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BOTANY

Copacabana is more than a beach in Rio de Janeiro, Brazil: the orchid flora of Parque Estadual da Chacrinha

Copacabana es más que una playa en Río de Janeiro, Brasil: Orquídeas del Parque Estadual da Chacrinha

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ABSTRACT

Orchidaceae is the most diverse botanical family in the city of Rio de Janeiro, Brazil, with 79 genera and 250 species. Vegetation in Rio de Janeiro is mostly restricted to small fragments of Atlantic Forest, many of which are located within conservation units and act as refuges for flora. Some of the best-known postcards of the city, such as Corcovado and Sugar Loaf mountains, and the Christ the Redeemer statue, are located within urban conservation units. This work presents the results of a floristic-taxonomic study of Orchidaceae in the *Parque Estadual da Chacrinha* (PE Chacrinha), a state park located extremely near the famous Copacabana beach in the heart of Rio de Janeiro. Brief morphological descriptions of the species are provided and an identification key for the orchids of PE Chacrinha is presented, based mainly on vegetative morphological characters. Orchidaceae of PE Chacrinha is represented by thirteen genera and 16 species, most of which restricted to Brazil, seven of them are also endemic to the Atlantic Forest, or South America and occur as terricolous or rupicolous. We highlighted the occurrences of *Acianthera limae, Epidendrum ammophilum* and *Prescottia spiranthophylla*, species that grow exclusively or predominantly on rocky outcrops. With these findings, our goal is to raise awareness among the local population about the importance of conserving the regional flora; stimulate visits to PE Chacrinha and promote the inclusion of this conservation unit in the tourist itinerary of the city of Rio de Janeiro.

Keywords. Brazilian Atlantic Forest, conservation unit, Orchidaceae, rocky outcrops, urban parks.

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RESUMEN

Orchidaceae es la familia botánica más diversa en la ciudad de Río de Janeiro, Brasil, con 79 géneros y 250 especies. La vegetación en Río de Janeiro se limita principalmente a pequeños fragmentos de Mata Atlántica, muchos de los cuales se localizan dentro de unidades de conservación y actúan como refugios para la flora. Algunas de las postales más conocidas de la ciudad, como las montañas Corcovado y Pan de Azúcar, y la estatua del Cristo Redentor, se encuentran dentro de unidades de conservación urbanas. Este trabajo presenta los resultados del estudio florístico-taxonómico de Orchidaceae en el Parque Estadual da Chacrinha (PE Chacrinha), un parque estatal ubicado muy cerca de la famosa playa de Copacabana en el corazón de Río de Janeiro. Se proporcionan breves descripciones morfológicas de las especies y una clave de identificación para las Orchidaceae del PE Chacrinha, basadas principalmente en caracteres morfológicos vegetativos. La familia Orchidaceae del PE Chacrinha está representada por trece géneros y 16 especies, la mayoría de las cuales están restringidas a Brasil, siete de ellas son también endémicas de la Mata Atlántica, o Sudamérica y crecen como terrestres o rupícolas. Destacamos la presencia de *Acianthera limae*, *Epidendrum ammophilum* y *Prescottia spiranthophylla*, especies que habitan exclusiva o predominantemente en afloramientos rocosos. Con estos hallazgos, nuestro objetivo es crear conciencia entre la población local sobre la importancia de conservar la flora regional; estimular visitas al PE Chacrinha; y promover la inclusión de esta unidad de conservación en el itinerario turístico de Río de Janeiro.

Palabras clave. Afloramientos rocosos, Mata Atlántica brasilera, Orchidaceae, parques urbanos, unidad de conservación.

INTRODUCTION

The flora of Brazil has received more detailed attention in recent years within the scope of the long-term project "Flora do Brasil 2020", mainly about data on geographic distribution and the recognition of diagnostic characters of taxa (Forzza *et al.* 2012, BFG 2015, Flora do Brasil c2020). A similar research initiative has been undertaken in the state of Rio de Janeiro and valuable information for the recognition of regional biological diversity, such as data on endemism, municipalities of occurrence and habitats, has been compiled and made available for all botanical species registered for the state (Baumgratz *et al.* c2014).

Orchidaceae is the most diverse family in the city of Rio de Janeiro, with 79 genera and 250 species that are predominantly distributed in forest remnants in conservation units (Barberena *et al.* c2014). Floristic-taxonomic studies of Orchidaceae in the city of Rio de Janeiro have been carried out mainly among the rocky outcrops of the Tijuca massif and in restinga formations and have revealed the occurrence of several endemic species to the Atlantic Forest domain (Fraga *et al.* 2005, Cunha and Forzza 2007, Saddi 2008, Moreira *et al.* 2014, Louzada 2020).

