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Original Paper

Orchidaceae in Iguaçu National Park, Paraná, Brazil

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Abstract

This study presents a synopsis of the Orchidaceae species in Iguaçu National Park (ParNa Iguaçu), one of the largest Atlantic Forest remnants in the state of Paraná. Orchidaceae is represented in the area by 65 species, distributed in 41 genera, the most representative being *Gomesa* (7 spp.) and *Acianthera* (6 spp.). Representatives of three subfamilies are present: Vanilloideae (2 spp.), Orchidoideae (12 spp.) and Epidendroideae (51 spp.) which, as expected, presents the greatest richness (78% of the total). Among the species found, five are considered endemic to Brazil, 23 are endemic to the Atlantic Forest (36%) and one is endemic to Paraná. Thirty-one new records were found for the area. The areas of Mixed Ombrophilous Forest (MOF) had 29 exclusive species, the Semideciduous Seasonal Forest (SSF) had 20, while 16 species occur in both phytophysiognomies. A new occurrence was recorded for MOF. Regarding habit, exclusively epiphytic was the most representative (39 spp.), followed by exclusively terricolous (15 spp.), two vines and one mycoheterotrophic species. Among the families already inventoried in ParNa Iguaçu, Orchidaceae is among the richest and the findings of the present study reinforce the importance of floristic studies for cataloging the local flora.

Key words: Atlantic forest, mixed ombrophilous forest, orchids, semideciduous seasonal forest.

Resumo

Este estudo apresenta a sinopse de Orchidaceae no Parque Nacional do Iguaçu (ParNa Iguaçu), um dos maiores remanescentes de Floresta Atlântica no estado do Paraná. Orchidaceae é representada na área por 65 espécies, distribuídas em 41 gêneros, sendo os mais representativos *Gomesa* (sete spp.) e *Acianthera* (seis spp.). Representantes de três subfamílias estão presentes: Vanilloideae (duas spp.), Orchidoideae (12 spp.) e Epidendroideae (51 spp.) que, como esperado, apresenta maior riqueza (78% do total). Entre as espécies encontradas, cinco são consideradas endêmicas do Brasil, 23 são endêmicas da Floresta Atlântica (36%) e uma é endêmica do Paraná. Foram encontrados 31 novos registros para a área. As áreas de Floresta Ombrófila Mista (FOM) tiveram 29 espécies exclusivas, as de Floresta Estacional Semidecidual (FES) tiveram 20, enquanto 16 espécies ocorreram em ambas fitofisionomias. Nova ocorrência foi registrada para FOM. Com relação ao hábito, espécies exclusivamente epífitas foram as mais representativas (39 spp.), seguidas de exclusivamente terrícolas (15 spp.), duas trepadeiras e uma micoheterotrófica. Entre as famílias já inventariadas no ParNa Iguaçu, Orchidaceae está entre as mais ricas e os achados no presente estudo reforçam a importância de estudos florísticos para catalogação da flora local.

Palavras-chave: Floresta Atlântica, floresta ombrófila mista, orquídeas, floresta estacional semidecidual..

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Introduction

Orchidaceae is the largest family in terms of number of species among the monocots, belonging to the order Asparagales (APG IV 2016), and consists of approximately 28,000 species, distributed in 736 genera (Christenhusz & Bing 2016). It is currently subdivided into five subfamilies: Apostasioideae, Cypripedioideae, Orchidoideae, Vanilloideae and Epidendroideae. These subfamilies are distinguished primarily by synapomorphies related to the pollinaria and anthers (Chase *et al.* 2015).

The family is composed of perennial herbs, occupying a diversity of habitats and ecological niches, such as aquatic, rupicolous, mycoheterotrophic, climbing, terricolous species, but most species are epiphytic (Dressler 1993). Representatives of the family are morphologically characterized by having fasciculated roots that, in some species, are fleshy and intumescent. Many species have reserve organs, called pseudobulbs, which are dilated, generally vertical, stem segments. Stems can be generated monopodially where the plant develops from a single apical bud or sympodially where the bud is changed year to year. In sympodial species the stem is divided into rhizomes, which consist of the structure that develops parallel to the substrate, from which the secondary, usually thickened, stem is generated. In monopodial species the main stem always predominates (Barros *et al.* 2008).

The leaves are alternate, distichous or spiral, and can be succulent or membranaceous. The flowers are bilaterally symmetrical, trimerous and most commonly perfect, that is, they have male (stamen) and female (pistil) reproductive structures. One of the petals is differentiated into the lip, being the main floral structure that attracts pollinators. The androecium and gynoecium are fused into a structure called a column or gynostemium. The pollen is most commonly compacted, forming pollinia. The fruits are capsular, usually dry, and in some genera of epiphytes can appear as fleshy capsules. The seeds are numerous, tiny, adapted for wind dissemination and the endosperm is reduced or absent (Weberling & Schwantes 1986; Chase *et al.* 2009; Rodrigues 2011).

Epiphytism is part of floristic diversity in humid forests, positively influencing ecological processes and maintaining the flow of energy and matter in the ecosystem (Petean 2009). It has great ecological importance in forest communities, providing food resources and specialized microenvironments for canopy fauna (Cestari 2009). In addition, epiphytic plants are considered important bioindicators of forest successional stage, because communities in secondary stages show less epiphytic diversity than communities in dynamic equilibrium (Ramalho & Pimenta 2010).

The family has a cosmopolitan distribution, not occurring only in polar climates or desert regions, with the greatest diversity in tropical and subtropical regions (Dressler 1993). Brazil is one of the largest centers of diversity of this family, with 206 genera and 2,346 native species, of which 56% (1,489 species) are endemic (Flora do Brasil 2020, continuously updated). It is distributed in all Brazilian phytogeographic domains and is considered the most important family of the Atlantic Forest, being the richest family among the Angiosperms in this domain (Stehmann *et al.* 2009).

The Atlantic Forest is one of the most threatened tropical forests in the world (Zachos & Rabel 2011). It had an original extension of approximately 1,360,000 km^2, and there are estimates that currently between 7–12% of the original cover remains, being represented by a thousands of generally small fragments (Meyers *et al.* 2000; Mittermeier *et al.* 2004; Ribeiro *et al.* 2009). In this phytogeographic domain, 51% (1,388 species) of the native orchid diversity of the country occurs, with 867 endemic species (Flora do Brasil 2020, continuously updated). For the state of Paraná, the presence of 588 native species is confirmed, distributed in 103 genera (Flora do Brasil 2020, continuously updated). This state originally had 83% of its territory covered by Atlantic Forest, but today this coverage has been reduced to 11.7%, consisting of mostly isolated fragments (Ribeiro *et al.* 2009; Oliveira *et al.* 2017; Rezende *et al.*2018).

The phytogeographic domain of the Atlantic Forest in Paraná is represented by three main vegetational formations: Dense Ombrophilous Forest in the far east, characterized by high biological diversity and abundance of phanerophytes, epiphytes and woody lianas; Mixed Ombrophilous Forest in the plateau portions of the southwestern and western regions, characterized by the frequent presence of *Araucaria angustifolia* (Bertol.) Kuntze; Semideciduous Seasonal Forest in the north and west with the presence of valleys and rivers, whose main characteristic is semideciduousness in the unfavorable season, and

the most characteristic species is *Aspidosperma polyneuron* Mull. Arg (Roderjan *et al*. 2002; Campanili & Prochnow 2006; Kaehler *et al.* 2014).

One of the largest Atlantic Forest remnants in the state is Iguaçu National Park (ParNa Iguaçu), which plays an important ecological role as it shelters rich biodiversity, including rare and threatened species of fauna and flora. Within ParNa Iguaçu the main phytophysiognomy is Semideciduous Seasonal Forest and, in the extreme north, Mixed Ombrophilous Forest occurs, while regions with Alluvial Pioneer formations are also found (ICMBIO 2018). ParNa Iguaçu is connected to other relevant areas such as the Iguazú National Park - Argentina, located in the north of the province of Misiones, which has an extension of approximately 670 km². Together, the two parks protect an area of approximately 2,500 km² (APN 2017).

The flora of ParNa Iguaçu is known by means of a checklist of phanerogams related to the municipality of Foz do Iguaçu (Trochez *et al.* 2017), and inventories, floras and synopses for lycophytes and ferns (Lautert *et al*. 2015), Acanthaceae (Hammes *et al.* 2021), Rubiaceae (Rauber *et al.* 2021a) and Fabaceae (Rauber *et al.* 2021b). Also, in ParNa Iguaçu, more comprehensive studies have been conducted focusing on epiphytes (Cervi & Borgo 2007), floristics and phytosociology (Gris & Temponi 2017; Souza *et al.* 2017), as well as others focused on the conservation of ParNa Iguaçu (Prasniewski *et al.* 2022). For the Iguazú National Park in Argentina, the flora of Orchidaceae has been elaborated, which documented 85 species (Johnson 2001), and there have been several studies on the tree species (Dimitri *et al.* 1974; Placci *et al.* 1992, 1994; Placci & Giorgis 1993; Malmierca *et al.* 1994; Srur *et al.* 2009).

In view of the above, this main objective of this study was to provide a synopsis of the Orchidaceae in ParNa Iguaçu. Thus, we present an identification key for the species of the family, in addition to photographs of species and data on the richness of subfamilies, tribes and subtribes, on the diversity of habits and substrate types, on flowering period, and on the distribution of the species in different vegetational formations of the study area.

Material and Methods

Study area

Iguaçu National Park (ParNa Iguaçu) (Fig. 1) was created in 1939 and is listed by UNESCO as a World Heritage Site for being the last large sample of the Atlantic Forest domain, covering a total area of 1,852.62 km² (ICMBIO 2018). ParNa Iguaçu is located in the west of the state of Paraná, in the southern portion of the third plateau, between the geographic coordinates 25°05'–25°41'S and 53°40'–54°38'W, at 168 m above sea level. The park covers 14 municipalities: Capanema, Capitão Leônidas Marques, Céu Azul, Foz do Iguaçu, Lindoeste, Matelândia, Medianeira, Ramilândia, Santa Lúcia, Santa Tereza do Oeste, Santa Terezinha de Itaipu, São Miguel do Iguaçu, Serranópolis do Iguaçu and Vera Cruz do Oeste (ICMBIO 2018). The predominant climate is Cfa, characterized as humid mesothermal subtropical, with hot summers and infrequent frosts, with an average annual air temperature of 20.1 °C to 22 °C. The average annual precipitation is 1,600–2,000 mm, well distributed throughout the year (IAPAR 2010). The soils are of the latosol and haplic gleisol types (IBGE 2012; Maack 2012).

The main phytophysiognomy of ParNa Iguaçu is the Semideciduous Seasonal Forest and in the extreme north the Mixed Ombrophilous Forest also occurs, while regions with Alluvial Pioneer formations are also found (Fig. 2) (ICMBIO 2018). Of the 14 municipalities that comprise ParNa Iguaçu, only Céu Azul, Lindoeste and Santa Tereza do Oeste are represented by the Mixed Ombrophilous Forest physiognomy; in the others, the Semideciduous Seasonal Forest predominates (Fig. 1).

Data collection and analysis

To determine the floristic composition of Orchidaceae, collections have been made since 2012. But since 2015 field expeditions have been intensified and collections are made monthly in the municipalities of Céu Azul, Capanema, Foz do Iguaçu, Matelândia, Santa Tereza do Oeste, Lindoeste and Serranópolis do Iguaçu.

Collections were made by the random-walk method described by Filgueiras *et al.* (1994) and detailed by Walter & Guarino (2006). The botanical material collected was herborized according to the usual techniques (Bridson & Forman 2004), and the exsiccates were deposited in the Herbarium of the Universidade Estadual do Oeste do Paraná (UNOP). Species that were not fertile were collected and kept in cultivation in an institutional area (greenhouses) until flowering. In addition to the collected specimens, high-definition images present in SpeciesLink (CRIA 2022), Jabot (SiBBr 2022) and REFLORA of specimens previously

collected and deposited in the herbaria of BOTU, DVPR, EFC, EVB, HCF, HUCP, HUCS, HUEM, JOI, MBM, NL-BOTANY, SHPR, SPSF, UPCB and UNOP (acronyms according to Thiers, continuously updated) were consulted.

For identification, the studies of Cogniaux (1893–1896, 1898–1902, 1904–1906), Hoehne (1940, 1942, 1944, 1953), Dunsterville & Garay (1959, 1961, 1965, 1966, 1972, 1976), Pabst & Dungs (1975, 1977), Johnson (2001), Carnevali *et al.* (2003), Toscano de Brito & Cribb (2005), Chiron & Neto (2005, 2006), Stancik *et al.* (2009), Buzatto *et al.* (2010), Macagnan *et al.* (2011), Rodrigues *et al.* (2015), Koehler *et al.* (2012), Mancinelli & Smidt (2012), Royer *et al.* (2014, 2017), Machnicki-Reis *et al.* (2015), Engels *et al.* (2016), Mancinelli & Esemann-Quadros (2016), Santos *et al.* (2019) and Santos *et al.* (2020) were consulted.

Terminologies for morphological structures were based on Lawrence (1973), Radford *et al.* (1974), Tom & Sheehan (1994) and Gonçalves & Lorenzi (2007). The geographical distribution of the species was based on Govaerts *et al.* (2020) and Flora e Funga do Brasil 2020 (continuously updated). The data on the flowering period were obtained by information acquired in the field expeditions and included on the labels of the exsiccates consulted.

An identification key was prepared, based on vegetative and reproductive morphological characters observed in the samples analyzed. The verification of the spelling of the scientific names and their respective authors were verified using the Flora e Funga do Brasil and International Plant Names Index (IPNI 2019). For the conservation status of the species, the National Center for the Conservation of Flora (CNCFlora 2020) and IUCN Red List (2022) were consulted.

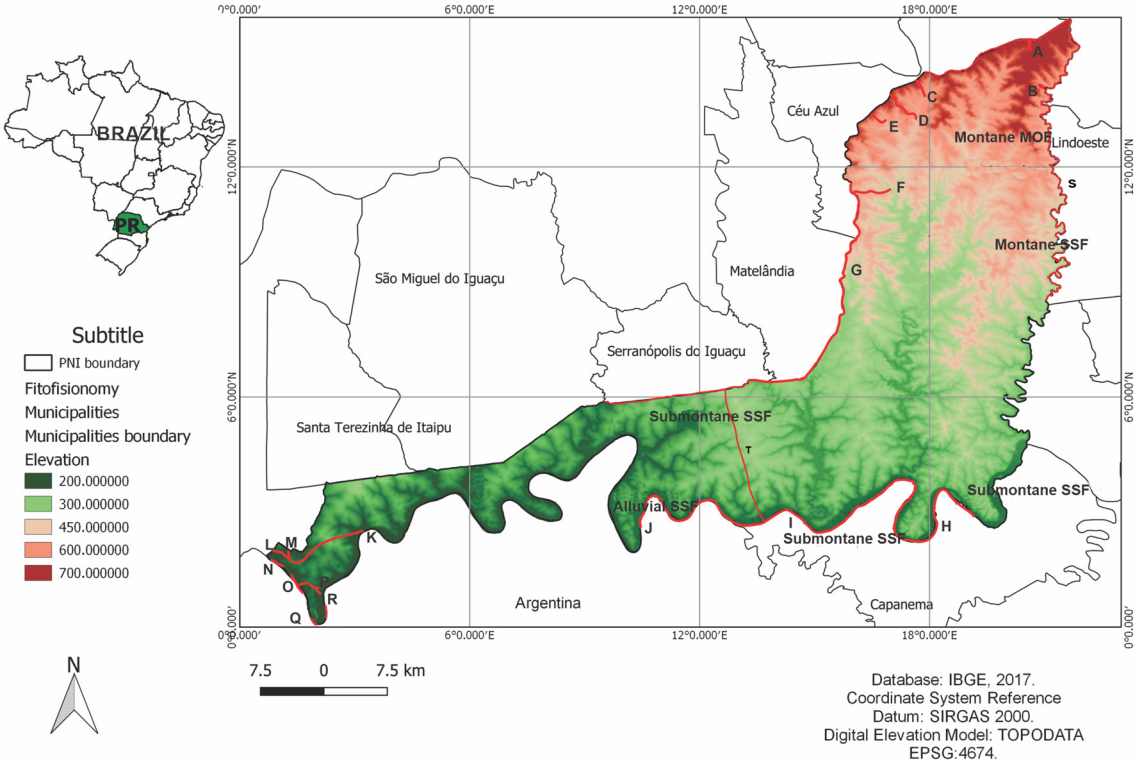

Figure 1 – MMap of Iguaçu National Park with the trails sampled, indicating the phytophysiognomic formations. (MOF = Mixed Ombrophilous Forest; SSF = Semideciduous Seasonal Forest). Boundaries of the municipalities and the trails traveled: A-F. Céu Azul – A. Fazenda Rio Butu; B. Nascentes do Jumelo; C. Araucárias; D. cachoeira Rio Azul; E. Manoel Gomes; F. Jacutinga; G-J. Capanema – G. Matelândia; H. margens do Rio Iguaçu do lado brasileiro; I. cachoeira Rio Silva-Jardim; J. Ilha do Sol; K-R. Foz do Iguaçu – K. Poço Preto; L. represa São João; M. antiga usina; N. Escola Parque; O. Macuco Safari; P. Bananeiras; Q. Cataratas; R. Hidrante; S-T. Lindoeste – S. Borda; T. Serranópolis do Iguaçu and Capanema – antiga estrada do Colono (modified from Hammes *et al.* 2021).

