformis (Vell.) K.Schum., Nat. Pflanzenfam. 4(2): 171. 1895.
Figure 4 c-d

Branches volute. Petiole 0.7-1.4 cm long; blade 1.8-5.5 × 0.7-2.9 cm, oblong, apex long-acuminate, base rounded to truncated; 2 colleters at the base of the midrib of the adaxial face. Inflorescence 2-9-flowered; peduncle 1.2-5 cm long, glabrous. Flowers slightly zygomorphic 4.7-6 cm long; pedicels 1-2.9 cm long, glabrous; lacinia of the calyx 0.2 × 0.08-0.1 cm, triangular-lanceolate, 1 colleter opposite at the base of the adaxial face of each lacinia; corolla yellow, tube inferior ca. 15 × 2-3 mm long, botuliform, tube superior 1.7-2.4 × 1.1-1.3 cm, throat reddish, lobes 1.4-1.7 × 1.8 cm, obovate-oblique, slightly recurved; anther ca. 0.7 cm long; ovary ca. 0.3 cm long, style ca. 1.6 cm long, stigma ca. 0.2 cm long. Follicles 8-9 cm long, cylindrical; coma 0.8-0.9 cm long; seeds 0.5-0.6 cm long, fusiform.

Examined material: BRAZIL. São Paulo: São Paulo, Parque Estadual Serra do Mar - Núcleo Curucutu, Trilha do Rio Embu-Guaçu, fl., 19-XII-1996, *R.J.F. Garcia 973* (PMSP); Trilha da Estrada da Entrada, próximo ao reflorestamento de Pinus, fl., fr., 19-X-1997, *R.J.F. Garcia 1324* (PMSP, UNISA); Trilha da Entrada, campo à direita, fl., 28-I-1999, *P. Affonso 335* (UNISA); Trilha do Rio Embu-Guaçu, fl., 11-XII-2002, *R.A. Alves 47* (PMSP); Trilha da Mata da Entrada da Sede (lado direito), fl., 11-XII-2006, *P. Affonso 951* (UNISA).

Mandevilla funiformis is endemic to Brazil, occurring in the Atlantic Forest in the States of Bahia, Minas Gerais, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, and São Paulo (Apocynaceae *in* Flora e Funga do Brasil). Flowering records have been made for the months of October through March, with fruiting observed from July through October (Sales 1993, Kinoshita 2005). In Núcleo Curucutu, it has been documented to flower in January, October, and December, while fruiting occurs in October.

Mandevilla funiformis may be mistaken for *M. guanabarica* Casar. *ex* M.F.Sales *et al.* because both exhibit a yellow infundibuliform corolla. However, they can be distinguished by the length of the peduncle and the corolla. While *M. funiformis* features a peduncle measuring 1.2-5 cm long and a corolla spanning 5.5-6.5 cm long, *M. guanabarica* possesses a peduncle ranging 0.1-8 mm long and a corolla measuring 3.5-5 cm long (Sales 1993).

In Núcleo Curucutu, it distinguishes itself from other species by possessing a long-acuminate leaf apex, one colleter opposite the sepal internally, and a corolla with recurved lobes that is yellowish in color.

Orthosia scoparia (Nutt.) Liede & Meve, Novon 18(2): 207. 2008.
Figures 1 j-m, 4 h-i

Subshrub volute; branches glabrous to unilaterally pubescent. Leaves opposite, caducous in flowering, blade 0.3-0.8(-1) × 0.1-0.2 cm, narrow-elliptic to linear, apex acute to attenuate, base attenuate, margin flat, pilosulose at the margin. Inflorescence thyrse or cyme, bracteate, 1-4-flowered, alternate, peduncle 6-15 cm long, glabrous. Pedicels 2-3 mm long, pubescent; sepals 0.55-0.72 × 0.44-0.5 mm, with 1-2 axillary colleters, ovate, externally pubescent to glabrous; corolla rotate, vinaceous, tube ca. 0.8 mm long, lobes erect 0.64-0.9 × 0.6-0.79 mm, oval-lanceolate, glabrous; corona simple, segments ca. 0.3 × 0.2 mm, rounded, attached to the base, not exceeding the anthers. Gynostegium sessile; apical membranous

appendage of the anthers oval-triangular, locular part of the anthers ca. 0.7 mm long, subquadrate, wings longer than the dorsal part; retinaculum ca. 0.13 × 0.03 mm, oblong, caudicles ca. 0.03 mm long, descending, oblique-descending, pollinia ca. 0.09 × 0.03 mm, clavate; stylar-head mammillate. Follicles not observed.