Vegetation in the city of Rio de Janeiro is mostly restricted to small fragments of Atlantic Forest, many of which are urban conservation parks that provide benefits to society (e.g. recreation, leisure, contemplation of nature) and act as refuges for flora and fauna in the face of urban growth (Gomes 2014, Sakata and Gonçalves 2019). Some of the best-known postcard scenes of the city, such as Corcovado and Sugar Loaf mountains, and the Christ the Redeemer statue, are also located within urban conservation units (ICMBio c2020, INEA c2020). Nonetheless, other famous localities and neighborhoods in the city that are visited by Brazilian and foreign tourists also concentrate protected green areas, although some are little known. Thus, we carried out a floristic-taxonomic study of Orchidaceae in a remnant of Atlantic forest in a state park located near the famous beach of Copacabana in the heart of Rio de Janeiro to disseminate information about the native flora of urban conservation units.

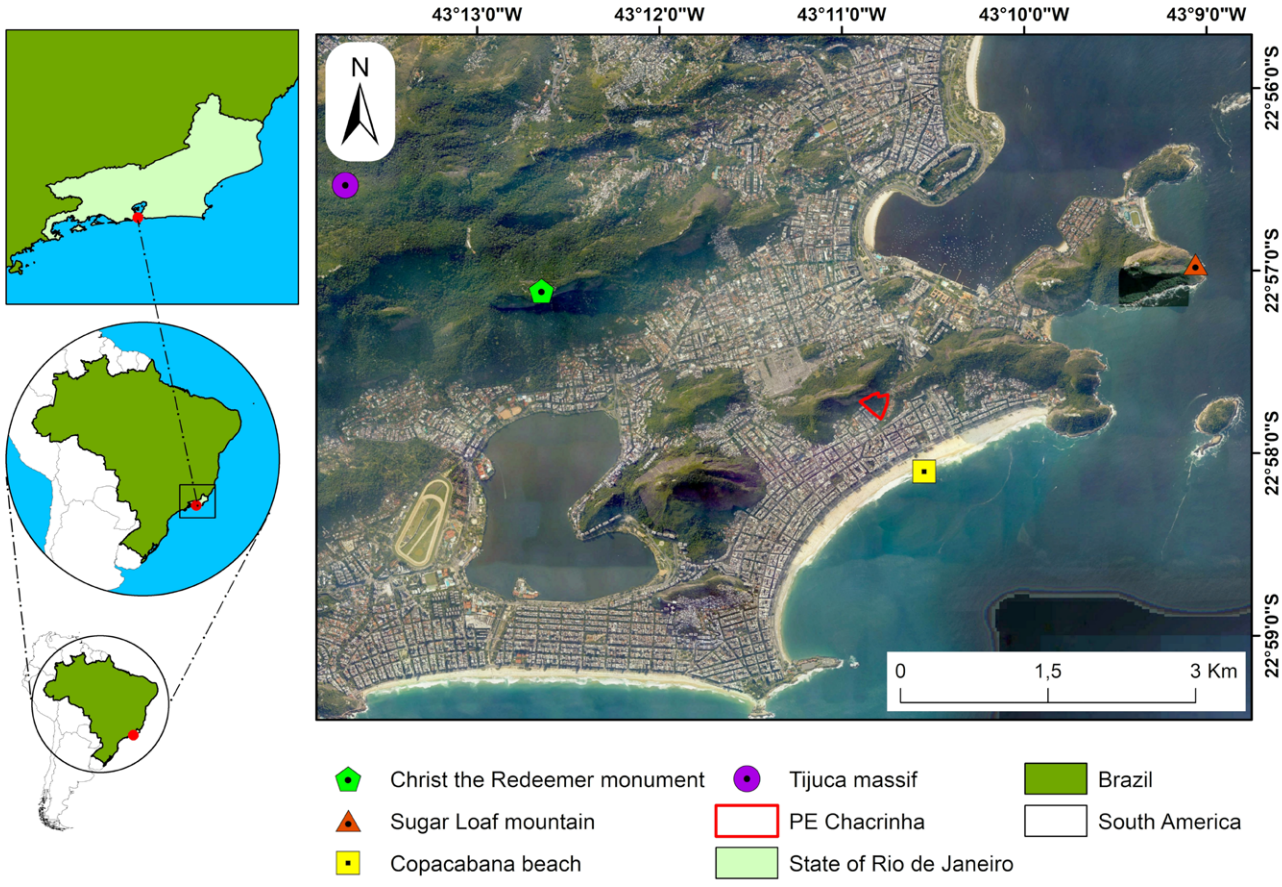

Figure 1. Map showing the Parque Estadual Chacrinha (PE Chacrinha) in the city of Rio de Janeiro, Brazil. Map produced by José Antônio Lima Rocha Junior.

MATERIAL AND METHODS

Study area

Parque Estadual da Chacrinha (PE Chacrinha) encompasses about thirteen hectares in the neighborhood of Copacabana in the South Zone of the municipality of Rio de Janeiro, a densely occupied region less than 1 km from the famous Copacabana beach (Fig. 1) (INEA c2006). The park has a narrow altitudinal gradient (5–80 m) and comprises rocky outcrops and fragments of lowland dense ombrophilous forest in medium to advanced stages of regeneration (Figs. 2a-c). The climate of the region is classified as Af, without dry season, the precipitation is greater than 2000 mm per year and the mean temperature is 22 ºC for the warmest months and 18 ºC for the coldest period (INEA c2006, Alvares *et al.* 2013).