Figure 2 – a-e. Environments of the Iguaçu National Park – a. Iguazu Falls; b. Gonçalves Dias river - Céu Azul; c. Iguazu Falls; d. Poço Preto trail - Foz do Iguaçu; e. Floriano - Capanema river. Authorship: a, c (Hauanna Zubek); b, d, e (Edemilson Siqueira).

Results and Discussion

In ParNa Iguaçu Orchidaceae is represented by 65 species, distributed among 41 genera, the most representative being *Gomesa* (7 spp.) and *Acianthera* (6 spp.) (Tab. S1, available on supplementary material <https://doi.org/10.6084/m9.figshare.26662531>; Figs. 3-6). As for subfamilies, three are represented in the park: Epidendroideae (Figs. 3-6), which presents the greatest richness, with 51 species (78% of the total), Orchidoideae (12 spp.) (Figs. 5-6) and Vanilloideae (2 spp.) (Tab. S1, available on supplementary material <https://doi.org/10.6084/m9.figshare.26662531>). In Epidendroideae subfamily, as expected, most of species are distributed in the tribes Cymbidieae (23 spp.) and Epidendrae (20 spp.) (Tab. S1, available on supplementary material <https://doi.org/10.6084/m9.figshare.26662531>).

Among the species found, five are considered endemic to Brazil (*Acianthera crepiniana* (Cogn.) Chiron & van den Berg., *Acianthera violaceomaculata* (Hoehne) Pridgeon & M.W. Chase, *Epidendrum fulgens* Brongn, *Pelexia macropoda* (Barb.Rodr.) Schlecht. and *Vanilla edwallii* Hoehne), 23 are endemic to the Atlantic Forest (36%) and one species is endemic to Paraná (*Acianthera violaceomaculata* (Hoehne) Pridgeon & M.W. Chase) (Flora e Funga do Brasil 2020, continuously updated). Only *Oeceoclades maculata* (Lindl.) Lindl. is not native to Brazil, being classified as a naturalized exotic species.

These results corroborate previous studies that indicate the Atlantic Forest as an ecosystem with high rates of endemism (Mittermeier *et al.* 2004), a statistic even more relevant when it comes to Orchidaceae (Stehmann *et al.* 2009). In comparison with work already conducted in ParNa Iguaçu (Cervi & Borgo 2007; Trochez *et al.* 2017), 31 species constitute new records for the area (Tab. S1, available on supplementary material <https://doi.org/10.6084/m9.figshare.26662531>). These findings reinforce the importance of floristic studies for cataloging the local flora.

Regarding the vegetational formations present in ParNa Iguaçu, the areas with Mixed Ombrophilous Forest present 29 exclusive species, while in the Semideciduous Seasonal Forest 20 exclusive species are found. In addition, 16 species occur in both the Mixed Ombrophilous Forest and the Semideciduous Seasonal Forest. According to information present in the Flora e Funga do Brasil 2020 (continuously updated) and in other studies (Cervi & Borgo 2007; Kersten *et al.* 2009; Geraldino *et al.* 2010; Rossetto & Vieira 2013; Trochez *et al.* 2017; Dettke *et al.* 2018) among the species found, only *Bulbophyllum tripetalum* Lindl. constitutes new occurrences for Mixed Ombrophilous Forest. This work confirms the occurrence of *Vanilla angustipetala* Schltr. in both vegetational types.

Regarding the conservation status of the Orchidaceae species occurring in ParNa Iguaçu, only 18 have been evaluated as to the degree of threat, with 15 classified as of Least Concern (LC) and three classified as Vulnerable (VU): *Cyrtopodium palmifrons* Rchb.f. & Warm., *Grandiphyllum divaricatum* (Lindl.) Docha Neto and *Isabelia virginalis* Barb.Rodr. [CNCFlora 2020, Red Book of the Flora do Brasil, (Martinelli & Moraes 2013) MMA Ordinance No. 148, June 7, 2022, IUCN red list]. These findings reinforce the importance of the park for conservation of rare and endangered species.

As for the substrate use of the Orchidaceae species in the park, exclusively epiphytic was the most representative with 39 species, followed by exclusively terricolous with 15 species and two vining. In addition, one mycoheterotrophic species was found and eight presented more than one habit (Fig. 7).

As for the flowering period, most species bloom in October and between December and February (Tab. S1, available on supplementary material <https://doi.org/10.6084/m9.figshare.26662531>; Fig. 8), which corresponds to spring and summer, the rainy season in the southern region. Between May and August, which is the dry season, fewer species are in bloom (Fig. 8).

Floristic studies on Orchidaceae in Paraná State have focused, almost exclusively, on specific groups (terricolous or epiphytic), with fewer works covering all life forms comprised by the family, which restricts the comparison of results. The vast majority of studies focus on areas of Dense Ombrophilous Forest, an environment typically richer for Orchidaceae compared to Mixed Ombrophilous Forest and Semideciduous Seasonal Forest (Siqueira *et al.* 2014). A study conducted close to ParNa Iguaçu and representing one of the vegetational formations was that of Johnson (2001), conducted in Iguazú National Park, Argentina, which listed 85 species. In comparison with this study, it is verified that according to the Flora e Funga do Brasil, all species are also registered for Brazil, 32 species are exclusive to

the Semideciduous Seasonal Forest, five species are exclusive to the Mixed Ombrophilous Forest, 24 species occur in both formations, and 24 species do not occur in either formation. Furthermore, in the work of Johnson (2001), two species are classified as naturalized (*Eulophia Alta* (L.) Fawc. & Rendle and *Oeceoclades maculata* (Lindl.) Lindl.). Regarding the substrate of occurrence, 53 species are classified as epiphytes.

Some of the factors that may have contributed to the higher number of species recorded for Igauazú National Park, Argentina, is the extensive trail network. Iguazú National Park even has trails suspended within the forest canopy, a factor that contributes to the collection of epiphytic species, since more than half of the Orchidaceae species have an epiphytic habit. Another factor is the time of collection, Johnson has been collecting intensively for 20 years. Taking these factors into consideration, Johnson's result is not so divergent when compared to this study.

For ParNa Iguaçu, few areas have been inventoried because many sites are difficult to access. In addition, many of the trails traveled suffer anthropic interference, a condition that can affect the occurrence of orchids that occupy specialized niches, as these orchids are sensitive to such interference (Suzuki 2005).

In this study, representatives of the three subfamilies that occur in the South of Brazil, Vanilloideae, Orchidoideae and Epidendroideae (Chase *et al*. 2015), were found. The richness of the tribes Cymbidieae and Epidendrae was significant (Tab. S1, available on supplementary material <https://doi.org/10.6084/m9.figshare.26662531>). Results are similar to those obtained by Johnson (2001).

Regarding the most representative genera sampled, *Gomesa* and *Acianthera* have also been cited in the works already conducted in ParNa Iguaçu as the most representative in the composition of this family. Nevertheless, Trochez *et al.* (2017) recorded *Acianthera* as the genus of the greatest representativeness, and Cervi & Borgo (2007) reported the genus *Oncidium* as having the greatest representativeness. In other synopses of epiphytes for Paraná, the authors Geraldino *et al.* (2010) recorded *Acianthera* as the genus of greatest representativeness and Bianchi *et al*. (2012) recorded *Gomesa* and *Acianthera* as the genera of greatest representativeness. In the study by Johnson (2001), the genera *Gomesa* and *Acianthera* also had the highest representativeness.

Even though in ParNa Iguaçu the main phytophysiognomy is Semideciduous Seasonal Forest, in the Mixed Ombrophilous Forest a higher representation of Orchidaceae species was found, confirming the indication of Stehmann *et al.* (2009) that the family is more abundant and diverse in habitats with high annual rainfall without effectively dry months.

An important characteristic of the Atlantic Forest is the large number of epiphytic plants found, with orchids and bromeliads being the most abundant epiphytes in this phytogeographic domain (Kersten & Silva 2001). Orchidaceae is considered one of the most representative families in studies of vascular epiphytes developed in forest formations inserted in the Atlantic Forest domain. In a study by Kersten (2010), where he gathered 62 surveys of vascular epiphytes in the Atlantic Forest, Orchidaceae was the most representative family accounting for 45% of the native epiphytic species.

Part of the floristic diversity in tropical humid forests comes from epiphytic species that make up 10% of all vascular plants, which positively influence ecosystem processes and maintenance (Kersten 2010). Orchidaceae is considered one of the most representative families in studies of vascular epiphytes developed in forest formations embedded in the Atlantic Forest domain (Neto *et al.* 2004; Buzatto *et al.* 2007; Neto *et al.* 2007; Kersten 2010; Krahl *et al.* 2014; Heberle *et al.* 2012; Mancinelli & Esemann-Quadros 2016).

As for the flowering period, most of the catalogued species bloom in October and between December and February; the wettest and warmest season is the most favorable for the metabolism of most plant species, this being one of the factors for the flowering of species at this time (Nardoto *et al.* 2006). Similar flowering results have already been presented by other authors (Batista *et al.* 2005; Pansarin & Pansarin 2008; Krahl *et al.* 2014).

Among the Angiosperm families already listed or inventoried for ParNa Iguaçu (Cervi & Borgo 2007; Gris & Temponi 2017; Souza *et al.* 2017; Trochez *et al.* 2017; Hammes *et al.* 2021; Rauber *et al.* 2021a, b; Hentz Júnior *et al.* 2022), Orchidaceae is among those with the highest richness. Thus, the findings of the present study reinforce the importance of floristic studies for cataloging the local flora, with emphasis on epiphytic species for their bioindicator potential. However, we emphasize that studies in areas not yet accessed in ParNa Iguaçu are necessary to possibly increase the richness of the family in the area.

Synopsis of species

Identification key to the Orchidaceae species of Iguaçu National Park

1. Plants vines; internodes twining 2
   2. Lip ovate, apex rounded, disc verrucose ..... 60. *Vanilla angustipetala*
   2'. Lip lanceolate-elliptical, apex acute, disc lamellate ..... 61. *Vanilla edwallii*
1'. Plants epiphytic or terricolous; internodes not twining 3
   3. Stems swollen into globose, ovoid, ellipsoid or fusiform pseudobulbs 4
      4. Leaves acicular 5
         5. Inflorescences terminal 6
            6. Lip 3-lobed ..... 41. *Leptotes unicolor*
            6'. Lip entire 7
               7. Sepals ≤ 0.7 cm long; lip obovate ..... 39. *Isabelia virginalis*
               7'. Sepals ≥ 2.5 cm long; lip ovate ..... 10. *Brassavola tuberculata*
         5'. Inflorescences lateral 8
            8. Inflorescences 1-flowered; flowers brown ..... 43. *Maxillaria paranaensis*
            8'. Inflorescences 2-flowered or multiflowered; flowers white 9
               9. Pseudobulbs ovoid; lip with acute apex ..... 16. *Capanemia micromera*
               9'. Pseudobulbs fusiform; lip with rounded apex ..... 17. *Capanemia superflua*
      4'. Leaves flat 10
         10. Pseudobulbs homoblastic 11
            11. Inflorescences terminal 12
               12. Plants epiphytic; flowers not resupinate ..... 54. *Polystachya concreta*
               12'. Plants terricolous; flowers resupinate ..... 29. *Galeandra beyrichi*
            11'. Inflorescences lateral 13
               13. Plants terricolous; flowers pinkish-white; lip entire ..... 62. *Warrea warreana*
               13'. Plants epiphytes; flowers yellowish; lip 3-lobed 14
                  14. Lip with fimbriate margin ..... 18. *Catasetum fimbriatum*
                  14'. Lip with entire margin ..... 24. *Cyrtopodium palmifrons*
         10'. Pseudobulbs heteroblastic 15
            15. Inflorescences terminal ..... 19. *Cattleya cernua*
            15'. Inflorescences lateral 16
               16. Inflorescences 1-flowered 17
                  17. Petals with rounded apex; lip with emarginate apex ..... 36. *Gomesa uniflora*
                  17'. Petals with acute apex; lip with rounded apex ..... 42. *Maxillaria chrysantha*
               16'. Inflorescences 2-flowered or multi-flowered 18
                  18. Spur present ..... 51. *Oeceoclades maculata*
                  18'. Spur absent 19
                     19. Pseudobulbs ≤ 1 cm long 20
                        20. Leaves > 4 cm wide; lip 3-lobed ..... 59. *Trichocentrum pumilum*
                        20'. Leaves < 1 cm wide; lip entire 21
                           21. Petals as wide or wider than lip ..... 65 *Zygostates alleniana*
                           21'. Petals narrower than lip 22
                              22. Plants reptant, rhizome between pseudobulbs ≥ 2 cm long ..... 11. *Bulbophyllum regnellii*
                              22'. Plants cespitose, rhizome between pseudobulbs ≤ 0.5 cm long ..... 56. *Sanderella riograndensis*