Examined material: BRAZIL. São Paulo: São Paulo, Parque Estadual Serra do Mar - Núcleo Curucutu, Trilha do Campo, fl., 12-VI-1996, *R.J.F. Garcia 880* (PMSP); Trilha do Rio Embu-Guaçu, fl., 08-VII-1997, *P. Affonso 31* (UNISA, PMSP); Trilha do Rio Capivari, fl., 03-IV-1998, *P. Affonso 257* (UNISA, PMSP); Trilha do Mirante, ao redor do 1º lago, fl., 04-VI-1998, *R.J.F. Garcia 1498* (PMSP, UNISA); Trilha do Campo, ao lado direito da estrada da entrada, fl., 02-VII-1999, *L.C.Q.M.P. Sampaio 243* (PMSP).

Additional examined material: BRAZIL. São Paulo: Biritiba Mirim, Estação Biológica de Boracéia, fl., 11-V-1984, *A. Custodio Filho 2426* (SP); Paranapiacaba, Estação Biológica, fl., 11-IX-1984, *M. Sugiyama 544* (SP).

Orthosia scoparia is native to Brazil, but not endemic. It is found in the Atlantic Forest in the States of Ceará, Espírito Santo, Minas Gerais, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, and São Paulo (Apocynaceae *in* Flora e Funga do Brasil). Flowering has been documented in March, June, November, and December (Kinoshita 2005). In Núcleo Curucutu, it was observed flowering in April, June, and July, with no recorded fruiting.

Orthosia scoparia can be confused with *O. guilleminiana* (Decne.) Liede & Meve. It is distinguished by the vinaceous corolla and rounded corona segments. In contrast, *O. guilleminiana* typically exhibits a greenish to yellowish corolla and oval to deltoid corona segments (Liede-Schumann & Meve 2008).

In Núcleo Curucutu, the species differs from others due to the absence of leaves during flowering, featuring diminutive and vinaceous flowers. Additionally, it forms clusters of erect branches on trees, supporting the findings of Monguilhott & Mello-Silva (2008) and Matozinhos & Konno (2011).

Oxypetalum R.Br.

Shrubs, branches glabrous, pubescent to villous. Petioles pubescent to villous or with small and sparse pilosulose; blades lanceolates to elliptics, apex acuminate, base subcuneate to cordate, cuneate, rounded, subcordate, margin revolute or not, glabrous to pubescent, 2-4 colleters at the base of the midrib of the adaxial face. Inflorescence corymbiform, pauci (3-4-flowered) or multiflora (10-20-flowered), axillary, alternate. Pedicels tomentose, pubescent to villous; sepals lanceolate, pilosulose sparse externally or villous, internally glabrous, colleters axillary or not; corolla green to yellowish-green, greenish, cream-green with vinous base, tube externally glabrous, internally barbellate to pubescent, lobes lanceolate, linear to linear-lanceolate, erect or twisted, patent or not, externally glabrous, internally papillose to puberulent; corona segments free, exceeding or not the anthers, rectangular or oblong, apex bifid or truncate, thickened or verrucose, provided internally or not with a dentiform extension. Gynostegium sessile or subsessile, locular part of the anther quadrangular or rectangular, wings surpassing the dorsal part, oblong or oval membranous appendage; retinaculum oblong or linear, caudicles horizontal or descending, lateral tooth curved, included, reticulate membrane conspicuous; pollinia pendulous, oblong; stylar-head barely visible or not, conical, cylindrical, cleft at the apex into two laminar branches or not, 3-lobulate or not. Follicles fusiform, slightly striate, pubescent; seeds comose, oval.

Oxypetalum is a neotropical genus, ranging from Mexico to Argentina. Among its species, 88 are found in Brazil, with 48 being endemic, predominantly in the States of Minas Gerais and São Paulo. In São Paulo State, 43 species are recorded (Monguilhott & Mello-Silva 2008, Apocynaceae *in* Flora e Funga do Brasil).