Data collection and analysis

Occasional field expeditions covering all seasons were carried out from August 2016 to December 2019, following the method of active search (Filgueiras *et al.* 1994). Collected specimens were herborized according to usual taxonomy techniques (Peixoto and Maia 2013) and deposited at the RFA herbarium (acronym according to Thiers c2020). Morphological analysis and the description of the specimens were performed using a stereoscopic microscope, and structures were measured using a caliper or ruler. Specimens from herbaria RB and RFA were examined and the CRIA database (http://splink.cria.org.br/) was consulted in search of additional specimens from the park.

Collected specimens were identified based on relevant literature related to the family, including nomenclatural and taxonomic revisions (e.g. Pinheiro and de Barros 2007, 2008, Romero-González *et al.* 2008, Azevedo *et al.* 2014), as well as comparisons with types and specimens already identified by orchid experts and deposited in herbaria. An identification key and a set of brief morphological descriptions are presented for all species based on herborized material complemented with field observations. Geographi-

cal coordinates and photos are provided when available. Additional photos of the species can be found in Flora do Brasil (c2020). Inflorescences with ten or more flowers were designated as multiflowered.

The morphological concepts of Dressler (1993) and Pridgeon *et al.* (1999) were adopted for the description of taxa. Data on geographical distribution and phytogeographic domain were obtained from Flora do Brasil (c2020), and complementary distribution data were obtained from Govaerts *et al.* (c2020) for species with extra-Brazilian distributions. Species names are in accordance with IPNI (c2020).

RESULTS AND DISCUSSION

Orchidaceae in PE Chacrinha is represented by thirteen genera and 16 species, most of which are restricted to Brazil or South America. This is the first survey of Orchidaceae from PE Chacrinha, and thus all records are new occurrences for the area. Highlighted among the findings are the occurrences of *Prescottia spiranthophylla* Barb.Rodr., a microendemic species that is restricted to the rocky outcrops of the state of Rio de Janeiro, and *Acianthera limae* (Porto & Brade) Pridgeon & M.W.Chase and *Epidendrum ammophilum* Barb.Rodr., which also occur predominantly in this type of vegetation (Cunha and Forzza 2007, Vieira and de Barros 2017, Flora do Brasil c2020). Six other species were also found as rupicolous in the park — *Brassavola tuberculata* Hook.; *Cyrtopodium flavum* Link & Otto ex Rchb.f.; *Epidendrum denticulatum* Barb.Rodr.; *Epidendrum secundum* Jacq.; *Maxillaria subulata* Lindl.; and *Prescottia plantaginifolia* Lindl. ex Hook. *Aspidogyne argentea* (Vell.) Garay, *Eltroplectris triloba* (Lindl.) Pabst, *Habenaria leptoceras* Hook. and *Oeceoclades maculata* (Lindl.) Lindl. were found as terrestrial, as was *P. plantaginifolia*, the only species to occur on two substrates in the park. *Cattleya forbesii* Lindl. and *Trichocentrum pumilum* (Lindl.) M.W.Chase & N.H.Williams are the only species occurring as epiphytes. The genus with the highest number of species is *Epidendrum* L. (three spp.), whose richness is explained by the high number of this taxa in the world, with more than 1500 species (Chase *et al.* 2015, Govaerts *et al.* c2020), also being the most expressive group in similar surveys in the city of Rio de Janeiro (e.g. Cunha and Forzza 2007, Moreira *et al.* 2014).

The orchid flora of PE Chacrinha is relatively similar to the orchid flora of other localities of rocky outcrops of the city of Rio de Janeiro, such as the *Pedra da Gávea* (Saddi 2008) in the Tijuca massif, with which it shares seven species, and with the Sugar Loaf (Louzada 2020), with which it shares six species. Nevertheless, nine species recorded in PE Chacrinha are restricted to Brazil, and seven of them are endemic to the Atlantic Forest. We also found two species recorded only in the state of Rio de Janeiro (*E. ammophilum* and *P. spiranthophylla*), of the 104 restricted to this Brazilian state (Flora do Brasil c2020). Despite the small size of the park (ca. thirteen ha), we registered 16 species, which is equivalent to almost one species per hectare, showing the importance of the conservation of this area. Among the orchid species of PE Chacrinha, *C. flavum* and *E. secundum* are the only species that had their status for conservation evaluated at the national level and were classified as Least Concern (Flora do Brasil c2020). However, *A. limae*, *B. tuberculata*, *C. forbesii*, *E. ammophilum, E. denticulatum, E. secundum,* and *T. pumilum* have small populations (estimated at fewer than twenty individuals) in the park, and thus require local conservation actions, whereas *O. maculata* is the only abundant species in the area, certainly with more than 50 individuals. Landslides and illegal collection of plants are the main threats to the species in PE Chacrinha.