19’. Pseudobulbs > 1 cm long 23
23. Petals ≤ 0.4 cm long ..... 12. *Bulbophyllum tripetalum*
23’. Petals ≥ 0.8 cm long 24
24. Lip entire 25
25. Sepals fused up to 3/4 of length ..... 35. *Gomesa recurva*
25’. Sepals free 26
26. Lip white, margin undulate; column wings present ..... 48. *Miltonia flavescens*
26’. Lip purple, margin straight; column wings absent ..... 64. *Zygopetalum maxillare*
24’. Lip 3-lobed 27
27. Callus of lip velutinous ..... 37. *Grandiphyllum divaricatum*
27’. Callus of lip glabrous 28
28. Lateral lobes of lip sub-orbiculate 29
29. Callus of lip with distal portion elongate and inflexed ..... 33. *Gomesa florida*
29’. Callus of lip with distal portion multiparted ..... 36. *Gomesa uniflora*
28’. Lateral lobes of lip oblong 30
30. Petals shorter than lip ..... 30. *Gomesa bifolia*
30’. Petals as long as or longer than lip 31
31. Callus extending from base of lip to tip of terminal lobe ..... 31. *Gomesa brieniana*
31’. Callus only on disc 32
32. Lateral sepals fused only at base ..... 32. *Gomesa cornigera*
32’. Lateral sepals fused up to the apex ..... 34. *Gomesa lietzei*
3’. Stems cylindrical or poorly developed 33
33. Plants terricolous 34
34. Spur present 35
35. Plants without leaves ..... 63. *Wullschlaegelia aphylla*
35’. Plants with leaves 36
36. Lip 3-parted ..... 38. *Habenaria bractescens*
36’. Lip entire or obscurely 3-lobed 37
37. Stem > 3.5–42 cm long 38
38. Lip epichile sagittate ..... 47. *Microchilus rosea*
38’. Lip epichile entire 39
39. Lip without callus ..... 46. *Microchilus kuczynskii*
39’. Lip with pair of calluses at apex of mesochile ..... 45. *Microchilus bidentifer*
37’. Stem inconspicuous 40
40. Petals ≥ 1.2 cm long ..... 25. *Eltroplectris schlechteriana*
40’. Petals ≤ 0.5 cm long 41
41. Pseudopetiole slightly shorter to longer than the leaf blade; ovary pedicel exposed ..... 52. *Pelexia macropoda*
41’. Pseudopetiole much shorter than the leaf blade; ovary pedicel covered by floral bracts ..... 44. *Mesadenella cuspidata*
34’. Spur absent 42
42. Inflorescences lateral ..... 20. *Corymborkis flava*
42’. Inflorescences terminal 43
43. Leaves coriaceous; flowers red to yellow; lip with frimbriate margin ..... 27. *Epidendrum fulgens*
43’. Leaves membranaceous; flowers whitish to greenish; lip with entire margin 44
44. Flowers not resupinate 45
45. Flowers sessile; lip cuculate ..... 55. *Prescottia stachyodes*

45’. Flowers pedicelate; lip flat ..... 21. *Cranichis candida*
44’. Flowers resupinate 46
46. Lateral sepals reflexed forming a mentum ..... 57. *Sarcoglottis acaulis*
46’. Sepals straight not forming a mentum 47
47. Lip with two tooth-shaped auricles at base ..... 22. *Cyclopogon congestus*
47’. Lip without auricles at base ..... 23. *Cyclopogon elatus*
33’. Plants epiphytic 48
48. Leaves distributed along stem 49
49. Inflorescences terminal 50
50. Flowers not resupinate ..... 28. *Epidendrum rigidum*
50’. Flowers resupinate 51
51. Sepals fused at base; lip entire ..... 40. *Isochilus linearis*
51’. Sepals free; lip 4-lobed ..... 26. *Epidendrum densiflorum*
49’. Inflorescences lateral 52
52. Plants without leaves ..... 14. *Campylocentrum grisebachi*
52’. Plants with developed leaves 53
53. Leaves acicular ..... 53. *Phymatidium delicatulum*
53’. Leaves flat 54
54. Inflorescences longer than leaves ..... 15. *Campylocentrum ulaei*
54’. Inflorescences shorter than leaves ..... 13. *Campylocentrum densiflorum*
48’. One apical leaf 55
55. Herbs reptant 56
56. Inflorescences composed of numerous racemes ..... 8. *Anathallis obovata*
56’. Inflorescences simple, one raceme 57
57. Leaves ≤ 2.0 cm long; lip entire ..... 9. *Barbosella cogniauxiana*
57’. Leaves ≥ 3.0 cm long; lip 3-lobed ..... 5. *Acianthera saudersiana*
55’. Herbs cespitose 58
58. Leaves laterally flattened ..... 2. *Acianthera crepiniana*
58’. Leaves dorso-ventrally flattened 59
59. Lateral sepals free 60
60. Inflorescences pedunculate ..... 7. *Anathalis linearifolia*
60’. Inflorescences sessile 61
61. Floral bracts < 0.1 cm long; never campanulate ..... 49. *Octomeria micrantha*
61’. Floral bracts > 0.2 cm long; campanulate ..... 50. *Octomeria warmingii*
59’. Lateral sepals connate at base or along entire length 62
62. Lip entire ..... 58. *Specklinia marginalis*
62’. Lip 3-lobed 63
63. Lateral sepals connate only at base ..... 1. *Acianthera aphthosa*
63’. Lateral sepals completely connate 64
64. Sepals externally pubescent ..... 4. *Acianthera pubescens*
64’. Sepals externally glabrous or minutely puberulent 65
65. Leaves > 5 cm long ..... 3. *Acianthera klotzschiana*
65’. Leaves ≤ 3 cm long ..... 6. *Acianthera violaceomaculata*

1. ***Acianthera aphthosa*** (Lindl.) Pridgeon & M.W. Chase, Lindleyana 16: 242 (2001) ≡ *Pleurothallis aphthosa* Lindl., Edwards’s Bot. Reg. 24(Misc.): 42(1838). Fig. 3a

In the study area the most similar species is *Acianthera pubescens* but differs by the lateral sepals connate only at the base (*vs.* completely connate).

Material examined: Céu Azul, trilha da Jacutinga, 13.X.2014, fl., *L. Boff & L.G. Temponi 138* (UNOP!); 5.X.2012, fl., *M.E. Engels et al. 731* (UNOP!); trilha Rio Azul, 12.VII.2015, fl., *L. Boff et al. 132* (UNOP!); trilha Manoel Gomes, 15.VIII.2016, fl., *M.G. Caxambu 7450* (HCF!); Foz do Iguaçu, trilha do Poço Preto, 21.IV.2016, fl., *M.G. Caxambu et al. 7449* (HCF!); 30.III.2011, fl., *M.T. Martinez et al. 16* (UNOP!).

The species is distributed in Bolivia, Colombia, Ecuador, Peru, Brazil and Paraguay (WCSP). In Brazil, it occurs in the Southeast (SP, MG, RJ) and South (PR, SC, RS). In the Brazilian territory, it only occurs in the Atlantic Forest, it occurs in areas of Semideciduous Seasonal Forest and Dense Ombrophilous Forest (BFG 2015).

Habit: Epiphytic.

Threat category: Least Concern (LC).

2. ***Acianthera crepiniana*** (Cogn.) Chiron and Van den Berg, Richardiana 12:73 (2012) ≡ *Pleurothallis crepiniana* Cogn. *Fl. Bras.* (Martius) 3(4): 542 (1896).

It is easily recognized among its cogeners for being the only species with laterally flattened leaves (*vs*. dorso-ventrally flattened).

Material examined: Foz do Iguaçu, trilha do Poço Preto, 30.III.2011, fl., *M.T. Martinez 24* (UNOP!).

The species is endemic to Brazil (WCSP), it occurs in the Southeast (MG, SP) and South (PR, SC, RS). In the phytogeographic domains of the *Cerrado* and Atlantic Forest, in Riparian or Gallery Forest, Semideciduous Seasonal Forest and Ombrophilous Forest (BFG 2015).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

3. ***Acianthera klotzschiana*** (Rchb.f.) Pridgeon & M.W. Chase, Lindleyana 16: 244 (2001) ≡ *Pleurothallis klotzschiana* Rchb.f., Linnaea 22(7): 828 (1850).

Among the species of the area, it can be confused with *Acianthera violaceomaculata*, but differs in the length of its leaves (> 5 cm *vs*. ≤ 3 cm long).

Material examined: Céu Azul, trilha do Rio Azul, 3.XI.2015, fl., *M.G. Caxambu et al. 7037* (HCF!); 19.II.2015, fl., *L. Boff 101* (UNOP!), *107* (UNOP!). Lindoeste, trilha da cachoeira, 15.IX.2016, fl., *M.G. Caxambu 7480* (HCF!).

The species is distributed in Brazil, Argentina, and Paraguay (WCSP). In Brazil, it occurs in the Southeast (MG, SP) and South (PR, SC, RS). Endemic to the Atlantic Forest, it is present in the vegetational formations Riparian or Gallery Forest and Ombrophilous Forest (Rainforest) (BFG 2015).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

4. ***Acianthera pubescens*** (Lindl.) Pridgeon & M.W. Chase, Lindleyana 16: 245 (2001) ≡ *Pleurothallis pubescens* Lindl. *in* Hook., Companion Bot. Mag. 2: 355 (1836).

In the study area it is morphologically similar to *Acianthera aphthosa*, however, it can be distinguished by the lateral sepals completely connate and pubescent (*vs*. connate only at the base).

Material examined: Foz do Iguaçu, BR-469, km 26, 10.II.2015, fl., *L. Boff et al. 102* (UNOP!); 11.III.2015, fl., *L. Boff & J.K. Hammes 144* (UNOP!), *123* (UNOP!); 19.II.2010, fl., *C. Snak 338* (UPCB!); 18.V.2017, fl., *I. Souza* (EFC!); nova trilha, 25.II.2016, fl., *M.G. Caxambu 7273* (HCF!).

The species is distributed in Mexico, Central America, South America - Bolivia, Colombia, Ecuador, Peru, Brazil, Argentina, Paraguay and Uruguay (WCSP). In Brazil, it occurs in the Northeast (BA), Central-west (MT, MS), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of *Cerrado*, Atlantic Forest and Pampa, and in the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (BFG 2015).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

5. ***Acianthera saundersiana*** (Rchb.f.) Pridgeon & M.W. Chase, Lindleyana 16: 246 (2001) ≡ *Pleurothallis saundersiana* Rchb.f. Gard. Chron. 1866: 74 (1866). Fig. 3b

It is easily recognized among its cogeners for being the only species with simple inflorescences (*vs*. compound multiflorous inflorescences).

Material examined: Matelândia, trilha do Rio Floriano, 27.III.2018, fl., *M.G. Caxambu et al. 8062* (HCF!).

The species is distributed in Bolivia, Peru, Argentina, and Paraguay (WCSP). In Brazil, it occurs in the Northeast (BA, CE, PE), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains Cerrado, Atlantic Forest and Pampa, in the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest), Mixed Ombrophilous Forest and Restinga (BFG 2015).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

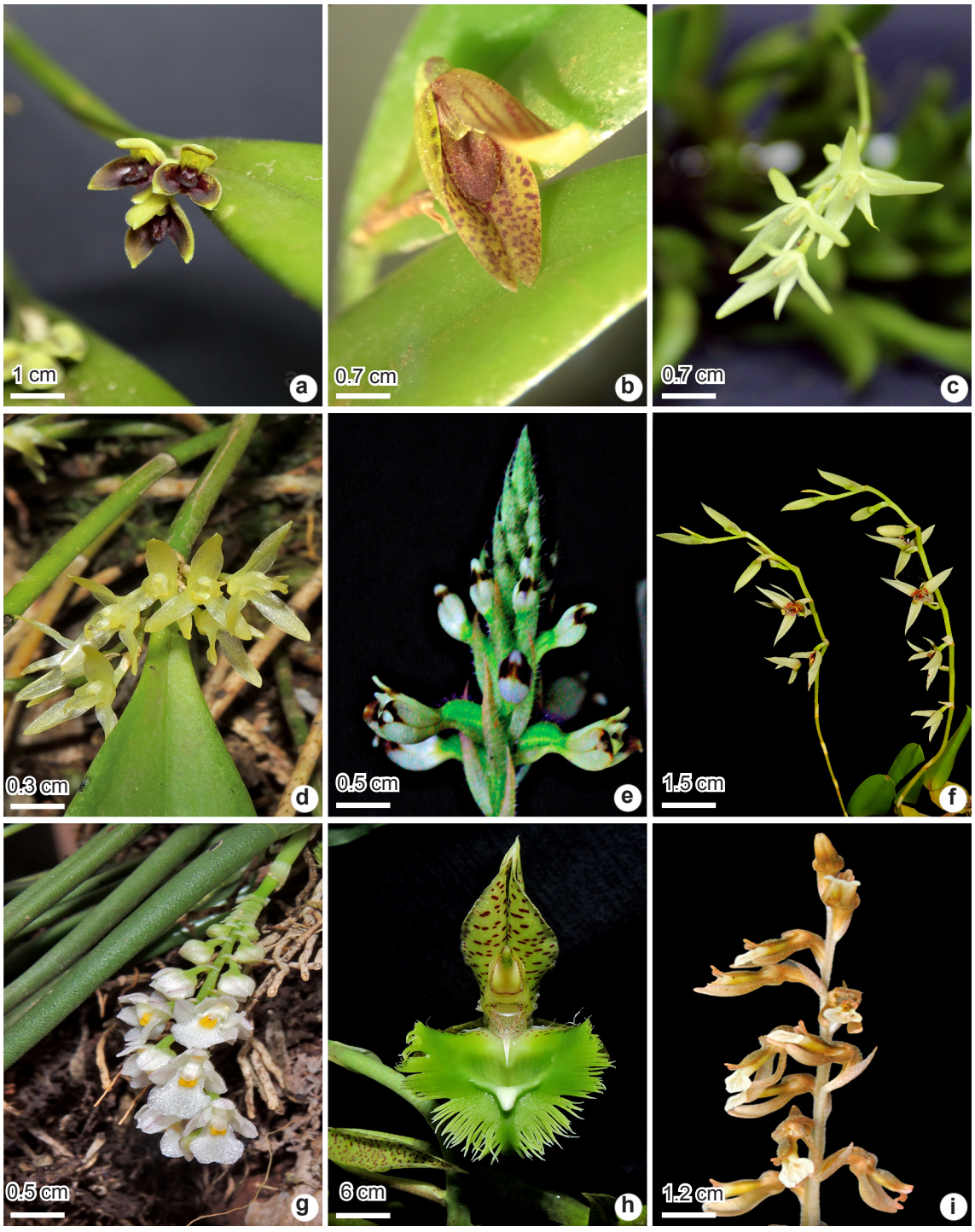

Figure 3 – a-i. Species of the Epidendroideae subfamily occurring in Iguaçu National Park – a. *Acianthera aphthosa*; b. *Acianthera saundersiana*; c. *Anathallis linearifolia*; d. *Anathallis obovata*; e. *Aspidogyne kuczynskii*; f. *Bulbophyllum tripetalum*; g. *Capanemia superflua*; h. *Catasetum fimbriatum*; i. *Cyclopogon elatus*. Authorship: a-d, f-h – Greta A. Dettke; e, i – Acervo Herbário UNOP.

6. ***Acianthera violaceomaculata*** (Hoehne) Pridgeon & M.W. Chase, Lindleyana 16: 246 (2001) ≡ *Pleurothallis violaceomaculata* Hoehne Arq. Bot. Estado Sao Paulo n.s., form. maior, 2: 123 (1952).

Among the species of the area, it can be confused with *Acianthera klotzschiana*, but can be distinguished by the length of its leaves (≤ 3 cm *vs*. > 5 cm long).

Material examined: Céu Azul, trilha do Rio Azul, 12.II.2015, fl., *L. Boff et al. 103* (UNOP!).

The species is endemic to Brazil (WCSP), from the state of Paraná and the Atlantic Forest, it occurs in the vegetational formation Ombrophilous Forest (Rainforest) (BFG 2015).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

7. ***Anathallis linearifolia*** (Cogn.) Pridgeon & M.W. Chase, Lindleyana 16: 249 (2001) = *Pleurothallis linearifolia* Cogn., *Fl. bras.* (Martius) 3(4): 573 (1896). Fig. 3c

In the study area it is morphologically similar to *Anathallis obovata*, distinguishing itself by the lip with midrib covered by subglobose papillae (*vs*. labellum without ornamentation in the middle portion).

Material examined: Santa Tereza do Oeste, bank of the Gonçalves Dias river, 21.VIII.2017, fl., *M.G. Caxambu et al. 7872* (HCF!); 30.VII.2012, fl., *L.G. Temponi et al. 1169* (UNOP!).