Oxypetalum insigne (Decne.) Malme, Ark. Bot. 21 A(3): 31. 1927.
Figures 2 a-c, 3 d-e

Branches pubescents to villous. Petiole 0.5-1.5 cm long, pubescent to villous; blade 2.5-6.9 × 1.1-3 cm, lanceolate to elliptic, base subcuneate to cordate, cuneate, rounded, subcordate, margin revolute or not, pubescent, more concentrated on the margins and midrib, 2 colleters at the base of the adaxial face. Inflorescences pauciflora, 3-4-flowered; peduncle 0.8-1.8 cm long, pubescent to villous. Pedicels 0.7-2.3 cm long, pubescent to villous; sepals 2-4 × 0.4-0.8 mm, externally villous; corolla green-yellowish, greenish, cream-greenish with vinaceous base, tube 0.2-0.3 cm long, internally pubescent, lobes 8-10 × 1.8-2 mm, linear to linear-lanceolate, twisted, internally puberulent; corona segments ca. 0.2 × 0.13 cm long, not surpassing the anthers, rectangular, apex truncate, verrucose, provided internally of a prolongation dentiform, free from the middle region, sometimes at the base expanding into two folds. Gynostegium ca. 3.2 mm long, sessile, locular part of anther ca. 0.5 mm long, quadrangular, membranous appendage oblong; retinacle ca. 0.72 × 0.19 mm, linear, caudicles ca. 0.03 mm long, horizontal, pollinia 0.25 × 0.08 mm; stylar-head ca. 2.5 mm long, white on vinous base, cylindrical, visible, split only at apex into two laminar branches 3-lobed. Follicles 5 × 1.5 cm; coma 2-2.5 cm long; seeds 0.8-0.9 × 0.3 cm, oval or obtuse.

Examined material: BRAZIL. São Paulo: São Paulo, Parque Estadual Serra do Mar - Núcleo Curucutu, Trilha do Campo, fl., 18-I-1996, *R. Simão-Bianchini 913* (PMSP); Trilha do Campo, fl., 18-X-1997, *R.J.F. Garcia 1301* (PMSP); Trilha do Campo, fl., 15-XI-1997, *R.J.F. Garcia 1365* (PMSP, UNISA); Trilha da Estrada Principal, fl., 17-IV-1998, *C.M. Izumisawa 75* (PMSP, UNISA); Campo à direita da estrada da entrada, fl., 17-IV-1998, *L.C.Q.M.P. Sampaio 33* (PMSP, UNISA); Trilha não determinada, fl., 15-V-1998, *L.C.Q.M.P. Sampaio 87* (PMSP, UNISA); Trilha da Estrada da Entrada, fl., 28-X-1998, *R.J.F.Garcia 1619* (PMSP); Trilha do Campo da Entrada, lado direito, fl., 18-III-1999, *P. Affonso 369* (UNISA); Trilha do Rio Capivari, fl., 09-X-2007, *C.V. Silva*