A first analysis of the specimens of Orchidaceae in herbaria or as live plants in collections, or even *in situ*, often results in misidentifications at the species level, especially for species complexes, which usually require morphometric studies (Pinheiro and de Barros 2007). The species *C. flavum*, *E. denticulatum*, *E. secundum, P. plantaginifolia* and *P. spiranthophylla* fall into this situation and deserve brief taxonomic comments.

Cyrtopodium flavum and *Cyrtopodium glutiniferum* Raddi belong to the *Cyrtopodium andersonii* complex and have several synonyms (Romero-González *et al.* 2008). Both species were treated as *Cyrtopodium andersonii* (Lamb. ex Andrews) R.Br. by Cogniaux (1902), resulting in historical problems in the delimitation of the species. A synopsis of the genus *Cyrtopodium* was presented by Romero-González *et al.* (2008), who reaffirmed the three species as autonomous. Both *C. flavum* and *C. glutiniferum* have been found on rocky outcrops in the city of Rio de Janeiro (CRIA c2020, JABOT c2020), although with slight morphological differences. Specimens of *C.*

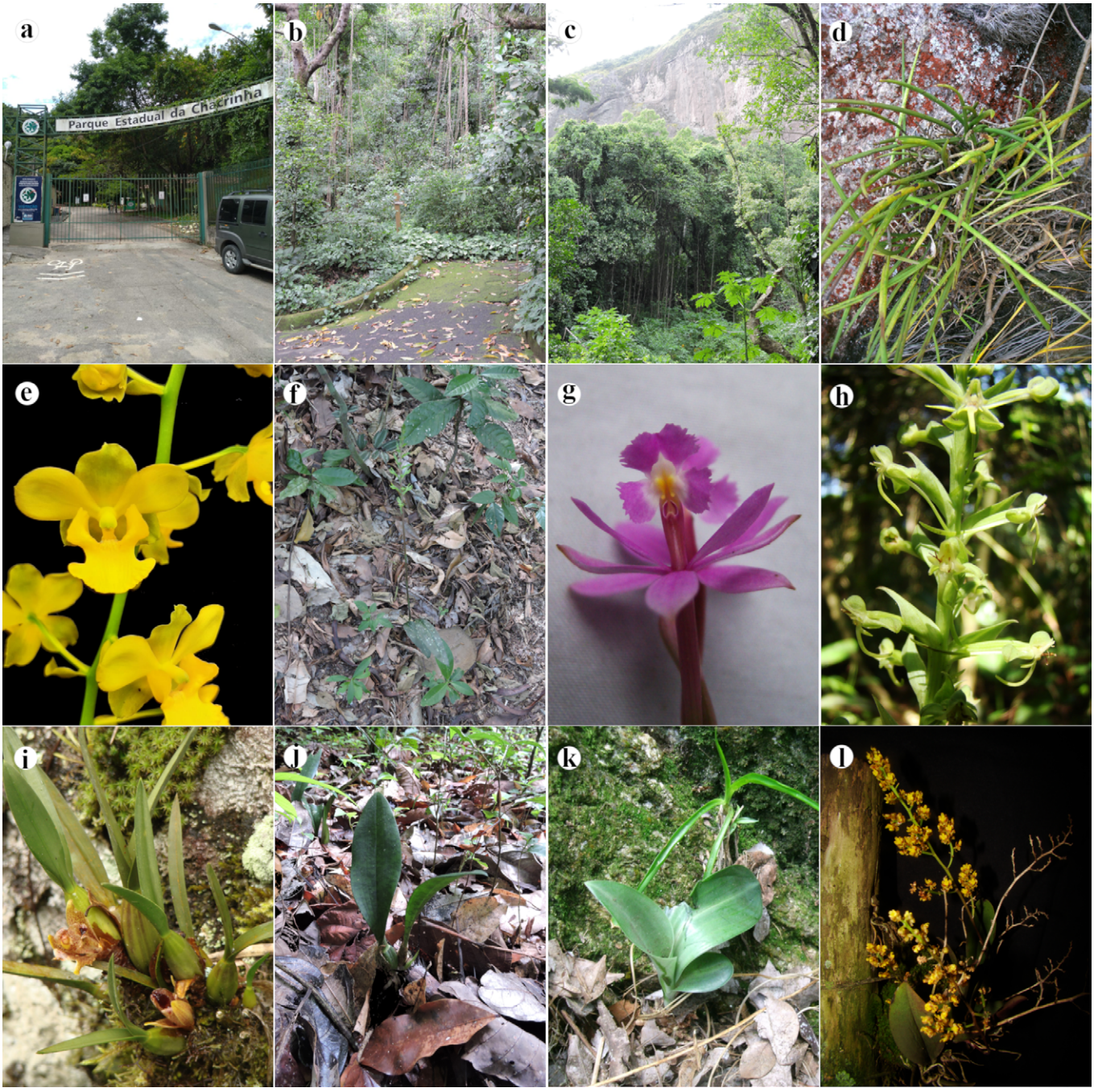

Figure 2. Parque Estadual da Chacrinha (PE Chacrinha) in the city of Rio de Janeiro, Brazil: landscapes and species. **a**. Park entrance, **b**. Fragment of lowland dense ombrophilous forest, **c**. Rocky outcrop, **d**. *Brassavola tuberculata* Hook., **e**. *Cyrtopodium flavum* Link & Otto ex Rchb.f., **f**. *Eltroplectris triloba* (Lindl.) Pabst, **g**. *Epidendrum secundum* Jacq., **h**. *Habenaria leptoceras* Hook., **i**. *Maxillaria subulata* Lindl., **j**. *Oeceoclades maculata* (Lindl.) Lindl., **k**. *Prescottia plantaginifolia* Lindl. ex Hook., **l**. *Trichocentrum pumilum* (Lindl.) M.W.Chase & N.H.Williams. Photos by Felipe Fajardo Villela Antolin Barberena (a-c, f, g-j, and l) and Roberto da Silva (d-e, and k).

glutiniferum may be misidentified as *C. flavum* and vice versa, since both are terricolous or rupicolous and have fusiform pseudobulbs, narrowly lanceolate to linear leaves, raceme or panicle inflorescences, and predominantly yellow flowers with obovate petals (Pabst 1966, Cunha and Forzza 2007, Chiron and Bolsanello 2013). *Cyrtopodium flavum* presents largely elliptical-oval sepals and a large-obovate central lobe of the lip with a retuse to emarginate apex, whereas *C. glutiniferum* has elliptical sepals and rhombic-triangular central lobe of the lip with an acute to obtuse apex (Romero-González 1999, Chiron and Bolsanello 2013).