The species is distributed in Brazil and Argentina (WCSP). In Brazil, it occurs in the Northeast (BA), Southeast (ES, RJ, SP) and South (PR, SC, RS). A species endemic to the Atlantic Forest, in the vegetational types Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (BFG 2015).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

8. ***Anathallis obovata*** (Lindl.) Pridgeon & M.W. Chase, Lindleyana 16: 250 (2001) ≡ *Specklinia obovata* Lindl., Edwards's Bot. Reg. 25: misc. 137 (1839). Fig. 3d

In the study area it is morphologically similar to *Anathallis linearifolia*, however, it can be distinguished by the lip without ornamentation in the middle portion (*vs*. lip with midrib covered by subglobose papillae).

Material examined: Capanema, Ilha do Sol, 26.II.2015, fl., *L. Boff et al. 108* (UNOP!), *109* (UNOP!). Foz do Iguaçu, trilha das Cataratas, 24. V.2016, fl., *M.G. Caxambu, 7417* (HCF!); 10.IV.2017, fl., *M.G. Caxambu 7795* (HCF!); 2.XII.2011, fl., *M.T. Martinez & L.G. Temponi 163* (UNOP!); 13.V.2010, fl., *W.S. Mancinelli 1224* (JOI).

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the Northeast (BA), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Atlantic Forest and Pampa, in the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (BFG 2015).

Habit: Epiphytic or rupicolous.

Threat category: Not evaluated (NE).

9. ***Barbosella cogniauxiana*** (Speg. & Kraenzl.) Schltr., Repert. Spec. Nov Regni Veg. 15: 260 (1918) ≡ *Restrepia cogniauxiana* Speg. & Kraenzl., Orchis 2: 127 (1908).

It is easily recognized in the study area by its cespitose habit, reduced caulome, uniflorous inflorescence considerably longer than the leaves and the lateral sepals which are concrested and very open in relation to the dorsal sepal and are colorful.

Material examined: Céu Azul, trilha Rio Gonçalves Dias, 10.IV.2017, fl., *M.G. Caxambu et al. 7793* (HCF!).

The species is distributed in Brazil and Argentina (WCSP). In Brazil, it occurs in the Southeast (ES, SP) and South (PR, RS, SC). In the phytogeographic domains Atlantic Forest and Pampa, in the vegetational formations Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Smidt 2020a).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

10. ***Brassavola tuberculata*** Hook., Bot. Mag. 56: t. 2878 (1829). Fig. 6e

It is easily recognized in the study area by its long, aciculate leaves and white flowers (> 15 cm *vs*. ≤ 5 cm long, brown flowers).

Material examined: Foz do Iguaçu, trilha do Hidrômetro, 28.I.2016, fl., *E.L. Siqueira & G. Medeiros 1886* (HCF!); Rio Iguaçu, 16.X.2015, fl., *M.G. Caxambu 7027* (HCF!); trilha das Cataratas, 2.XII.2011, fl., *M.T. Martinez & L.G. Temponi 126* (UNOP!); 2.XII.2018, fl., *C.R. Rauber 226* (UNOP!); 10.III.2015, fl., *L. Boff 120* (UNOP!); 6.XII.2019, fl., *L.H.S.M. Conceição & L.G. Temponi 213* (UNOP!); 17.I.2011, fl., *W.S. Mancinelli 1373* (JOI).

The species is distributed in Bolivia, Brazil, Argentina and Paraguay (WCSP). In Brazil, it

occurs in the North (RO, TO), Northeast (AL, PB, PE, RN, SE), Central-west (MS, MT, GO), Southeast (MG, SP, RJ) and South (PR, SC, RS). In the phytogeographic domains of the *Caatinga*, *Cerrado*, Atlantic Forest and *Pampa*. In the vegetational formations Cerrado (*sensu lato*), Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest), Restinga and vegetation on rock outcrops (van den Berg 2020a).

Habit: Epiphytic or Rupicolous.

Threat category: Not evaluated (NE).

11. *Bulbophyllum regnellii* Rchb.f., Linnaea 22: 835 (1850).

In the study area the most similar species is *Bulbophyllum tripetalum*, however, it can be differentiated by its flat sepals, entire lip and lack of callus (*vs.* navicular sepals, trilobed lip, callus present).

Material examined: Céu Azul, cercanias da BR-277, 3.IV.2017, fl., *M.G. Caxambu et al. 7792* (HCF!).

The species is endemic to Brazil (WCSP), with occurrences in the Southeast (MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains *Cerrado* and Atlantic Forest, in the vegetational formations Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (Smidt 2020b).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

12. *Bulbophyllum tripetalum* Lindl., Ann. Mag. Nat. Hist. 10: 185 (1842). Fig. 3f

In the study area the most similar species is *Bulbophyllum regnellii*, however, it can be differentiated by its navicular sepals, trilobed lip and callus present (*vs.* flat sepals, entire lip and callus absent).

Material examined: Céu Azul, road between Céu Azul and Serranópolis do Iguaçu, 11.II.2020, fl., *E.L. Siqueira et al. 3437* (HCF!); trilha da Jacutinga, 6.IX.2011, fl., *M.T. Martinez & L.G. Temponi 164* (UNOP!).

The species is distributed in Brazil and Paraguay (WCSP). In Brazil, it occurs in the Central-west (MT), Southeast (RJ, SP) and South (PR). In the phytogeographic domains *Cerrado* and Atlantic Forest, in the vegetational formations *Cerrado* (*sensu lato*), Riparian or Gallery Forest, Deciduous Seasonal Forest and Semideciduous Seasonal Forest (Smidt 2020b).

Habit: Epiphytic or Rupicolous.

Threat category: Least Concern (LC).

13. *Campylocentrum densiflorum* Cogn., *Fl. bras.* (Martius) 3(6): 511 (1906).

It is easily recognized in the study area because it has cylindrical roots with a smooth surface, an elongating stem, conduplicate leaves with rounded lobes, larger flowers at the base, smaller ones at the apex, petals yellowish-white with 3 veins.

Material examined: Céu Azul, trilha da Lagoa Azul, 2.VI.2017, fl., *M.G. Caxambu et al. 7834* (HCF!); trilha do Rio Butu, 24.VII.2015, fl., *L. Boff. et al. 131* (UNOP!); 12.XII.2018, fl., *C.R. Rauber 245* (UNOP!); Foz do Iguaçu, 13.IV.2010, fl., *W.S. Mancinelli 1230* (JOI); trilha da Represa, 10.IV.2017, fl., *M.G. Caxambu & E.L. Siqueira 7794* (HCF!).

The species is distributed in Brazil, Argentina, Paraguay, and Uruguay (WCSP). In Brazil, it occurs in the Southeast (MG, SP) and South (PR, SC, RS). In the phytogeographic domains Amazon, *Caatinga*, *Cerrado*, *Pampa* and Atlantic Forest, in the vegetational formations Evergreen Seasonal Forest, Semideciduous Seasonal Forest, Ombrophylous Forest (Rainforest), Restinga (Pessoa 2020a).

Habit: Epiphytic.

Threat category: Least Concern (LC) (Pessoa & Alves 2019)

14. *Campylocentrum grisebachii* Cogn. in C.F.P. von Martius & auct. suc. (eds.), *Fl. bras.* 3(6): 522 (1906).

It is easily recognized in the study area as it belongs to the group of species that does not have apparent leaves or stems, visible only during the reproduction period, its inflorescences sprout directly from a nodule at the base of its aerial roots. The floral bracts, sepals, petals and lips are innervated.

Material examined: Céu Azul, trilha do Rio Azul, 10.II.2015, fl., *L. Boff et al. 104* (UNOP!). Lindoeste, trilha cachoeira dos Gois, 28.VII.2016, fl., *M.G. Caxambu 7440* (HCF!).

The species is distributed in Bolivia, Brazil, Argentina and Paraguay (WCSP). It occurs in Brazil in the Southeast (MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains *Cerrado* and Atlantic Forest. In the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Pessoa 2020a).

Habit: Epiphytic.

Threat category: Near Threatened (NT) (Pessoa & Alves 2016).

15. *Campylocentrum ulaei* Cogn. in C.F.P. von Martius & auct. suc. (eds.), *Fl. bras.* 3(6): 514 (1906).

It is easily recognized in the study area for having inflorescences longer than the leaves, with short stems, distichous leaves, and racemose inflorescence with tiny, spaced flowers, white in color, with free sepals and petals, and nectary at the back of the lip.

Material examined: Foz do Iguaçu, BR-469, km 26, 27.I.2015, fl., *L. Boff et al. 87* (UNOP!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). The species is endemic to the Atlantic Forest, occurring in the vegetational formations Riparian or Gallery Forest and Ombrophilous Forest (Rainforest) (Pessoa 2020a).

Habit: Epiphytic.

Threat category: Least Concern (LC) (Pessoa & Alves 2018).

16. *Capanemia micromera* Barb.Rodr., Gen. Spec. Orchid. 1: 138 (1877).

Among the species of the study area, it can be confused with *Capanemia superflua*, but it differentiates itself by having ovoid pseudobulbs and a lip with an acute apex (*vs*. fusiform pseudobulbs; lip with rounded apex).

Material examined: Céu Azul, trilha do Rio Azul, 15.V.2017, fl., *M.G. Caxambu & E.L. Siqueira 7813* (HCF!). Lindoeste, Vila Goes, 24.V.2016, fl., *J.K. Hammes et al. 124* (UNOP!).

The species is distributed in Bolivia, Brazil, Argentina, Paraguay and Uruguay (WCSP). In Brazil, it occurs in the Northeast (BA), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Atlantic Forest and Pampa. In the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Santos & Smidt 2020).

Habit: Epiphytic.

Threat category: Least Concern (LC).

17. *Capanemia superflua* (Rchb.f.) Garay, Bot. Mus. Leafl. 21: 261 (1967) ≡ *Oncidium superfluum* Rchb.f. Ann. Bot. Syst. (Walpers) 6(5): 721 (1863). Fig. 3g

Among the species of the study area, it can be confused with *Capanemia micromera*, however, it distinguishes itself by having fusiform pseudobulbs and lip with rounded apex (*vs.* ovoid pseudobulbs and lip with acute apex).

Material examined: Céu Azul, trilha Rio Gonçalves Dias, 10.XI.2016, fl., *M.G. Caxambu et al. 7667* (HCF!); trilha Rio Azul, 10.II.2015, fl., *L. Boff et al. 146* (UNOP!). Lindoeste, trilha Cachoeira dos Gois, 27.X.2016, fl., *M.G. Caxambu et al. 7646* (HCF!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Southeast (ES, MG) and South (PR, SC, RS). In the phytogeographic domains of the Atlantic Forest and *Pampa*. In the vegetational formations Riparian or Gallery Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Santos & Smidt 2020).

Habit: Epiphytic.

Threat category: Least Concern (LC).

18. *Catasetum fimbriatum* (C.Morren) Lindl., Paxton's Fl. Gard. 1: 124 (1850) ≡ *Myanthus fimbriatus* C.Morren. Ann. Soc. Roy. Agric. Gand iv. (1848) 453. t. 231. Fig. 3h

It is easily recognized in the study area by its deeply concave sacciform lip and deeply fimbriate margins.

Material examined: Céu Azul, trilha Manoel Gomes, 4.XII.2019, fl., *M.G. Caxambu et al. 9091* (HCF!); 11.IV.2015, fl., *L. Boff & L.G. Temponi 127* (UNOP!); 5.II.2015, fl., *L. Boff & T.M. Silva1 97* (UNOP!).

The species is distributed in Venezuela, Bolivia, Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the North (PA, RR), Central-west (DF, GO, MS, MT), Southeast (MG, SP) and South (PR, SC, RS). In the phytogeographic domains of the Amazon, *Cerrado*, Atlantic Forest and *Pantanal*. In the vegetational formations *Cerrado* (*sensu lato*), Riparian or Gallery Forest, Deciduous Seasonal Forest and Semideciduous Seasonal Forest (Petini-Benelli 2020).

Habit: Epiphytic.

Threat category: Least Concern (LC).

19. *Cattleya cernua* (Lindl.) van den Berg, Neodiversity 5: 13 (2010) ≡ *Sophronitis cernua* Lindl., Bot. Mag. 65: t. 3677 (1838).

It is easily recognized in the study area for having monophyllous pseudobulbs; these pseudobulbs are organized in a single row along the stem of the plant, which is a distinctive characteristic of this species. The leaves have an obovate shape, the flowers are pale orange in color, with a yellow lip base and two lilac column wings. Each inflorescence has 2 to 5 flowers.

Material examined: Foz do Iguaçu, trilha do Hidrômetro, 11.III.2015, fl., *L. Boff et al. 122* (UNOP!), 13.V.2010, fl., *W.S. Mancinelli 1220* (JOI).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Northeast (BA), Central-west (DF, GO, MS, MT), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains Caatinga, Cerrado, Atlantic Forest and Pampa. In the vegetational formations Campo Rupestre, Cerrado (*sensu lato*), Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) Restinga and vegetation on rock outcrops (van den Berg C 2020b).

Habit: Epiphytic.

Threat category: Least Concern (LC).

20. *Corymborkis flava* (Sw.) Kuntze, Revis. Gen. Pl. 2: 658 (1891) ≡ *Serapias flava* Sw., Prodr. [O. P. Swartz] 119 (1788). Fig. 6f

It is easily recognized in the study area due to its erect, unbranched, slightly lignified stem. The leaves are alternate with an elliptical and plicate blade. The inflorescence is lateral, pluriflorous, the flowers are resupinate and yellowish in color.

Material examined: Capanema, near to the old Estrada do Colono, 20.III.2014, fl., *M.L. Toderke et al. 182* (UNOP!). Céu Azul, trilha do Rio Azul, 11.II.2016, fl., *M.G. Caxambu et al. 7232* (HCF!); 10.II.2015, fl., *L. Boff et al. 105* (UNOP!); 28.I.2020, fl. *J.G. Wink et al.* 51 (UNOP!); 19.II.2020, fl., *H.T.P. Vieira et al. 63* (EVB!); trilha Manuel Gomes, 5.II.2015, fl., *L. Boff & T.M. Silva 99* (UNOP!); trilha da Cachoeira Jacutinga, 6.IV.2011, fl., *L. Boff et al. 08* (UNOP!); trilha das Araucárias, 15.III.2013, fl., *A.R. Escher & A.A Junior 02* (UNOP!); PIC Céu Azul, 25.VI.2019, fl., *L. Biral & A.M. Pedroso 1652* (SHPR!). Foz do Iguaçu, trilha do Poço Preto, 25.II.2016, fl., *M.G. Caxambu et al. 7268* (HCF!); BR-469, km 26, 27.I.2015, fl., *L.G. Temponi et al. 1261* (UNOP!).

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the Southeast (MG, RJ, SP) and South (PR, SC, RS). In Brazil, the species occurs in the Atlantic Forest, in the vegetational formations Riparian or Gallery Forest and Semideciduous Seasonal Forest (Bochorny & Smidt 2020).

Habit: Terricolous.

Threat category: Least Concern (LC).

21. *Cranichis candida* (Barb.Rodr.) Cogn. in C.F.P. von Martius & auct. suc. (eds.), *Fl. bras.* 3(4): 248 (1895) ≡ *Cystochilum candidum* Barb. Rodr., Gen. Sp. Orchid. i. 198 (1877).

Among the species of the study area, it can be confused with *Mesadenella cuspidata*, differentiating itself by not having a calcar and the flowers are not resupinate (*vs.* having a calcar and the flowers are resupinate).

Material examined: Céu Azul, trilha da Lagoa Azul, 2.VI.2017, fl., *M.G. Caxambu et al. 7824* (HCF!).

The species is distributed in Brazil and Argentina (WCSP). In Brazil, it occurs in the Northeast (AL, PE, SE), Central-west (DF, GO), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains Cerrado, Atlantic Forest and Pampa. In the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo 2020b).

Habit: Terricolous.

Threat category: Least Concern (LC).

22. *Cyclopogon congestus* (Vell.) Hoehne, Fl. Brasílica 8(12; 2): 209 (1945) ≡ *Serapias congesta* Vell., Fl. Flumin. Icon. 9: t. 54 (1831).