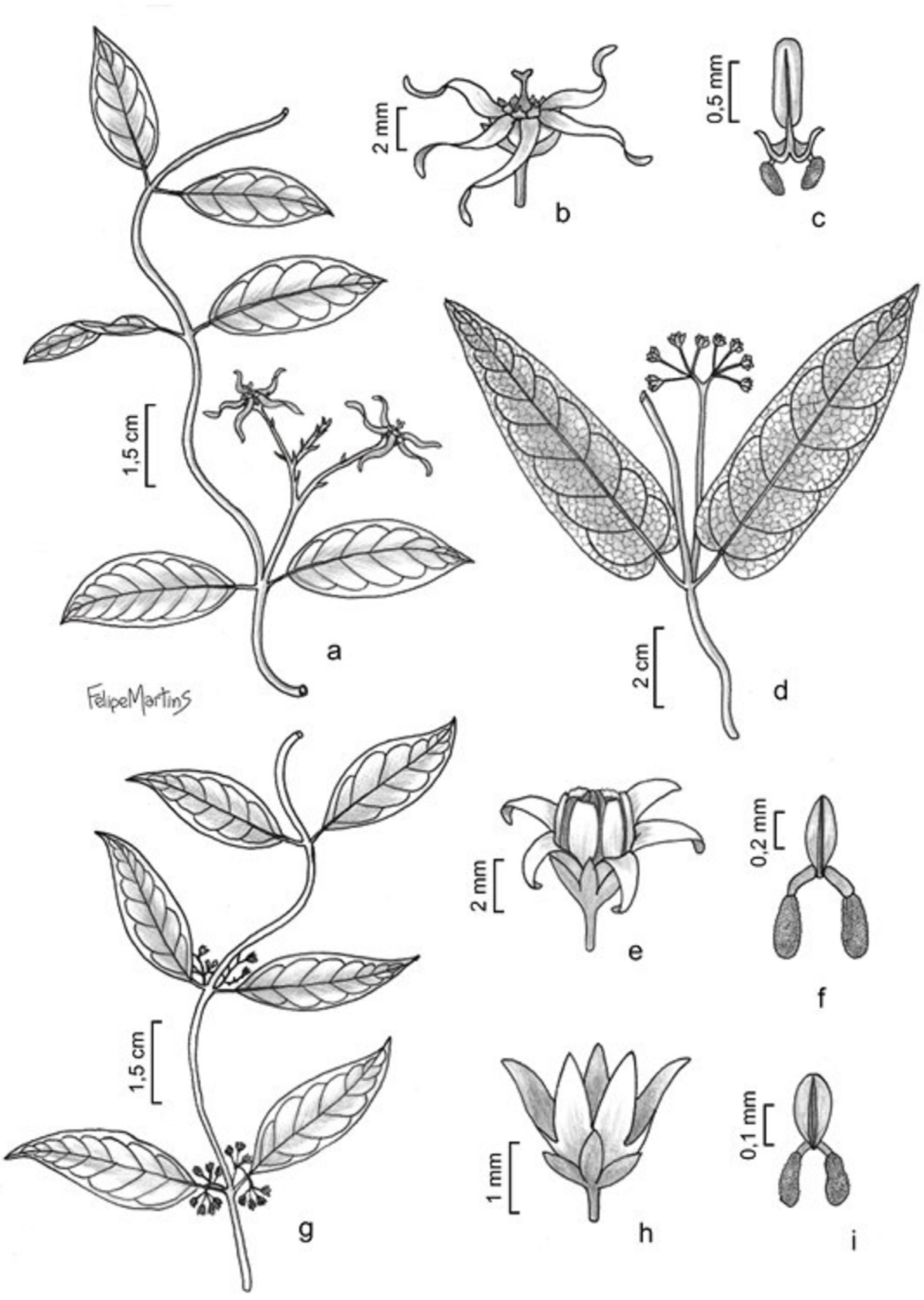

Figure 2. a-c. *Oxypetalum insigine* (Decne.) Malme. a. Branch. b. Flower. c. Pollinarium. d-f. *Oxypetalum pachyglossum* Decne. d. Branch. e. Flower. f. Pollinarium. g-i. *Peplonia axillaris* (Vell.) Fontella & Rapini. g. Branch. h. Flower. i. Pollinarium.