Epidendrum secundum and *E. denticulatum* are polymorphic species (Pinheiro and de Barros 2007, 2008) frequently collected in the state of Rio de Janeiro and easily confused with each other, especially when herborized. In addition, the species sometimes occur in the same area, as seen in PE Chacrinha, which requires even more detailed morphological analysis of specimens. Both species present subcorymbiform to corymbiform racemes with pink to lilac non-resupinate flowers but can be distinguished mainly by the callus of the lip. *Epidendrum secundum* presents a multifaceted callus that is generally limited to the disc of the lip, whereas *E. denticulatum* has two basal ovoid calli and a keel-shaped central callus projected longitudinally over the central lobe, as previously reported by other authors (Pinheiro and de Barros 2007, Stancik *et al.* 2009).

Prescottia plantaginifolia is morphologically variable and could be confused with *P. spiranthophylla*, a recently re-established species (Azevedo *et al.* 2014). Both species have green flowers, outer surface of lip with trichomes at the base and dorsal surface of column covered by trichomes, but *P. plantaginifolia* has lax inflorescences with non-overlapping flowers, whereas *P. spiranthophylla* has congested inflorescences with overlapping flowers (Azevedo *et al.* 2014). In PE Chacrinha, the species can also be distinguished by their leaves — *P. plantaginifolia* has petiolate, rarely sessile leaves with a lanceolate or elliptical blade, while *P. spiranthophylla* has sessile leaves with a linear blade. Given the above, an identification key for Orchidaceae of PE Chacrinha is needed and presented below.

Taxonomic Treatment

Key to the species of Orchidaceae in PE Chacrinha

1. Epiphytic herbs.
2. One apical leaf; inflorescence lateral, in panicle; sepals and petals maculate ..... *Trichocentrum pumilum*
2. Two apical leaves; inflorescence terminal, in raceme; sepals and petals immaculate ..... *Cattleya forbesii*

1'. Terricolous or rupicolous herbs.
3. Leaves apical.
4. Two leaves ..... *Maxillaria subulata*

4'. One leaf.
5. Leaves maculate; inflorescence lateral; flowers calcarate ..... *Oeceoclades maculata*

5'. Leaves immaculate; inflorescence terminal; flowers ecalcarate.
6. Leaves cylindrical; sepals and petals white-yellowish to yellowish ..... *Brassavola tuberculata*

6'. Leaves flat to concave; sepals and petals purple ..... *Acianthera limae*

3'. Leaves basal in rosette or distributed along the caulome.
7. Leaves reticulate-veined..... *Aspidogyne argentea*

7'. Leaves obscurely or distinctly parallel-veined.
8. Leaves membranaceous or chartaceous, convolute (rolled like an umbrella) or plicate (folded like a fan).
9. Leaves plicate, sepals and petals yellow to greenish-yellow..... ..... *Cyrtopodium flavum*

9'. Leaves convolute, sepals and petals pale green to green.
10. Flowers resupinate; lip trilobed.
11. Leaves sessile; inflorescence glabrous; petals bifid ..... *Habenaria leptoceras*

11'. Leaves petiolate; inflorescence pilose; petals entire.
12. One to three leaves; flowers calcarate; lip green ..... *Eltroplectris triloba*