Among the species of the study area, it can be confused with *Cyclopogon elatus*, however, it distinguishes itself by having two dentiform auricules at the base of the lip (*vs.* not having auricules on the lip).

Material examined: Capanema, Ilha do Sol, 26.VIII.2014, fl., *L. Boff et al. 64* (UNOP!). Céu Azul, trilha do Rio Azul, 20.VIII.2015, fl., *M.G. Caxambu et al. 6790* (HCF!); trilha Manoel Gomes, 21.VIII.2014, fl., *L. Boff et al. 62* (UNOP!)*, 63* (UNOP!); trilha das Araucárias, 12.VIII.2015, fl., *L. Boff et al. 140* (UNOP!); trilha da Jacutinga, 6.IX.2011, fl., *M.T. Martinez et al. 67* (UNOP!); Foz do Iguaçu, às margens da BR-469, 14.VIII.2015, fl., *M.G. Caxambu 6761* (HCF!); 12.IV.2014, fl., *L. Boff et al. 66* (UNOP!); 27.I.2015, fl., *L. Boff et al. 134* (UNOP!); trilha de Visitação, 12.IV.2014, fl., *L. Boff et al. 67* (UNOP!); trilha do Poço Preto, 28.VII.2015, fl., *T.M. Silva & C.S. Jesus 111* (UNOP!); trilha do Macuco Safari, 31.VIII.2017, fl., *E.L. Siqueira 2313* (HCF!).

The species is distributed in Brazil, Argentina, Paraguay and Uruguay (WCSP). In Brazil, it occurs in the Northeast (BA), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Atlantic Forest and Pampa. In the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo 2020c).

Habit: Epiphytic or Terricolous.

Threat category: Not evaluated (NE).

23. *Cyclopogon elatus* (Sw.) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 6: 53 (1919) ≡ *Satyrium elatum* Sw., Prodr. [O. P. Swartz] 119 (1788). Fig. 3i

Among the species of the study area, it can be confused with *Cyclopogon congestus*, but can be distinguished by not having auricules at the base of the lip (*vs*. having two dentiform auricles at the base of the lip).

Material examined: Capanema, trilha Silva Jardim, 4.IV.2019, fl., *C.R. Rauber et al. 401* (UNOP!). Foz do Iguaçu, trilha da Represa, 27.VII.2017, fl., *M.G. Caxambu et al. 7860* (HCF!); trilha do Poço Preto, 17.VIII.2018, fl., *C.R. Rauber et al. 137* (UNOP!). Serranópolis do Iguaçu, estrada do Colono, 9.VII.2019, fl., *C.R. Rauber et al. 412* (UNOP!), *413* (UNOP!).

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the Northeast (BA, PE), Central-west (DF), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains Cerrado and Atlantic Forest. In the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (Meneguzzo 2020c).

Habit: Terricolous.

Threat category: Not evaluated (NE).

24. *Cyrtopodium palmifrons* Rchb.f. & Warm. in H.G. Reichenbach, Otia Bot. Hamburg.: 88 (1881). Fig. 4a

It is easily recognized in the study area by its elongated pseudobulbs which can reach 80 cm long.

Material examined: Foz do Iguaçu, trilha do Poço Preto, 10.X.2018, fl., *M.G. Caxambu & E.L. Siqueira 8557* (HCF!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Southeast (MG, SP) and South (PR, RS, SC). Endemic to the Atlantic Forest, it occurs in the vegetational formations Deciduous Seasonal Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Batista & Bianchetti 2020).

Habit: Epiphytic.

Threat category: Vulnerable (VU).

25. *Eltroplectris schlechteriana* (Porto & Brade) Pabst, Bradea 1: 469 (1974) ≡ *Centrogenium schlechterianum* Porto & Brade, Anais Reunião Sul-Amer. Bot. 3: 32, t. 2, f. 2 (1940). Fig. 4b

It is easily recognized in the study area because it has concrested lateral sepals forming the mentum. The flowers are white in color.

Material examined: Foz do Iguaçu, trilha do Poço Preto, 22.IV.2016, fl., *M.G. Caxambu 7411* (HCF!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Southeast (ES, SP) and South (PR). Endemic to the Atlantic Forest, it occurs in the vegetational formation Ombrophilous Forest (Rainforest) (Guimarães 2020a).

Habit: Terricolous.

Threat category: Not evaluated (NE).

26. *Epidendrum densiflorum* Hook., Bot. Mag. 66: t. 3791 (1840). Fig. 4c

Among the species in the study area, it can be confused with *Epidendrum rigidum*, but can be differentiated by its longer stem, ranging from 6 to 90 cm in length. The leaves are larger and the inflorescence is a panicle and can have from 6 to 80 flowers per inflorescence. The sepals are light green to whitish, and the labellum is cream-colored, fleshy, flat, trilobed to tetralobed (*vs*. smaller stem and leaves, raceme inflorescence, green and entire labellum).

Material examined: Capanema, trilha das taquaras, margeando a cachoeira, 18.X.2015, fl., *L. Boff et al. 128* (UNOP!). Céu Azul, trilha da Jacutinga, 7.XII.2011, fl., *M.T. Martinez & L.G. Temponi 150* (UNOP!); 6.IX.2011, fl., *M.T. Martinez et al. 56* (UNOP!); 5.X.2012, fl., *M.E. Engels et al. 733* (UNOP!); 2.V.2013, fl., *L.G. Temponi et al. 1253* (UNOP!); 19.VI.2015, fl., *M.G. Caxambu et al. 6575* (HCF!). Foz do Iguaçu, trilha das Cataratas, 26.II.2016, fl., *M.G. Caxambu et al. 7277* (HCF!); 10.XII.2014, fl., *L. Boff & D.A. Schinemann 83* (UNOP!); 2.XII.2011, fl., *M.T. Martinez & L.G. Temponi 133* (UNOP!); 15.VIII.1971, fl, *B.E Irgang* (JF); 13.V.2010, fl, *W.S. Mancinelli 1221* (JOI!); trilha Macuco Safari 18.IV.2019, fl, *G.B. Lima et al. 152* (EVB). São Miguel do Iguaçu, Linha Martins, 19.VI.2011, fl., *M.T. Martinez & L.G. Temponi 40* (UNOP!).

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the North (TO), Northeast (BA), Central-west (GO, MS, MT), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Amazon, Cerrado and Atlantic Forest. In the vegetational formations Campinarana, Cerrado (*sensu lato*), Riparian or Gallery Forest, Igapó Forest, Terra Firme Forest, Lowland Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and vegetation on rock outcrops (Pessoa 2020b).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

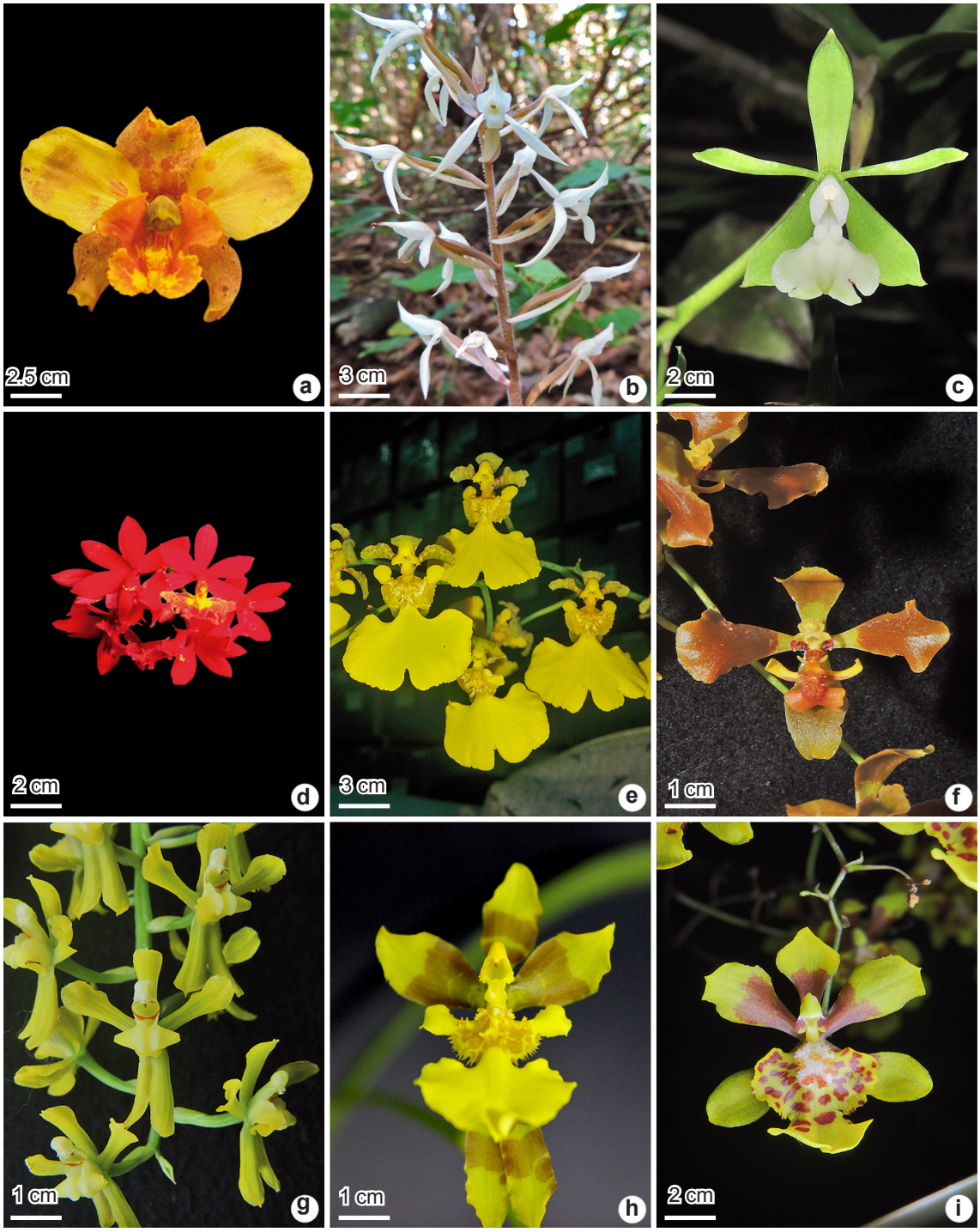

Figure 4 – a-i. Species of the Epidendroideae subfamily occurring in Iguaçu National Park – a. *Cyrtopodium palmifrons*; b. *Eltroplectris schlechteriana*; c. *Epidendrum densiflorum*; d. *Epidendrum fulgens*; e. *Gomesa bifolia*; f. *Gomesa lietzei*; g. *Gomesa recurva*; h. *Gomesa uniflora*; i. *Grandiphyllum divaricatum*. Authorship: a, c, e-i – Greta A. Dettke; b – Edemilson Siqueira; d – Shirley M. Silva.

27. *Epidendrum fulgens* Brongn., Voy. Monde, Phan. 196, T. 43 (1834). Fig. 4d

It is easily recognized in the study area by its red to yellow flowers and lip with a fimbriated margin. It is a cultivated plant in the studied area.

Material examined: Céu Azul, trilha de educação ambiental, 7.XI.2019, fl., *M.A. Catañeda et al. 4148* (EVB!).

Species endemic to Brazil (WCSP), with occurrences in the Southeast (RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Atlantic Forest. In the vegetational formation *Restinga* (Pessoa 2020b). Observation: most probably introduced.

Habit: Rupicolous or Terricolous.

Threat category: Least Concern (LC) (Cintra *et al.* 2023).

28. *Epidendrum rigidum* Jacq., Enum. Syst. Pl.: 29 (1760).

Among the species in the study area, it can be confused with *Epidendrum densiflorum*, but can be differentiated by the size of the stem, which is shorter, ranging from 3.5 to 16 cm in length. The leaves are smaller, the inflorescence is a raceme and has from 3 to 9 flowers per inflorescence. The sepals and petals are green, and the labellum is green, fleshy, flat, and entire (*vs*. larger stem and leaves, panicle inflorescence, cream-colored and trilobed to tetralobed labellum).

Material examined: Foz do Iguaçu, próximo as Cataratas do Iguaçu, 10.I.2017, fl., *M.G. Caxambu et al. 7734* (HCF!); ao lado do Hotel das Cataratas, 11.III.2015, fl., *L. Boff et al. 121* (UNOP!); 13.V.2010, fl, *W.S. Mancinelli 1222* (JOI!).

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the North (AC, AM, AP, PA, RO, RR, TO), Northeast (AL, BA, CE, MA, PB, PE, SE), Central-west (GO, MS, MT), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Amazon, *Caatinga*, *Cerrado* and Atlantic Forest. In the vegetational formations Campinarana, *Campo Rupestre*, *Cerrado* (*sensu lato*), Riparian or Gallery Forest, Igapó Forest, Terra Firme Forest, Floodplain Forest, Deciduous Seasonal Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest), *Restinga* and vegetation on rock outcrops (Pessoa 2020b).

Habit: Epiphytic or rupicolous.

Threat category: Not evaluated (NE).

29. *Galeandra beyrichii* Rchb.f., Linnaea 22: 854 (1850).

It is easily recognized in the study area by its slightly greenish, resupinate flowers, entire, campanulate lip which is white with vinaceous stripes.

Material examined: Céu Azul, trilha nascentes do Rio Floriano, 31.I.2020, fl., *M.G. Caxambu et al. 9099* (HCF!); trilha do Riu Butu, 12.XII.2018, fl., *C.R. Rauber et al. 253* (UNOP).

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the Northeast (BA), Central-west (DF, GO, MT), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains *Cerrado*, Atlantic Forest and Pampa. In the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (Monteiro 2020).

Habit: Terricolous.

Threat category: Least Concern (LC).

30. *Gomesa bifolia* (Sims) M.W. Chase & N.H. Williams, Ann. Bot. (Oxford) 104: 396 (2009) ≡ *Oncidium bifolium* Sims, Bot. Mag. 36: t. 1491 (1812). Fig. 4e

Among the species of the study area, it can be confused with *Gomesa brieniana*, however, it distinguishes itself by its petals shorter than the lip (*vs.* petals longer than the lip).

Material examined: Foz do Iguaçu, trilha do Poço Preto, 28.II.2018, fl., *M.G. Caxambu & E.L. Siqueira 8057* (HCF!). Matelândia, estrada de terra entre Céu Azul and Serranópolis do Iguaçu, 25.II.2018, fl., *M.G. Caxambu & E.L. Siqueira 8056* (HCF!).

The species is distributed in Bolivia, Argentina, Paraguay and Uruguay (WCSP). In Brazil, it occurs in the South (PR, SC, RS). In the phytogeographic domains of the Atlantic Forest and Pampa. In the vegetational formations Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo 2020d).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

31. *Gomesa brieniana* (Rchb.f.) M.W. Chase & N.H. Williams, Ann. Bot. (Oxford) 104: 396 (2009) ≡ *Oncidium brienianum* Rchb.f. Gard. Chron. n.s., 15: 40 (1881).

Among the species of the study area, it can be confused with *Gomesa bifolia*, however, it distinguishes itself by the petals longer than the lip (*vs.* petals shorter than the lip).

Material examined: Céu Azul, trilha Manoel Gomes, 10.III.2016, fl., *M.G. Caxambu & E.L. Siqueira 7278* (HCF!); 17.II.2017, 7750 (HCF!); trilha do Rio Azul, 10.II.2015, fl., *L. Boff et al. 145* (UNOP!); 16.III.2015, fl., *L. Boff et al. 126* (UNOP!); trilha do Rio Butu, 26.II.2015, fl., *L. Boff & C.V. Buturi 113* (UNOP!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it only occurs in the State of Paraná, species endemic to the Atlantic Forest, in the vegetational formations Riparian or Gallery Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo 2020d).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

32. *Gomesa cornigera* (Lindl.) M.W. Chase & N.H. Williams, Ann. Bot. (Oxford) 104: 396 (2009) ≡ *Oncidium cornigerum* Lindl. Bot de Edwards. Reg. 18: t. 1542 (1832).