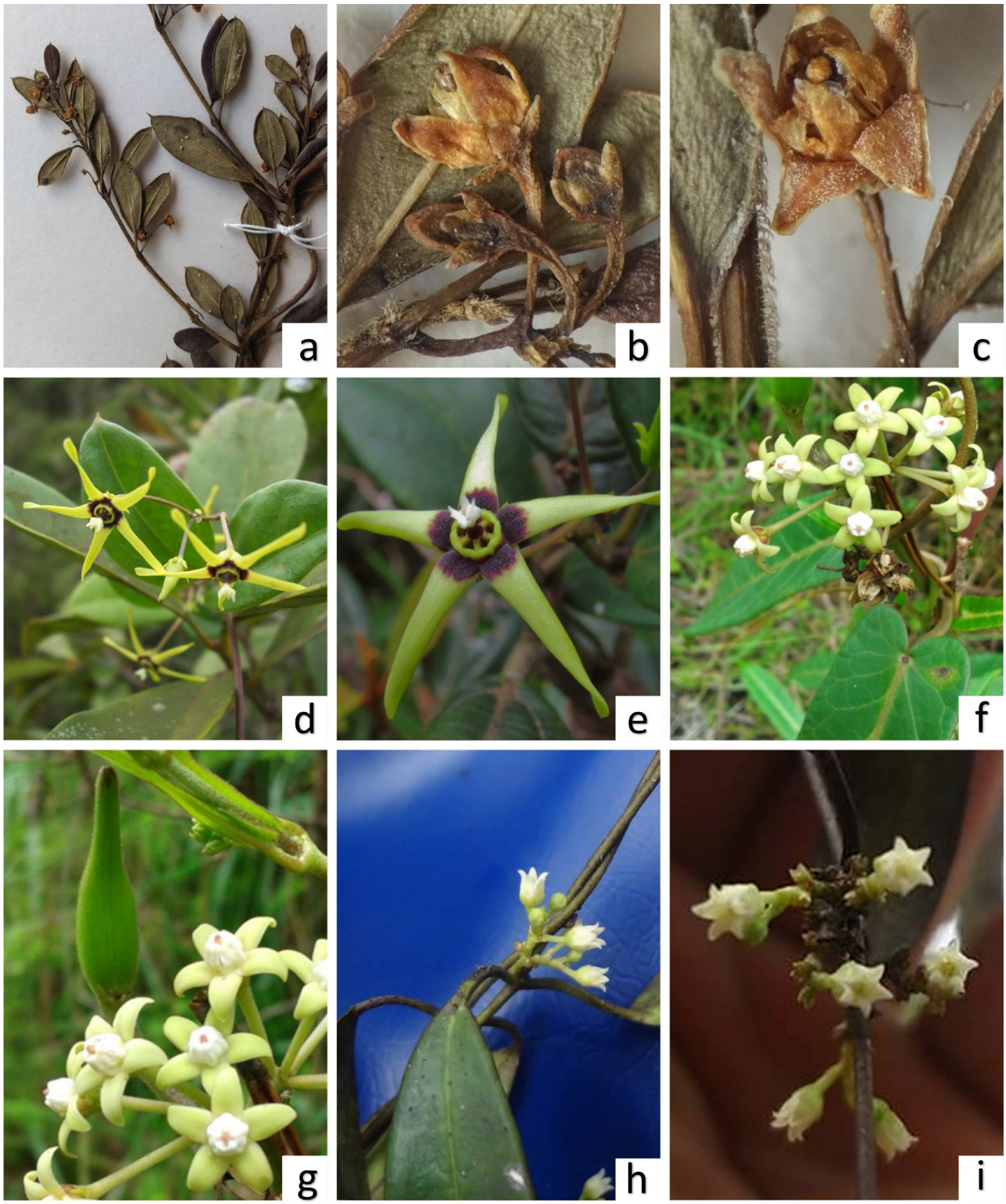

Figure 3. a-c. *Ditassa gracilis* Hand.-Mazz. a. Branches with flowers. b-c. Flower details. d-e. *Oxypetalum insigne* (Decne.) Malme. d. Branch with flowers. e. Flower details. f-g. *Oxypetalum pachyglossum* Decne. f. Branch with flowers. g. Flowers and fruit. h-i. *Peplonia axillaris* (Vell.) Fontella & Rapini. h. Branch with flowers. i. Flowers details. Photos: a-c. e. Juliana Bianchi. d. f-g. i. Paulo Affonso. h. Henrique B. Zamengo.