12'. Five leaves; flowers ecalcarate; lip white ..... *Cyclopogon argyrifolius*

10'. Flowers non-resupinate; lip entire.
13. Leaves petiolate, rarely sessile; leaf blade lanceolate or elliptic; inflorescence lax; flowers not overlapping ..... *Prescottia plantaginifolia*

13'. Leaves sessile; leaf blade linear; inflorescence congested; flowers overlapping ..... *Prescottia spiranthophylla*

8'. Leaves coriaceous, conduplicate (folded along the midrib).
14. Flowers resupinate; sepals and petals green to brownish ..... *Epidendrum ammophilum*

14'. Flowers non-resupinate; sepals and petals pink to lilac.
15. Lip with cut-out and multifaceted callus and limited to the center of the disc..... *Epidendrum secundum*

15'. Lip with two basal oval calli and keel-like central callus projected longitudinally over the central lobe ..... *Epidendrum denticulatum*

Orchidaceae in PE Chacrinha

1. *Acianthera limae* (Porto & Brade) Pridgeon & M.W.Chase, Lindleyana 16(4): 244. 2001.

Rupicolous herb. Leaf one, sessile, apical; blade green to vinaceous, immaculate, coriaceous, flat to concave, conduplicate, slightly ovate, obscurely parallel-veined, apex acute. Inflorescence in raceme, terminal, 2-flowered, glabrous. Flowers resupinate, ecalcarate; sepals and petals purple, immaculate; lip purple, slightly trilobed.

Distribution: Restricted to Brazil and endemic to the Atlantic Forest domain, occurring exclusively on rocky outcrops (Flora do Brasil c2020).

Specimen examined: 23 Jan 2004 (fl), *L.J.T. Cardoso 90* (RB).

2. *Aspidogyne argentea* (Vell.) Garay, Bradea 2(28): 203. 1977.

Terricolous herb. Leaves six, petiolate, distributed along the caulome; blade green with white veins, immaculate, membranaceous, flat, convolute, slightly ovate to lanceolate, reticulate-veined, apex acuminate. Inflorescence in raceme, terminal, multiflowered, pilose. Flowers resupinate, calcarate; sepals and petals white with brown macules; lip white, lobed (subdivided into hypochile, mesochile and epichile).

Distribution: Paraguay and Brazil, where it occurs in the Atlantic Forest, Caatinga and Cerrado domains (Govaerts *et al.* c2020, Meneguzzo c2020a).

Specimen examined: S.d. (fl), *L.J.T. Cardoso 872* (RB).

3. *Brassavola tuberculata* Hook., Bot. Mag 56: t. 2878. 1829. Fig. 2d

Rupicolous herb. Leaf 1, sessile, apical; blade purple to dark green, immaculate, fleshy, cylindrical, conduplicate, linear, obscurely parallel-veined, apex acute. Inflorescence in raceme, terminal, 2-3-flowered, glabrous. Flowers resupinate, ecalcarate; sepals and petals white-yellowish to yellowish, immaculate; lip white, yellowish-green at the base, entire.

Distribution: Bolivia, Paraguay, and Brazil, in which occurs in the Atlantic Forest, Caatinga, Cerrado and Pampa domains (Govaerts *et al.* c2020, van den Berg c2020a).

Specimen examined: 31 Mar 2004 (fl), *L.J.T. Cardoso & M. Moraes 135* (RB).

4. *Cattleya forbesii* Lindl., Coll. Bot.: sub t. 37. 1821.

Epiphytic herb. Leaves 2, sessile, apical; blade green, immaculate, coriaceous, flat, conduplicate, oblong, obscurely parallel-veined, apex acute to rounded. Inflorescence in raceme, terminal, 3-flowered, glabrous. Flowers resupinate, ecalcarate; sepals and petals cream to pale vinaceous, immaculate; lip yellowish with vinaceous veins, trilobed.

Distribution: Restricted to Brazil and endemic to the Atlantic Forest domain (van den Berg c2020b).

Specimen examined: 22°57'43" S, 43°10'51" W, 7 Dec 2017 (fl), *R. Silva s.n.* (RFA 43320).

5. *Cyrtopodium flavum* Link & Otto ex Rchb.f., Iconogr. Bot. Exot. 3: 7, t. 214. 1830. Fig. 2e

Rupicolous herb. Leaves 6, sessile, distributed along the caulome; blade green, immaculate, chartaceous, flat, plicate, linear, parallel-veined, apex acute to acuminate. Inflorescence in raceme or panicle, lateral, multiflowered, glabrous. Flowers resupinate, ecalcarate; sepals and petals yellow to greenish-yellow, immaculate; lip yellow, trilobed.

Distribution: Restricted to Brazil and endemic to the Atlantic Forest domain (Flora do Brasil c2020).

Specimen examined: 22°57'31" S, 43°10'47" W, 9 Aug 2018 (fl), *R. Silva s.n.* (RFA 43324).

6. *Cyclopogon argyrifolius* (Barb.Rodr.) Szlach. & Rutk., Phylogeny Taxon. Subtr. Spiranthinae Stenorrhynchidinae Cyclopogoninae Centr. S. Amer.: 186. 2008.