Among the species of the study area, it can be confused with *Gomesa lietzei*, however, it distinguishes itself by its lip with erect-flat lateral lobes in the plane of the disc (*vs*. lip with lateral lobes turned down).

Material examined: Capanema, Ilha do sol, 26.II.2015, fl., *L. Boff et al. 112* (UNOP!), *114* (UNOP!); trilha do Cavalo, 18.V.2015, fl., *L. Boff 148* (UNOP!). Céu Azul, estrada de chão entre Céu Azul and Serranópolis do Iguaçu, 12.X.2016, fl., *M.G. Caxambu 7583* (HCF!); trilha da Cachoeira Jacutinga, 6.IX.2011, fl., *M.T. Martinez et al. 62* (UNOP!). Foz do Iguaçu, trilha do Macuco Safari, 29.I.2016, fl., *E.L. Siqueira* 1895 (HCF!); trilha das Cataratas, 2.XII.2011, fl., *M.T. Martinez & L.G. Temponi* 137 (UNOP!); BR-469, km 26, 27.I.2015, fl., *L. Boff et al. 89, 91, 94* (UNOP!); 20.II.2015, fl., *Boff et al. 115* (UNOP!); trilha do Poço Preto, 10.XII.2014, fl., *L. Boff et al.* 92 (UNOP!); 19.II.2010, fl., C. *Snak 332, 333* (UPCB!).

The species is distributed in Brazil and Paraguay (WCSP). In Brazil, it occurs in the Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Atlantic Forest and *Pampa*. In the vegetational formations Riparian or Gallery Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo 2020d).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

33. *Gomesa florida* (Vell.) Meneguzzo, Phytotaxa 450: 58 (2020) ≡ *Epidendrum floridum* Vell., Fl. Flumin. Icon. 9: t. 22 (1831).

Among the species of the study area, it can be confused with *Gomesa uniflora*, however, it distinguishes itself by the callus of the lip with distal portion elongated and inflexed (*vs*. callus of the lip with distal portion multiparted).

Material examined: Céu Azul, trilha do afluente do Rio Gonçalves Dias, 1.X.2020. fl., *M.G. Caxambu et al. 9159* (HCF!); trilha da cachoeira Jacutinga, 5.X.2012, fl., *M.E. Engels et al. 730* (UNOP!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Southeast (MG, RJ, SP) and South (PR, SC, RS). Endemic to the Atlantic Forest, the species occurs in the vegetational formations Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo 2020d).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

34. *Gomesa lietzei* (Regel) M.W. Chase & N.H. Williams, Ann. Bot. (Oxford) 104: 397 (2009) ≡ *Oncidium lietzei,* Regel Trudy Imp. S.-Peterburgsk. Bot. Sada vii. (1880) 387. Fig. 4f

Among the species of the study area, it can be confused with *Gomesa cornigera*, but it differentiates itself by the lip with lateral lobes turned down (*vs.* lip with lateral lobes erect-flat in the plane of the disc).

Material examined: Céu Azul, trilha do Rio Azul, 11.IV.2016, fl., *C.C. de Araújo et al. 01* (HCF!); 16.III.2015, fl., *L. Boff et al. 125* (UNOP!); estrada de chão entre Céu Azul and Serranópolis do Iguaçu, 12.X.2016, fl., *M.G. Caxambu 7584* (HCF!); trilha Manuel Gomes, 26.II.2015, fl., *L. Boff & M.T. Silva 111* (UNOP!); trilha da Jacutinga, 13.X.2014, fl., *L. Boff & L.G. Temponi 90* (UNOP!). Foz do Iguaçu, BR-469, km 31, 11.III.2015, fl., *L. Boff et al. 124* (UNOP!).

The species is distributed in Brazil and Paraguay (WCSP). In Brazil it occurs in the Central-west (MS), Southeast (MG, RJ, SP) and South (PR). In the phytogeographic domains Cerrado and Atlantic Forest. In the vegetational formations Riparian or Gallery Forest and Ombrophilous Forest (Rainforest) (Meneguzzo 2020d).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

35. *Gomesa recurva* R.Br., Bot. Mag. 42: t. 1748 (1815). Fig. 4g

It is easily recognized in the study area by its resupinate, greenish, membranous flowers, genuflexed labellum, obtuse to rounded apex with two lateral wings and two clavicular central calluses, orange stigma.

Material examined: Céu Azul, information post and controle-PIC, 11.I.2017, fl., *M.G. Caxambu et al. 7737* (HCF!); trilha Manuel Gomes, 5.II.2015, fl., *L. Boff & M.T. Silva 110* (UNOP!); trilha Rio Butu, 6.I.2015, fl., *L. Boff & V.C. Buturi 93* (UNOP!).

The species is distributed in Brazil and Argentina (WCSP). In Brazil, it occurs in the Northeast (BA), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains *Cerrado*, Atlantic Forest and Pampa. In the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo 2020d).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

36. *Gomesa uniflora* (Booth *ex* Lindl.) M.W. Chase & N.H. Williams, Ann. Bot. (Oxford) 104: 398 (2009) ≡ *Oncidium uniflorum* Booth *ex* Lindl., Edwards's Bot. Reg. 29: t. 43 (1843). Fig. 4h

Among the species of the study area, it can be confused with *Gomesa florida*, however, it can be distinguished by the presence on the lip of a callus with distal portion multiparted (*vs*. callus of lip with distal portion elongated and inflexed).

Material examined: Céu Azul, trilha do Rio Azul, 31.I.2017, fl., *M.G. Caxambu et al. 7745* (HCF!).

The species is distributed in Brazil, Paraguay and Argentina (WCSP). In Brazil, it occurs in the Northeast (BA), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains Cerrado, Atlantic Forest and Pampa, in the vegetational formations Riparian or Gallery Forest, Evergreen Seasonal Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest), Mixed Ombrophilous Forest and vegetation on rock outcrops (Meneguzzo 2020d).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

37. *Grandiphyllum divaricatum* (Lindl.) Docha Neto, Colet. Orquídeas Brazil. 3: 75 (2006) ≡ *Oncidium divaricatum* Lindl., Bot. Reg. 13: t. 1050 (1827). Fig. 4i

Among the species of the study area, it can be confused with species of the genus *Gomesa*, however, it distinguishes itself by the velutinous callus of the lip (*vs*. glabrous callus of the lip).

Material examined: Céu Azul, trilha do Rio Azul, 28.XII.2016, fl., *M.G. Caxambu 7730* (HCF!); trilha Manoel Gomes, 13.X.2014, fl., *L. Boff & L.G. Temponi 81* (UNOP!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). Endemic to the Atlantic Forest, it occurs in the vegetational formations *Campo Rupestre*, Riparian or Gallery Forest, Deciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and vegetation on rock outcrops (Meneguzzo 2020e).

Habit: Epiphytic.

Threat category: Vulnerable (VU).

38. *Habenaria bractescens* Lindl., Gen. Sp. Orchid. Pl.: 308 (1835). Fig. 5a

It is characterized in the study area by the presence of long, separate stigmas with involute edges, and its 3-parted lip.

Material examined: Foz do Iguaçu, próximo às Cataratas do Iguaçu, 8.II.2018, fl., *M.G. Caxambu et al. 8047* (HCF!); 20.II.1963, fl., *G. Hatschbach 9900* (MBM!); 6.XII.2019, fl., *L.H.S.M Conceição & L.G. Temponi 212* (UNOP!); rafting do Macuco Safari, 8.III.2018, fl. *E.L. Siqueira 2460* (HCF!).

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the Northeast (BA), Central-west (GO, MS, MT) and South (PR, SC, RS). In the phytogeographic domains *Cerrado* and Atlantic Forest. In the vegetational formations *Campo Limpo* and *Campo Rupestre* (BFG 2015).

Habit: Terricolous.

Threat category: Not evaluated (NE).

39. *Isabelia virginalis* Barb.Rodr., Gen. Spec. Orchid. 1: 76 (1877).

It is easily recognized in the study area by its reptant pseudobulbs covered by brownish-colored, reticulate sheaths.

Material examined: Céu Azul, estrada de chão entre Céu Azul and Serranópolis do Iguaçu, 19.V.2017, fl., *E.L. Siqueira et al. 2163* (HCF!); trilha Manoel Gomes, 5.II.2015, fl., *L. Boff & M.T. Silva 98* (UNOP!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Southeast (MG, RJ, SP) and South (PR). Endemic to the Atlantic Forest, the species occurs in the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (van den Berg 2020c).

Habit: Epiphytic or rupicolous.

Threat category: Vulnerable (VU).

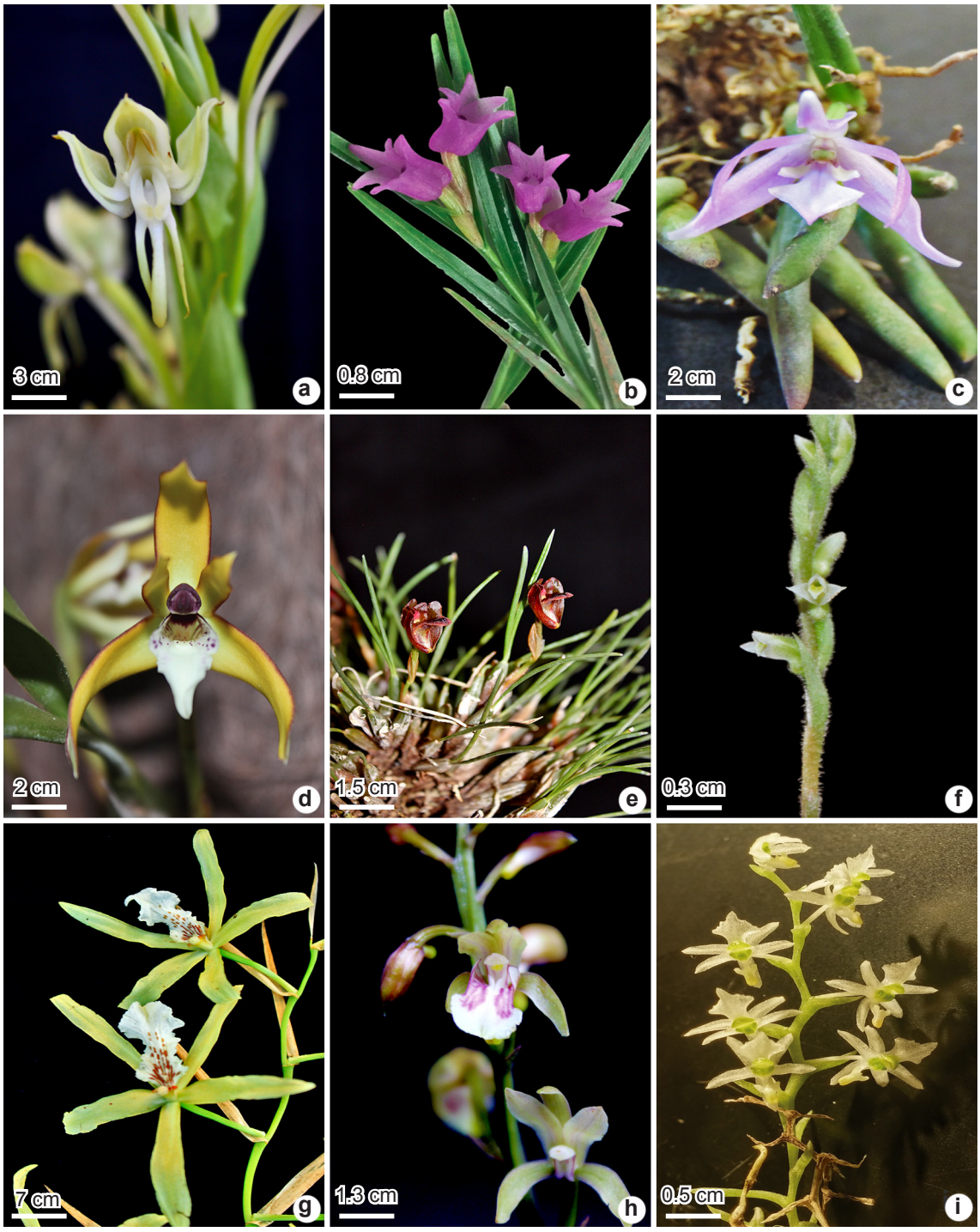

Figure 5 – a-i. Species of the subfamilies Orchidoideae (a, f) and Epidendroideae (b-e; g-i) occurring in Iguaçu National Park – a. *Habenaria bractescens*; b. *Isochilus linearis*; c. *Leptotes unicolor*; d. *Maxillaria chrysantha*; e. *Maxillaria paranaensis*; f. *Mesadenella cuspidata*; g. *Miltonia flavescens*; h. *Oeceoclades maculata*; i. *Phymatidium delicatulum*. Authorship: a, g – Acervo Herbário UNOP; b-f, h-i – Greta A. Dettke.

40. ***Isochilus linearis*** (Jacq.) R.Br. in W.T.Aiton, Hortus Kew. 5: 209 (1813) ≡ *Epidendrum lineare* Jacq., Enum. Syst. Pl. 29 (1760). Fig. 5b

It is easily recognized in the study area for having narrow and membranaceous leaves, flowers tubular, pink-violet in color.

Material examined: Céu Azul, estrada de chão entre Céu Azul and Serranópolis do Iguaçu, 21.VI.2017, fl., *E.L. Siqueira et al. 2221* (HCF!). Foz do Iguaçu, trilha das Cataratas, 21.VII.2016, fl., *M.G. Caxambu et al. 7439* (HCF!); 13.V.2010, fl., *W.S. Mancinelli 1228* (JOI!); 10.XII.2014, fl., *L. Boff et al. 85* (UNOP!); 2.XII.2001, fl, *M.T. Martinez et al. 128* (UNOP!).

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the North (TO), Northeast (AL, BA, CE, SE), Central-west (DF, GO, MS), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). It occurs in the phytogeographic domains *Caatinga*, *Cerrado* and Mata Atlantica. In the vegetational formations Caatinga (*sensu stricto*), *Campo Rupestre*, *Cerrado* (*sensu lato*), Deciduous Seasonal Forest, Evergreen Seasonal Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and vegetation on rock outcrops (van den Berg 2020d).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

41. ***Leptotes unicolor*** Barb.Rodr., Gen. Spec. Orchid. 1: 74 (1877). Fig. 5c

It is easily recognized in the study area by its green, succulent, acicular leaves, quite tumbled flowers and whole pale pink.

Material examined: Céu Azul, trilha Rio Floriano, 10.V.2016, fl., *M.G. Caxambu 7416* (HCF!). Foz do Iguaçu, trilha da Represa, 15.V.2017, fl., *M.G. Caxambu & E.L. Siqueira 7814* (HCF!). Lindoeste, trilha da Cachoeira dos Gois, 2.VI.2016, fl., *M.G. Caxambu et al. 7437* (HCF!); Vila Goes, em torno do Parque, 5.V.2016, fl., *J.K. Hammes et al. 125* (UNOP!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Southeast (MG, SP) and South (PR, SC, RS). Endemic to the Atlantic Forest, the species occurs in the vegetational formations Riparian or Gallery Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (van den Berg 2020e).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

42. ***Maxillaria chrysantha*** Barb.Rodr., Gen. Spec. Orchid. 1: 115 (1877). Fig. 5d

It is easily recognized in the study area due to its ovoid, striated, green pseudobulbs with two apical leaves; lateral, racemose inflorescences; yellowish, fleshy resupinate flowers, oblong-elliptical sepals, free, curved forward, lanceolate petals, acute apex, entire margin, fleshy three-lobed lip, pale yellow with violet spots on the lateral lobes.