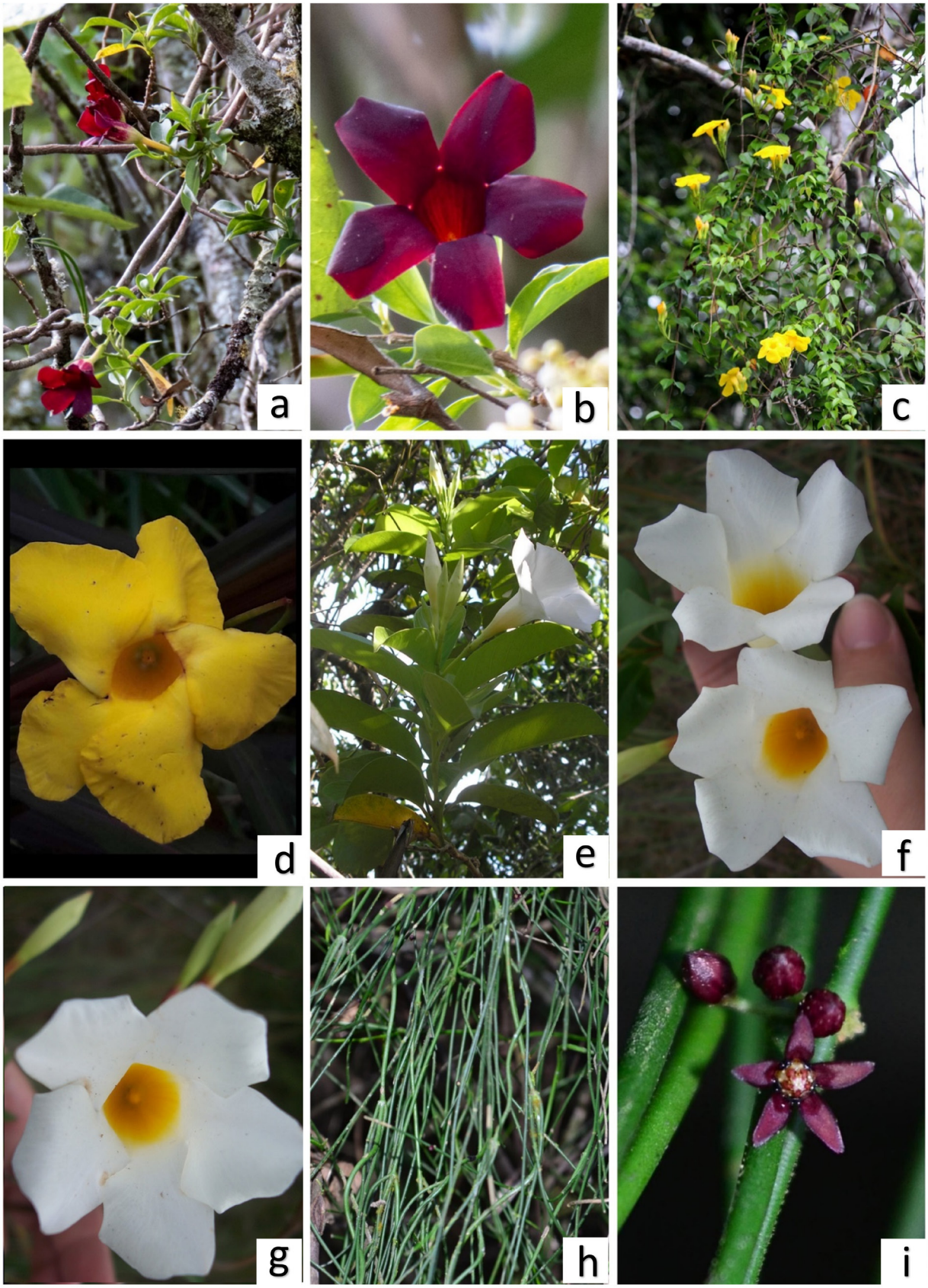

Figure 4. a-b. *Mandevilla atroviolacea* (Stadelm.) Woodson. a. Branches with flowers. b. Flower details. c-d. *Mandevilla funiformis* (Vell.) K.Schum. c. Branches with flowers. d. Flower details. e-g. *Mandevilla fragrans* (Stadelm.) Woodson. e. Branch with flowers. f-g. Flowers details. h-i. *Orthosia scoparia* (Nutt.) Liede & Meve. h. Branches with flowers. i. Flowers details. Photos: a-b. Rodrigo Freitas (Nova Friburgo-RJ). c. Nicco L. Faria (Itanhaém-SP). d. Jader O. Caetano (Benedito Novo-SC). e. Marcelo F. Castilhori (Macaé-RJ). f-g. Paulo Affonso. h-i. Paulo Schwirkowski (São Bento do Sul-SC).

146 (UNISA); Trilha do Embu, após a segunda ponte, fl., 20-II-2015, *P. Affonso 1320* (UNISA).

Additional examined material: BRAZIL. São Paulo: Salesópolis, Estação Biológica de Boracéia, estrada para a barragem da SABESP no Rio Guaratuba, fl., fr., 05-IX-1994, *R.T. Shirasuna 27* (SP); São Paulo, Estrada da Rivieira, fl., fr., 10-X-1995, *G.L. Esteves 2565* (SP).

Oxypetalum insigne is endemic to Brazil, distributed in the Atlantic Forest and Cerrado. It occurs in the States of Minas Gerais, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, and São Paulo (Apocynaceae *in* Flora e Funga do Brasil).

There are records of flowering and fruiting throughout the year (Farinaccio & Mello-Silva 2004, Pereira 2005, Monguilhott & Mello-Silva 2008). In Núcleo Curucutu, it blooms in January, May, October, and November, with no recorded fruiting.

Oxypetalum insigne may be mistaken for *O. gyrophylum* Farinaccio & Mello-Silva, distinguished by having smaller (2.5-6.9 × 1.1-3 cm) and pubescent blades, whereas *O. gyrophylum* features larger (6.2-7.5 × 3.3-4 cm) and glabrescent blades (Apocynaceae *in* Flora e Funga do Brasil). It is also commonly confused with *O. rusticum* Rapini, but can be differentiated by the pubescent to villous indumentum and a smaller retinaculum (0.72 × 0.19 mm), while in the former species, a lanate indumentum and a larger retinaculum (2.4-2.6 × 0.8 mm) were observed (Apocynaceae *in* Flora e Funga do Brasil, Monguilhott & Mello-Silva 2008).

In Núcleo Curucutu, this species is easily distinguished primarily by its elongated and conspicuous style appendage. Additionally, it is characterized by a prominent corona, twisted petals, and the largest retinaculum, measuring approximately 0.72 mm long compared to other species in the study area.