Terricolous herb (Flora do Brasil c2020). Leaves 5, petiolate, distributed along the caulome; blade dark green, immaculate, membranaceous, flat, convolute, linear, obscurely parallel-veined, apex acute. Inflorescence in raceme, terminal, multiflowered, pilose. Flowers resupinate, ecalcarate; sepals and petals green, immaculate; lip white, trilobed.

Distribution: Restricted to Brazil and endemic to the Atlantic Forest domain (Flora do Brasil c2020).

Specimen examined: 7 Jan 2004 (fl), *L.T.J. Cardoso 446* (RB).

7. *Eltroplectris triloba* (Lindl.) Pabst, Bradea 1(47): 470. 1974. Fig. 2f

Terricolous herb. Leaves 1-3, petiolate, basal in rosette; blade dark green, immaculate or maculate, membranaceous, flat, convolute, oblong to elliptical, obscurely parallel-veined, apex acute. Inflorescence in raceme, terminal, multiflowered, pilose. Flowers resupinate, calcarate; sepals and petals green, immaculate; lip green, trilobed.

Distribution: Argentina and Brazil, where it occurs in the Atlantic Forest and Caatinga domains (Govaerts *et al.* c2020, Guimarães c2020).

Specimen examined: 22°57'38" S, 43°10'46" W, 5 Jul 2017 (fl), *R. Silva 3* (RFA).

8. *Epidendrum ammophilum* Barb.Rodr., Gen. Sp. Orchid. 2: 149. 1882.

Rupicolous herb. Leaves 4-10, sessile, distributed along the caulome; blade green, immaculate, coriaceous, flat to slightly concave, conduplicate, oblong, obscurely parallel-veined, apex rounded. Inflorescence in subcorymbiform to corymbiform raceme, terminal, 3-9-flowered, glabrous. Flowers resupinate, ecalcarate; sepals and petals green to brownish, immaculate; lip white, trilobed.

Distribution: Restricted to Brazil (only in the state of Rio de Janeiro) and endemic to the Atlantic Forest domain, occurring predominantly on rocky outcrops (Pessoa c2020).

Specimens examined: 7 Jan 2004 (fl), *L.J.T. Cardoso 58* (RB); 22°57'39" S, 43°10'50" W, 9 Nov 2017 (fl), *R. Silva s.n.* (RFA 43317).

9. *Epidendrum denticulatum* Barb.Rodr., Gen. Sp. Orchid. 2: 143. 1882.

Rupicolous herb. Leaves 11, sessile, distributed along the caulome; blade green, immaculate, coriaceous, flat, conduplicate, oblong to narrow-elliptical, obscurely parallel-veined, apex acute to rounded. Inflorescence in subcorymbiform to corymbiform raceme, terminal, 6-flowered, glabrous. Flowers non-resupinate, ecalcarate; sepals and petals pink to lilac, immaculate; lip pink to lilac, yellowish at the disc, trilobed.

Distribution: Restricted to Brazil, occurring in the Atlantic Forest and Cerrado domains (Pessoa c2020).

Specimen examined: 10 Dec 2003 (fl), *L.J.T. Cardoso 47* (RB).

10. *Epidendrum secundum* Jacq., Enum. Syst. Pl.: 29. 1760. Fig. 2g

Rupicolous herb. Leaves 13, sessile, distributed along the caulome; blade green, immaculate, coriaceous, flat, conduplicate, oblong to narrow-elliptical, obscurely parallel-veined, apex acute to rounded. Inflorescence in subcorymbiform to corymbiform raceme, terminal, 8-flowered, glabrous. Flowers non-resupinate, ecalcarate; sepals and petals pink to lilac, immaculate; lip pinkish to lilac, white or yellowish at the disc, trilobed.

Distribution: Central America, Venezuela, Guyana, and Brazil; in this country, it occurs in the Atlantic Forest, Amazon, Caatinga and Cerrado domains (Pessoa c2020).

Specimens examined: 10 Dec 2003 (fl), *L.J.T. Cardoso 48* (RB); 22°57'40" S, 43°10'48" W, 4 Aug 2017 (fl), *R. Silva 4* (RFA); 22°57'44" S, 43°10'54" W, 28 Feb 2018 (fl), *R. Silva s.n.* (RFA 43318).

11. *Habenaria leptoceras* Hook., Bot. Mag. 54: t. 2726. 1827. Fig. 2h

Terricolous herb. Leaves 9, sessile, distributed along the caulome; blade green, immaculate, membranaceous, flat, convolute, lanceolate to elliptic, obscurely parallel-veined, apex acute to rounded. Inflorescence in raceme, terminal, multiflowered, glabrous. Flowers resupinate, calcarate; sepals and petals pale green, immaculate; petals bifid; lip pale green, trilobed.

Distribution: Restricted to Brazil and endemic to the Atlantic Forest domain (Flora do Brasil c2020).

Specimen examined: 22°57'28" S, 43°10'44" W, 10 May 2017 (fl), *R. Silva 2* (RFA).