Material examined: Céu Azul, estrada de chão entre Céu Azul and Serranópolis do Iguaçu, 28.VII.2016, fl., *E.L. Siqueira et al. 2025* (HCF!). Foz do Iguaçu, trilha do Poço Preto, 18.IX.2017, fl., *M.G. Caxambu & E.L. Siqueira 7874* (HCF!).

The species is distributed in Brazil and Argentina (WCSP). In Brazil it occurs in the Southeast (ES, MG, RJ) and South (PR, SC, RS). Endemic to the Atlantic Forest, it occurs in the vegetational formations Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo *et al.* 2020).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

43. ***Maxillaria paranaensis*** Barb.Rodr., Gen. Spec. Orchid. 2: 205 (1882). Fig. 5e

It is easily recognized in the study area by its acicular leaves and brownish-colored flowers.

Material examined: Céu Azul, trilha da Jacutinga, 5.X.2012, fl., *M.E. Engels et al. 732* (UNOP!). Santa Tereza do Oeste, as margens do Rio Gonçalves Dias, 21.VIII.2017, fl., *M.G. Caxambu et al. 7873* (HCF!).

The species is distributed in Brazil and Argentina (WCSP). In Brazil, it occurs in the Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). Endemic to the Atlantic Forest, the species occurs in the vegetational formations Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo *et al.* 2020).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

44. ***Mesadenella cuspidata*** (Lindl.) Garay, Fl. Ecuador 9(225: 1): 238 (1978) ≡ *Spiranthes cuspidata* Lindl., Gen. Sp. Orchid. Pl. 471 (1840). Fig. 5f

Among the species of the study area, it can be confused with *Cranichis candida*, however, it distinguishes itself by having a calcar and has resupinate flowers (*vs.* not having a calcar and the flowers not resupinate).

Material examined: Céu Azul, trilha Manoel Gomes, 25.III.2016, fl., *M.G. Caxambu et al. 7310* (HCF!); trilha do Rio Azul, 15.III.2017, fl., *M.G. Caxambu 7772* (HCF!).

The species is distributed in Guyana, Venezuela, Bolivia, Colombia, Ecuador, Peru, Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the North (PA), Northeast (BA, CE, PE), Central-west

(DF, GO, MT), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Amazon, *Cerrado*, Atlantic Forest and Pampa, in the vegetational formations *Campo Limpo*, *Cerrado* (*sensu lato*), Riparian or Gallery Forest, Deciduous Seasonal Forest, Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (Guimarães 2020b).

Habit: Terricolous.

Threat category: Not evaluated (NE).

45. *Microchilus bidentifer* (Schltr.) E.C. Smidt & M.W. Chase, Bot. J. Linn. Soc. 197(3): 337 (2021) ≡ *Aspidogyne bidentifera* (Schltr.) Garay, Bradea 2: 203 (1977).

In the study area it presents similarities to *Microchilus kuczynskii*, being distinguished by its lobed lip with a pair of calluses at the apex of the mesochile (*vs*. lip entire without calluses).

Material examined: Foz do Iguaçu, trilha do Monitoramento, 20.IX.2018, fl., *E.L. Siqueira & H.C.L. Geraldino 2804* (HCF!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Northeast (BA), Southeast (RJ, SP) and South (PR, SC, RS). Endemic to the Atlantic Forest, it is present in the vegetational formations Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo 2020a).

Habit: Terricolous.

Threat category: Not evaluated (NE).

46. *Microchilus kuczynskii* (Porsch) E.C. Smidt & M.W. Chase, Bot. J. Linn. Soc. 197(3): 340 (2021). ≡ *Aspidogyne kuczynskii* (Porsch) Garay, Bradea 2: 203 (1977). Fig. 3e

In the study area it is morphologically similar to *Microchilus bidentifer*, however, it distinguishes itself by its entire lip (*vs*. lobed lip).

Material examined: Céu Azul, trilha do Rio Azul, 11.XII.2015, fl., *M.G. Caxambu et al. 7150* (HCF!); 11.I.2017, *7739* (HCF!); 13.XII.2018, fl., *C.R Rauber 254* (UNOP!); trilha da Cachoeira Jacutinga, 7.XII.2011, fl., *L.G. Temponi & M.T. Martinez 1076* (UNOP!); 8.XI.2013, fl., *M.E. Engels 527* (UPCB); trilha Manoel Gomes, 2.XII.2019, fl., *J.G. Wink 23* (UNOP!); 5.II.2015, fl., *L. Boff & M.T. Martinez 133* (UNOP!); 28.XI.2017, fl., *L. Biral 1242* (SHPR). Foz do Iguaçu, 3.I.2012, fl., *W.S. Mancinelli 1447* (JOI).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Southeast (RJ, SP) and South (PR, SC, RS). In the phytogeographic domains *Cerrado* and Atlantic Forest. In the vegetational formations Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo 2020a).

Habit: Terricolous.

Threat category: Least Concern (LC).

47. *Microchilus rosea* (Lindl.) E.C. Smidt & M.W. Chase, Bot. J. Linn. Soc. 197(3): 340 (2021) ≡ *Aspidogyne rosea* (Lindl.) Meneguzzo, Orquidário 26: 90 (2012).

It is easily distinguished from its congeners by being the only species with elliptical leaves and its sagittate epichile (*vs.* leaves ovate, epichile obovate).

Material examined: Capanema, próximo à antiga estrada do Colono, 20.II.2014, fl., *M.L. Toderke et al. 191* (UNOP!). Céu Azul, trilha das Araucárias, 31.VII.2012, fl., *L.G. Temponi et al. 1178* (UNOP!); trilha da Jacutinga, 30.III.2014, fl., *M.E. Engels 2373* (HCF!).

The species is distributed in Bolivia, Colombia, Ecuador, Peru, Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the North (AC), Northeast (BA), Southeast (MG, RJ, SP) and South (PR). In the phytogeographic domains of the Amazon and Atlantic Forest, in the vegetational formations Riparian or Gallery Forest, Upland Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo 2020a).

Habit: Terricolous.

Threat category: Not evaluated (NE).

48. *Miltonia flavescens* (Lindl.) Lindl., Sert. Orchid.: t. 48 (1841) ≡ *Cyrtochilum flavescens* Lindl., Edwards's Bot. Reg. 19: t. 1627 (1833). Fig. 5g

The species can be recognized by its elongated cartaceous leaves, pseudobulb flattened, in addition to the light-yellow petals and sepals and white labellum with brown streaks in the disc region.

Material examined: Capanema, trilha das Taquaras, 18.III.2015, *L. Boff et al. 129* (UNOP!). Céu Azul, estrada de chão entre Céu Azul and Serranópolis, 1.X.2015, fl., *M.G. Caxambu et al. 6924* (HCF!); trilha de Educação Ambiental, 7.XI.2019, fl., *V.M. Oliveira et al. 07* (EVB!); trilha da Jacutinga, fl., 5.X.2012, fl., *M.E. Engels et al. 729* (UNOP!); trilha do Rio Azul, 11.X.2011, fl., *J.A Lombardi et al.* 8699 (UNOP!); trilha Manoel Gomes, 13.X.2014, fl., *L. Boff & L.G. Temponi 71* (UNOP!). Foz do Iguaçu, trilha das Bananeiras, 5.XI.2016, fl., *L.C.P. Lima 779* (EVB!); BR-469, 12.IX.2014, fl., *L. Boff et al. 147* (UNOP!); Casa de Hóspedes, 15.X.1986, fl., *G. Hatschbach et al. 50648* (MBM!); trilha do Poço Preto, 11.X.2010, fl., *L.G. Temponi et al. 884* (UNOP!); trilha do Macuco Safari, 1.XII.2011, fl., *M.T. Martinez & L.G. Temponi 120* (UNOP!); trilha da Represa, 16.X.2015, fl.,

M.G. Caxambu 7007 (HCF!). Matelândia, trilha do Rio Floriano, 30.X.2015, fl., *M.G. Caxambu 7088* (HCF!). São Miguel do Iguaçu, Parque Nacional do Iguaçu, 15.X.2015, fl., *M.G. Caxambu 6996* (HCF!). Serranópolis do Iguaçu, 13.X.2016, fl., *M.G. Caxambu 7612* (HCF!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Northeast (BA, PE), Central-west (MS), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). It occurs in the phytogeographic domains *Caatinga*, *Cerrado*, Atlantic Forest and *Pampa*. In the vegetational formations *Campo Rupestre*, *Cerrado* (*sensu lato*), Riparian or Gallery Forest, Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (van den Berg 2020f).

Habit: Epiphytic.

Threat category: Least Concern (LC).

49. *Octomeria micrantha* Barb.Rodr., Gen. Spec. Orchid. 1: 33 (1877).

Among the species of the study area, it can be confused with *Octomeria warmingii*, being differentiated by its smaller, never campanulate, floral bracts (< 0.1 cm long *vs.* floral bracts > 0.2 cm long, campanulate).

Material examined: Céu Azul, trilha da Jacutinga, 10.II.2015, fl., *L. Boff et al. 106* (UNOP!); 6.IX.2011, fl., *M.T. Martinez et al. 64* (UNOP!). Foz do Iguaçu, trilha do Restaurante, 11.VII.2016, fl., *M.G. Caxambu et al. 7443*, (HCF!); 9.II.2017, fl., *M.G. Caxambu 7748* (HCF!); próximo às Cataratas, 9.II.2017, fl., *M.G. Caxambu 7747* (HCF!); trilha da Represa, 9.II.2017, fl., *M.G. Caxambu 7749* (HCF!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Southeast (MG, RJ, SP) and South (PR, SC, RS). Endemic to the Atlantic Forest, the species occurs in the vegetational formations Riparian or Gallery Forest and Ombrophilous Forest (Rainforest) (BFG 2015).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

50. *Octomeria warmingii* Rchb.f., Otia Bot. Hamburg.: 94 (1881).

Among the species of the study area, it can be confused with *Octomeria micrantha*, however, it distinguishes itself by its larger, campanulate floral bracts (floral bracts > 0.2 cm long *vs.* < 0.1 cm long, never campanulate).

Material examined: Foz do Iguaçu, próximo ao Restaurante, 11.VII.2016, fl., *M.G. Caxambu et al. 7443* (HCF!); próximo às Cataratas, 11.VII.2016, fl., *M.G. Caxambu 7444* (UNOP!); IV.1957, fl, *G. Hatschbach 4122* (MBM). Matelândia, trilha do Rio Benjamin Constant, 11.VII.2016, fl., *M.G. Caxambu et al. 7441* (HCF!).

The species is endemic to Brazil (WCSP), with occurrence in the Central-west (MS), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains *Cerrado* and Atlantic Forest, in the vegetational formations *Cerrado* (*sensu lato*), Riparian or Gallery Forest, Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (BFG 2015).

Habit: Epiphytic.

Threat category: Least Concern (LC).

51. *Oeceoclades maculata* (Lindl.) Lindl., Gen. Sp. Orchid. Pl.: 237 (1833) ≡ *Angraecum maculatum* Lindl., Coll. Bot. (Lindley) t. 15 (1821). Fig. 5h

This species is easily recognized by its green leaves with dark green spots, purplish-cream flowers, having a calcar and the labellum is white with pink spots.

Material examined: Céu Azul, trilha Manoel Gomes, 19.I.2017, fl., *M.G. Caxambu et al. 7746* (HCF!); 5.II.2015, fl., *L. Boff & T.M. Silva 142* (UNOP!); trilha Rio Azul, 10.II.2015, fl., *L. Boff et al. 116* (UNOP!). Foz do Iguaçu, trilha da Represa São João, 10.III.2015, fl., *L. Boff & A.R. Escher 117* (UNOP!); 27.I.2010, fl., *L.G. Temponi et al. 711* (UNOP!).

The species is distributed in Africa and the Neotropical region (WCSP). In Brazil, it occurs in the North (AM, PA, RR, RO, TO), Northeast (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-west (DF, GO, MS, MT), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Amazon, *Caatinga*, *Cerrado*, Atlantic Forest, in the vegetational formations anthropic areas, *Campinarana*, *Cerrado* (*sensu lato*), Riparian or Gallery Forest, Terra Firme Forest, Floodplain Forest, Deciduous Seasonal Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest), Mixed Ombrophilous Forest and Restinga (Machnicki-Reis & Smidt 2020).

Origin: Naturalized, native to Africa.

Habit: Terricolous.

Threat category: Not evaluated (NE).

52. *Pelexia macropoda* (Barb.Rodr.) Schltr., Beih. Bot. Centralbl. 37(2): 409 (1920) ≡ *Spiranthes macropoda* Barb.Rodr., Gen. Sp. Orchid. i. 186.

It is easily recognized in the study area by its flowers which have a long and narrow column with a thin, flexible, triangular-shaped rostrum, prominent nectary and conically shaped calcar.

Material examined: Foz do Iguaçu, 25.VIII.2010, fl., *W.S. Mancinelli 1284* (UPCB).

This species is endemic to Brazil (WCSP), and the Atlantic Forest. It occurs in the Southeast (ES, MG, SP) and South (PR, SC, RS). In the vegetational formation Ombrophilous Forest (Rainforest) (Meneguzzo 2020f).

Habit: Terricolous.

Threat category: Not evaluated (NE).

53. *Phymatidium delicatulum* Lindl., Gen. Sp. Orchid. Pl.: 310 (1833) = *Phymatidium paranaense* A.Samp., Plant. Nov. vel min. cog. 59, t. 2. (1916). Fig. 5i

Among the species of the study area, it is similar to *Zygostates alleniana*, however, it can be differentiated by its acicular leaves and trilobed lip (*vs.* lanceolate leaves and entire lip).

Material examined: Céu Azul, trilha da Lagoa Azul, 2.X.2017, fl., *M.G. Caxambu et al. 7876* (HCF!); trilha do Riu Butu, 12.X.2018, fl., *C.R. Rauber et al. 243* (UNOP!); Lindoeste, trilha da Cachoeira, 27.X.2016, fl., *M.G. Caxambu et al. 7647* (HCF!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Northeast (BA, PE), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). Endemic to the Atlantic Forest, the species occurs in the vegetational formations anthropic areas, Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest), Mixed Ombrophilous Forest and Restinga (Royer, Smidt & Brito 2020).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

54. *Polystachya concreta* (Jacq.) Garay & H.R.Sweet, Orquideologia 9: 206 (1974) ≡ *Epidendrum concretum* Jacq., Enum. Syst. Pl. 30 (1760). Fig. 6a

It is easily recognized in the study area by its light green petals and sepals and mealy disc of the lip.

Material examined: Foz do Iguaçu, trilha da Represa, 21.V.2015, fl., *M.G. Caxambu et al. 6350* (HCF!); trilha do Poço Preto, 30.X.2014, fl., *L. Boff et al. 74* (UNOP!); trilha das Cataratas, 17.I.2019, fl., *V.M.N. Benati et al. 45* (UNOP!); trilha das Cataratas, 2.XII.2011, fl., *M.T. Martinez & L.G. Temponi 129* (UNOP!); 13.V.2010, fl., *W.S. Mancinelli 1231* (JOI!). Foz do Iguaçu, Parque Nacional do Iguaçu, trilha das Bananeiras, 10.III.2015, fl., *L. Boff & J.K. Hammes 119* (UNOP!); BR-469, km 26, 27.I.2015, fl., *L. Boff et al. 88* (UNOP!).

The species is widely distributed in tropical and subtropical regions (WCSP). In Brazil, it occurs in the North (AP, RO), Central-west (GO, MT) and South (PR). It occurs in the phytogeographic domains of the Amazon, *Caatinga*, *Cerrado*, Atlantic Forest, *Pampa*, Pantanal, in the vegetational formations Riparian or Gallery Forest, Igapó Forest, Terra Firme Forest, Floodplain Forest, Deciduous Seasonal Forest, Evergreen Seasonal Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest), Mixed Ombrophilous Forest, Restinga and vegetation on rock outcrops (Meneguzzo 2020g).