Oxypetalum pachyglossum Decne. in A. DC., Prodr. 8: 585. 1844.
Figures 2 d-f, 3 f-g

Branches glabrous. Petiole 0.7-3.1 cm long, sparse pilosulose; blade 5.7-15.5 × 0.7-4 cm, lanceolate, base cordiform, margin entire, glabrous, 4 colleters at the base of the adaxial face. Inflorescence multiflora, 10-20-flowered; peduncle 1.8-7.5 cm long. Pedicels 0.5-1.2 cm long, tomentose; sepals 1.3-2 × 0.7 mm, sparse pilosulose externally, internally glabrous with 2 axillary colleters; corolla green, tube ca. 2.5 mm long, internally barbellate, lobes 4-5 × 1-2 mm, lanceolate, erects, patent, externally glabrous, internally papillose; corona segments 2-3 × 0.9-1.5 mm, surpassing the anthers, oblong, apex bifid, thickened. Gynostegium 2.5 mm long, subsessile; locular part of anthers 1-1.2 mm, rectangular, membranous appendage ca. 1 mm long, oval; retinaculum 0.47 x 0.13 mm, oblong, caudicles 0.16 mm long, descending, pollinia 0.54 × 0.16 mm; style appendage ca. 1 mm long, conic, barely visible. Follicles 3.2-10 × 0.5-1 cm, fusiform; seeds not observed.

Examined material: BRAZIL. São Paulo: São Paulo, Parque Estadual Serra do Mar - Núcleo Curucutu, Trilha do Campo, fl., 18-I-1996, *R. Simão-Bianchini 912* (PMSP); Trilha do Campo, fl., 13-II-1997, *R.J.F. Garcia 1032* (PMSP); Trilha do Campo, fl., 16-IV-1998, *L.C.Q.M.P. Sampaio 24* (PMSP, UNISA); Trilha do Rio Embu-Guaçu, fl., 11-XII-2002, *R.A. Alves 42* (PMSP); Trilha do Campo, fl., fr., 28-IV-2005, *P. Affonso 818* (UNISA); Trilha da Entrada, fl., 21-II-2007, *P. Affonso 961* (UNISA); Trilha da Entrada dos Pinus, fl., 17-I-2008, *P. Affonso 1033* (UNISA); Trilha do Embu, início, fl., fr., 20-II-2015, *P. Affonso 1331* (UNISA); Trilha do Embu, início, fl., fr., 20-II-2015*, P. Affonso 1330* (UNISA).

Oxypetalum pachyglossum is endemic to Brazil and is found in the Amazon Rainforest, Caatinga, Cerrado, and Atlantic Forest. It is distributed in the Distrito Federal and in the States of Bahia, Goiás, Minas Gerais, Paraná, Pernambuco, Rio de Janeiro, Santa Catarina, and São Paulo (Apocynaceae *in* Flora e Funga do Brasil). Flowering occurs from April to July, and fruiting occurs from November to April (Pereira 2005). In Núcleo Curucutu, it blooms in January, February, April, and December, and fruits in February and April.

Oxypetalum pachyglossum closely resembles *O. alpinum* (Vell.) Fontella, but it differs primarily in the length of the gynostegium, the length and shape of the style appendage, and the format of the corona segments. While *O. pachyglossum* features a larger gynostegium measuring 2.5 mm long, a conical style appendage ca. 1 mm long, and oblong corona segments, *O. alpinum* possesses a gynostegium measuring 1-1.5 mm long, an ovate style appendage of 0.6-0.6 mm long, and linear-oblong to rectangular corona segments (Silva *et al.* 2007).

The species exhibits lanceolate and elongated leaves with a highly noticeable cordate base and small flowers arranged in 10-20-flowered inflorescences. These characteristics are crucial for distinguishing the species from others documented in the region (Rapini *et al.* 2001).

Peplonia axillaris (Vell.) Fontella & Rapini, Kew Bull. 59(4): 536. 2004.
Figures 2 g-i, 3 h-i

Subshrub volute. Petiole 8-15 mm long, glabrous; blade 2.3-7.8 × 0.5-2.7 cm, narrow-elliptic, lanceolate to oblong-lanceolate, apex acuminate, base acute, cuneate to obtuse, margin revolute, pilosulose at the margin. Inflorescence 10-21-flowered, axillary, opposite; peduncle 2-5 mm long, glabrous. Pedicels 2-4 mm long, glabrous; sepals 0.8-1.5 × 0.5-1 mm, oval-triangulate, margin ciliate or glabrous; corolla yellowish or white, tube ca. 0.5 mm long; lobes 1.2-2 × 0.7-1.2 mm, triangulate, externally glabrous, internally bearded in the middle part; corona segment 1, 1.5 × 0.8-1 mm, spatulate, fimbriate at the apex, visibly surpassing the anthers. Gynostegium sessile; apical membranous appendage of anthers oval, fimbriate at apex, locular part subtriangular, wings almost as long as the dorsal part; retinaculum ca. 0.16 × 0.06 mm, obovate, caudicles ca. 0.03 mm long, oblique-descending, pollinia ca. 0.22 × 0.09 mm, oval-oblong; style appendage mamillate, hidden by the membranous appendages of anthers. Follicles 5-8.2 × 0.6-0.9 cm, fusiform; coma 1.5-3 cm long; seeds 0.9-1 × 0.6-0.9 cm, ovoid.