12. *Maxillaria subulata* Lindl., Gen. Sp. Orchid Pl. 147. 1832. Fig. 2i

Rupicolous herb. Leaves 2, sessile, apical; blade dark green, immaculate, coriaceous, concave, conduplicate, linear, obscurely parallel-veined, apex acute. Inflorescence in

raceme, lateral, 1-flowered, glabrous. Flowers resupinate, ecalcarate; sepals and petals brownish-orange with vinaceous macules; lip brownish-orange with vinaceous macules and an atropurpureous longitudinal stripe, slightly trilobed.

Distribution: Paraguay and Brazil, where it occurs in the Atlantic Forest and Cerrado domains (Flora do Brasil c2020, Govaerts *et al.* c2020).

Specimen examined: 14 Jun 2006 (fl), *L.T.J. Cardoso & R.C. Forzza s.n.* (RB 428890).

13. *Oeceoclades maculata* (Lindl.) Lindl., Gen. Sp. Orchid. Pl. 237. 1833. Fig. 2j

Terricolous herb. Leaf 1, sessile, apical; blade green with dark green macules, coriaceous, flat to slightly concave, conduplicate, oblong to slightly elliptic, obscurely parallel-veined, apex acute. Inflorescence in raceme, rarely in panicle, lateral, 7-9-flowered, glabrous. Flowers resupinate, calcarate; sepals and petals brownish, immaculate; lip white, pink at the lateral margins, trilobed.

Distribution: Tropical Africa and the Neotropics; in Brazil, occurs in the Atlantic Forest, Amazon, Caatinga and Cerrado domains (Govaerts *et al.* c2020, Machnicki-Reis and Smidt c2020).

Specimens examined: 4 Mar 2004 (fl, fr), *L.J.T. Cardoso 116* (RB); 22°57'40" S, 43°10'49" W, 12 Apr 2017 (fl, fr), *R. Silva 1* (RFA).

14. *Prescottia plantaginifolia* Lindl. ex Hook., Exot. Fl. 2: t. 115. 1824. Fig. 2k

Rupicolous herb. Leaves 4, petiolate, rarely sessile, distributed along the caulome; blade green, immaculate, membranaceous, flat, convolute, lanceolate or elliptic, obscurely parallel-veined, apex acute to acuminate. Inflorescence in raceme, terminal, multiflowered, lax, glabrous. Flowers non-resupinate, ecalcarate, not overlapping; sepals and petals green, immaculate; lip green, entire.

Distribution: Restricted to Brazil, where it occurs in the Atlantic Forest and Cerrado domains (Meneguzzo c2020b).

Specimens examined: 22°57'40" S, 43°10'51" W, 14 Dec 2017 (fl), *R. Silva s.n.* (RFA 43322); 22°57'38" S, 43°10'57" W, 13 Jul 2018 (fl), *R. Silva s.n.* (RFA 43316).

15. *Prescottia spiranthophylla* Barb.Rodr., Gen. Sp. Orchid.1: 177. 1877.

Rupicolous herb. Leaves 6, sessile, distributed along the caulome; blade green, immaculate, subchartaceous, flat, convolute, linear, obscurely parallel-veined, acute apex. Inflorescence in raceme, terminal, multiflowered, congested, glabrous. Flowers non-resupinate, ecalcarate, overlapping; sepals and petals green, immaculate; lip green, entire.

Distribution: Restricted to Brazil (only in the state of Rio de Janeiro) and endemic to the Atlantic Forest domain, occurring exclusively on rock outcrops (Meneguzzo c2020b).

Specimen examined: 22°57'31" S, 43°10'47" W, 9 Nov 2017 (fl), *R. Silva s.n.* (RFA 43323).

16. *Trichocentrum pumilum* (Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16(2): 138. 2001. Fig. 2l

Epiphytic herb. Leaf 1, sessile, apical; blade green, immaculate, coriaceous, flat, conduplicate, oblong to narrow-elliptical, obscurely parallel-veined, apex acute. Inflorescence in panicle, lateral, multiflowered, glabrous. Flowers resupinate, ecalcarate; sepals and petals yellow with brown macules; lip yellow with vinaceous macules, trilobed.

Distribution: Argentina and Brazil, in which occurs in the Atlantic Forest and Cerrado domains (Meneguzzo c2020c).

Specimen examined: 22°57'47" S, 43°10'48" W, 9 Nov 2017 (fl), *R. Silva s.n.* (RFA 43319).

With these findings we aim to raise awareness among the local population about the importance of conserving regional flora and stimulate visits and valuation of environmental education and ecotourism actions in PE Chacrinha to include the conservation unit in the tourist itinerary of the city of Rio de Janeiro.

AUTHORS CONTRIBUTIONS

RS collected the field data. FFVAB and RS provided photos, identified and described the specimens. RCL guided the work and provided significant suggestions during the study. FFVAB added intellectual content. All the authors contributed to preparation and critical revision of the manuscript.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest.

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