Examined material: BRAZIL. São Paulo: São Paulo, Parque Estadual Serra do Mar - Núcleo Curucutu, Trilha do Campo, à direita na estrada da entrada, fl., 14-XII-1997, *R.J.F. Garcia 1448* (UNISA); trilha da Estrada Principal, à esquerda, beira do lago, fl., 17-IV-1998, *C.M. Izumisawa 86* (UNISA); Trilha do campo, fl., 19-IX-1998, *J.R. Pirani 4420* (SPF); Trilha do Rio Embu-Guaçú, fl., 26-II-1999, *C.M. Izumisawa 190* (UNISA); Trilha do Campo, fl., 03-III-2001, *M.A. Farinaccio 449* (SPF); Trilha da Nascente do Rio Embu, fl., 08-XII-2003, *R.J.F. Garcia 2254* (PMSP); Trilha da Entrada, próximo aos Pinus, fl., 20-II-2015, *P. Affonso 1324* (UNISA); Trilha do Embu, fl., 20-II-2015, *P. Affonso 1332* (UNISA).

Additional examined material: BRAZIL. São Paulo: Parque do Estado de São Paulo, fl., fr., 27-XI-1931, *F.C. Hoehne s/n* (SP); Ibiuna, Bairro Sorocabuçu, 8 km da estrada SP-250 no km 63, fl, fr., 22-X-1983, *T. Yano & O. Yano 44* (SP); Ubatuba - Núcleo Picinguaba, Estrada da casa da farinha, fl., fr., 29-VIII-1994, *M.A. de Assis 410* (SP); Parque Estadual Serra do Mar, Núcleo Cunha, estrada de acesso ao Núcleo, fl., 28-III-1994, *J.B. Baitello 441* (SP); Ilha Comprida, -25.020278 -47.916389, fl., fr., 11-II-1995, *H.F. Leitão Filho 32798* (SP).

Peplonia axillaris is endemic to Brazil, occurring in the Atlantic Forest within the States of Espírito Santo, Minas Gerais, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, and São Paulo (Apocynaceae *in* Flora e Funga do Brasil). Flowering has been documented from May to October, with fruiting observed in February, March, and November (Rapini 2004, Pereira 2005). In Núcleo Curucutu, it exhibits blooming patterns in February, March, April, September, and December (Rapini 2004, Pereira 2005).

Peplonia axillaris resembles *P. adnata* (E.Fourn.) U.C.S.Silva & Rapini, but can be differentiated by displaying a corona segment and fringed lobes at the apex. In contrast, *P. adnata* features two corona segments and cucullate lobes (Apocynaceae *in* Flora e Funga do Brasil).

Unlike the other species recorded in the study area, *P. axillaris* features a blade with an acuminate apex and a yellowish or alveolar corolla with triangular lobes that extend beyond the anthers.

Acknowledgements

We express our gratitude to the Núcleo Curucutu staff, for their invaluable support in specimen collection. Special thanks to the Instituto Florestal, for granting authorization for this research. We also extend our appreciation to the Curators of the visited Herbaria: Maria Candida Henrique Mamede (SP), Renato de Mello-Silva *in memoriam* (SPF), Ricardo José Francischetti Garcia (PMSP), and João Batista Baitello (SPSF). Pedro Resende (UnB), for the English revision and the Universidade Santo Amaro, for all the assistance.

Conflicts of interest

There is no conflict of interest.

Author Contributions

Bruna Carvalho de Vasconcelos: Contribution in the concept and design of the study; Contribution to data collection; Contribution in identifications of the studied species; Contribution to data analysis and interpretation.
Leandro Matheus de Carvalho Vaz: Contribution to data collection; Contribution in identifications of the studied species; Contribution to data analysis and interpretation; Contribution to manuscript preparation; Contribution to critical revision, adding intellectual content.
Juliana Moreira Bianchi: Contribution to data collection; Contribution in identifications of the studied species; Contribution to data analysis and interpretation; Contribution to manuscript preparation; Contribution to critical revision, adding intellectual content.
Paulo Affonso: Contribution in the concept and design of the study; Contribution to data collection; Contribution in identifications of the studied species; Contribution to data analysis and interpretation; Contribution to critical revision, adding intellectual content.

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Editor Associado: Paulo Silveira
Recebido: 11/07/2023
Aceito: 06/12/2023

ISSN da publicação *online* 2236-8906