Habit: Epiphytic or Rupicolous.

Threat category: Not evaluated (NE).

55. *Prescottia stachyodes* (Sw.) Lindl., Edwards's Bot. Reg. 22: t. 1915 (1836) ≡ *Cranichis stachyodes* Sw., Prodr. [O. P. Swartz] 120 (1788). Fig. 6b

It is easily recognized in the study area by its sessile flowers and cucullate lip.

Material examined: Céu Azul, trilha do Rio Azul, 28.VII.2016, fl., *M.G. Caxambu et al. 7447* (HCF!); trilha das Araucárias, 12.VIII.2015, fl., *L. Boff et al. 141* (UNOP!).

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the North (AM, PA), Northeast (AL, BA, CE, PB, PE), Central-west (DF, GO), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Amazon, Caatinga, Cerrado, Atlantic Forest and Pampa. In the vegetational formations Campo Limpo, Riparian or Gallery Forest, Deciduous Seasonal Forest, Evergreen Seasonal Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest), Mixed Ombrophilous Forest, Restinga and vegetation on rock outcrops (Meneguzzo 2020h).

Habit: Terricolous.

Threat category: Not evaluated (NE).

56. *Sanderella riograndensis* Dutra *ex* Pabst, Sellowia 10: 137 (1959).

It is easily recognized in the study area by its miniscule pseudobulbs which are monofoliate, short and tetragonal, dark green, occasionally speckled brown, and its small, whitish flowers speckled with violet.

Material examined: Foz do Iguaçu, 13.V.20210, fl., *W.S. Mancinelli 1218* (JOI!).

The species is distributed in Brazil and Argentina (WCSP). In Brazil, it occurs in the South (SC, RS), with a new record for the State of Paraná. Endemic to the Atlantic Forest, it occurs

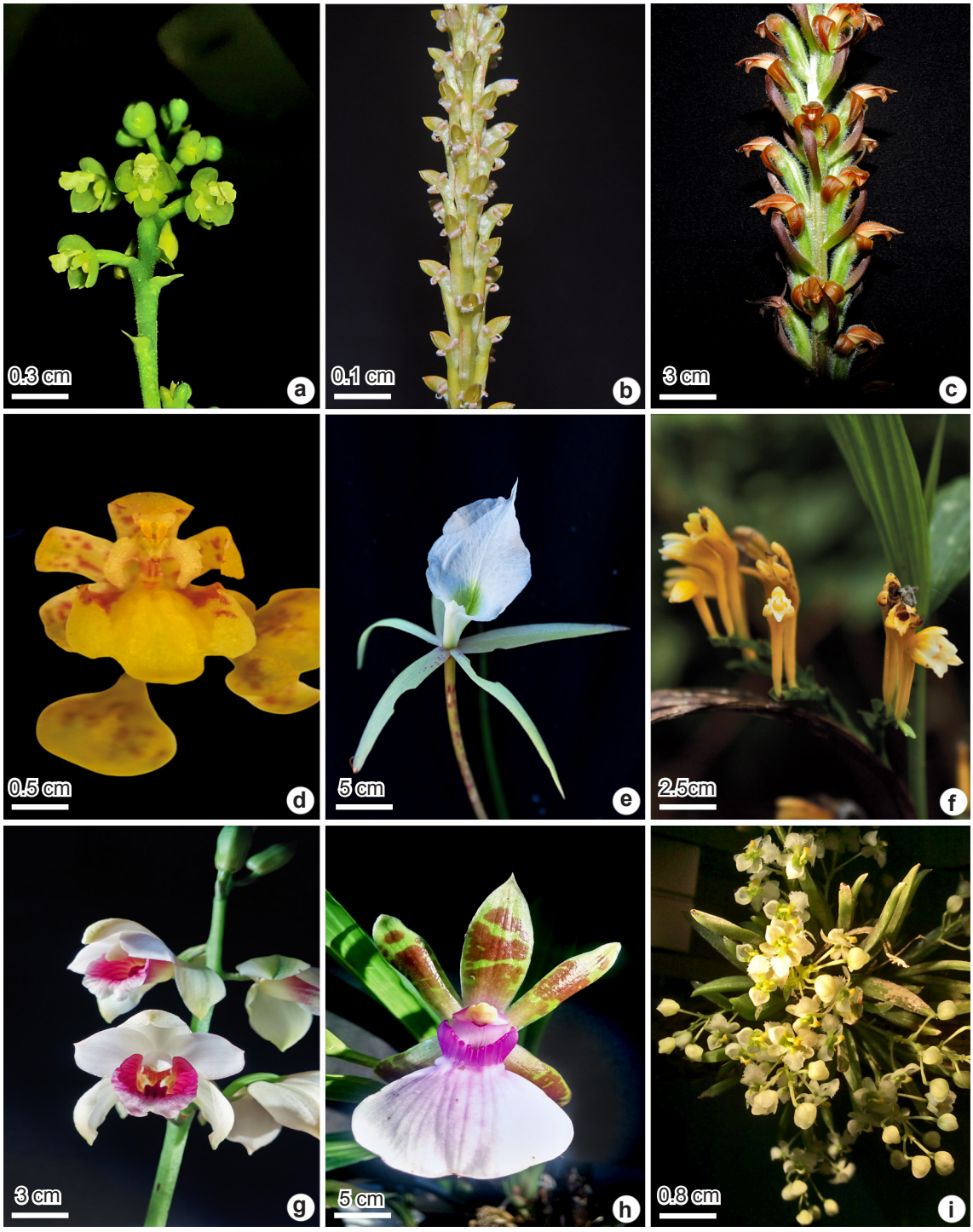

Figure 6 – a-i. Species of the subfamilies Epidendroideae (a,d,e,f,g-i), Orchidoideae (b-c) occurring in Iguaçu National Park – a. *Polystachya concreta*; b. *Prescottia stachyodes*; c. *Sarcoglottis acaulis*; d. *Trichocentrum pumilum*; e. *Brassavola tuberculata* ; f. *Corymborkis flava*; g. *Warrea warreana*; h. *Zygopetalum maxillare*; i. *Zygostates alleniana*. Authorship: a-d, g-i – Greta A. Dettke; e-f – Acervo Herbário UNOP.

in the vegetational formation Ombrophilous Forest (Rainforest) (Meneguzzo 2020i).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

57. ***Sarcoglottis acaulis*** (Sm.) Schltr., Repert. Spec. Nov Regni Veg. Beih. 6: 53 (1919) ≡ *Neottia acaulis* Sm., Exot. Bot. ii. 91. Fig. 6c

It is easily recognized in the study area because it has an elongated, hairy, and fleshy rhizome; cylindrical, hairy stem covered with sheaths; alternating-spiral, oblong-lanceolate, green leaves, variegated with white; racemose, multiflorate inflorescences; terete peduncle; green and white flowers, with a slightly three-lobed, ligulate-anchoform, hairy, white, and green lip.

Material examined: Céu Azul, trilha Manoel Gomes, 2.XII.2019, fl., *J.G. Wink & L.H.S.M. Conceição 26* (UNOP!). Foz do Iguaçu, trilha das Bananeiras, 2.XII.2020, fl., *E.L. Siqueira et al. 3478* (HCF!).

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the North (AP, PA, RO, TO), Northeast (AL, BA, CE, PB, RN, SE), Central-west (GO), Southeast (ES, MG, RJ, SP) and South (PR, RS). In the vegetational formations Campo Limpo, Campo Rupestre, Riparian or Gallery Forest, Terra Firme Forest, Deciduous Seasonal Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Restinga (Meneguzzo 2020j).

Habit: Terricolous.

Threat category: Not evaluated (NE).

58. ***Specklinia marginalis*** (Rchb.f.) F.Barros, Hoehnea 10: 110 (1983 publ. 1984) ≡ *Pleurothallis marginalis* Rchb.f., Bonplandia 3: 224 (1855).

The species can be recognized by the narrowly elliptical leaves with the base attenuated, inflorescence larger than the leaf blade and the light green petals and sepals.

Material examined: Céu Azul, trilha do Rio Butu, 25.VI.2015, fl., *L. Boff et al. 137* (UNOP); trilha Nascentes do Rio Floriano, 10.VIII.2017, fl., *M.G. Caxambu 7869* (HCF).

The species is distributed in Brazil and Argentina (WCSP). In Brazil, it occurs in the North (PA), Northeast (BA), Southeast (ES, MG, RJ, SP) and South (PR, RS, SC). In the phytogeographic domains of the Amazon and Atlantic Forest. In the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (BFG 2015).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

59. ***Trichocentrum pumilum*** (Lindl.) M.W. Chase & N.H. Williams, Lindleyana 16: 138 (2001) ≡ *Oncidium pumilum* Lindl., Bot. Reg. 11: t. 920 (1825). Fig. 6d

Among the species of the study area, it can be confused with species of the genus *Gomesa*, however, it distinguishes itself by the shape of its lip which has a base concrescent with the column, the pseudobulb is reduced, apically unifoliate, and the leaf is fleshy (*vs.* base of the lip not concrescent with the column, elongated pseudobulbs, multifoliate).

Material examined: Céu Azul, trilha da Educação Ambiental, 30.XI.2018, fl., *V.M.N. Benatti & C.R. Rauber 39* (UNOP!). Foz do Iguaçu, trilha da Represa, 26.XI.2015, fl., *E.L. Siqueira & M.P. Chagas 1848* (HCF!); trilha do Rio São João, 9.XI.2000, fl., *A.C. Cervi 8101* (UPCB); BR-469, 27.I.2015, fl., *L. Boff et al. 149* (UNOP!); trilha do Poço Preto, 30.X.2014, fl., *L. Boff et al.76* (UNOP!); trilha das Cataratas, 2.XII.2011, fl., *M.T. Martinez & L.G. Temponi 138* (UNOP!); trilha do Macuco Safari, 01.XII.2011, fl., *M.T. Martinez & L.G. Temponi 117* (UNOP!). Matelândia, 13.XI.2015, fl., *E.L. Siqueira 1805* (HCF!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil it occurs in the Northeast (BA, SE), Central-west (DF, GO), Southeast (ES, MG, RJ, SP) and South (PR, RS, SC). In the vegetational formations Riparian or Gallery Forest, Evergreen Seasonal Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest), Mixed Ombrophilous Forest and Restinga (Meneguzzo 2020k).

Habit: Epiphytic.

Threat category: Not evaluated (NE).

60. ***Vanilla angustipetala*** Schltr., Anexos Mem. Inst. Butantan, Secç. Bot. 1(4): 19 (1922).

Among the species of the study area, it can be confused with *Vanilla edwallii*, however, it distinguishes itself by its ovate lip with a rounded apex, warty on central disc (*vs.* lanceolate-elliptical lip with an acute apex, lamellate lip).

Material examined: Capanema, trilha Silva Jardim, 4.IV.2019, fl., *C.R. Rauber et al. 398* (UNOP!). Céu Azul, trilha das Araucárias, 31.VII.2012, fr., *L.G. Temponi et al. 1172* (UNOP!); trilha do Rio Butu, 12.XII.2018, fl, *C.R. Rauber et al. 237* (UNOP!); trilha da Jacutinga, 19.VI.2015, fl, *M.G. Caxambu 6580* (HCF!); trilha Manoel Gomes, 10.XI.2018, fl, *G.B. Mano & L.C.P. Lima 59* (EVB). Foz do Iguaçu, trilha do Poço Preto, 21.IV.2016, fl., *M.G. Caxambu et al. 7410* (HCF!); BR-469, 10.XII.2014, fl, *L. Boff et al. 82* (UNOP!); trilha do Macuco Safari, 18.IV.2019, *G.B. Mano et al. 143* (EVB!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Northeast (BA), Southeast (ES, SP) and with a new record for the State of Paraná in the South region. Endemic to the Atlantic Forest, the species occurs in the vegetational formations Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (BFG 2015).

Habit: Vining.

Threat category: Not evaluated (NE)

61. *Vanilla edwallii* Hoehne, Arq. Bot. Estado São Paulo, n.s., f.m., 1: 61 (1941).

Among the species of the study area, it can be confused with *Vanilla angustipetala*, however, it distinguishes itself by its lanceolate-elliptical lip with an acute apex and lamellate lip (*vs.* ovate lip with rounded apex, lip warty on central disc).

Material examined: Céu Azul, trilha do Rio Azul, 11.XII.2015, fl, *M.G. Caxambu 7151* (HCF!); 19.II.2020, fr, *H.T.P. Vieira et al. 54* (EVB); 15.VI.2018, fl, *L. Biral et al 1334*; trilha Manoel Gomes, 5.II.2015, fr, *L. Boff & T. M. Silva 95, 96* (UNOP!); trilha da Jacutinga, 19.VI.2015, fr., *M.G. Caxambu 6580* (HCF!).

The species is endemic to Brazil (WCSP), it occurs in the Central-west (DF, GO), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains *Cerrado* and Atlantic Forest. In the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (BFG 2015).

Habit: Vining.

Threat category: Least Concern (LC).

62. *Warrea warreana* (Lodd. *ex* Lindl.) C.Schweinf., Bot. Mus. Leafl. 17: 55 (1955) ≡ *Maxillaria warreana* Lodd. *ex* Lindl., Gen. Sp. Orchid. Pl. 148 (*Warreae* sp. ?) (1832). Fig. 6g

It is easily recognized in the study area by its erect inflorescence which can reach 1 m long, white, lightly pinkish flowers, lip in two tones of purple, and waxy, rounded and ribbed callus.

Material examined: Céu Azul, trilha Nascentes do Rio Floriano, 11.XII.2017, fl., *M.G. Caxambu et al. 7973* (HCF!).

The species is distributed in Venezuela, Bolivia, Colombia, Ecuador, Peru, Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the North (AC, AM, AP, PA, RR, TO), Northeast (AL, BA, MA, PB, PE, PI, SE), Central-west (GO, MT, MS) Southeast (MG, RJ, SP) and South (PR, SC, RS). Occurs in the Atlantic Forest. It occurs in the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest and Ombrophilous Forest (Rainforest) (Meneguzzo & Hall 2020a).

Habit: Terricolous.

Threat category: Not evaluated (NE).

63. *Wullschlaegelia aphylla* (Sw.) Rchb.f., Bot. Zeitung (Berlin) 21: 131 (1863) ≡ *Cranichis aphylla* Sw., Prodr. [O. P. Swartz] 120 (1788).

It is easily recognized in the study area for having neither leaves nor photosynthetic pigments, pale-colored inflorescence and diminutive, white flowers.

Material examined: Céu Azul, trilha do Rio Azul, 11.XII.2015, fl., *M.G. Caxambu et al. 7152* (HCF!); trilha Rio Gonçalves Dias, 25.I.2018, fl., *E.L. Siqueira 2435* (HCF!). Santa Tereza do Oeste, trilha Jumelo, 30.I.2019, fl., *C.R. Rauber et al. 301* (UNOP!).

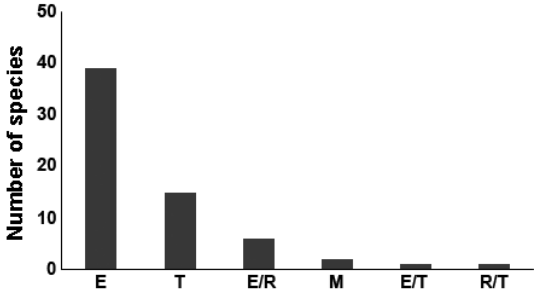

Figure 7 – Distribution of substrate types of the Orchidaceae family in Iguaçu National Park, PR. E = epiphytic; Te = terrestrial; E/R = epiphytic/rupicolous; E/T = epiphytic/terrestrial; M = Mycoheterotrophic.

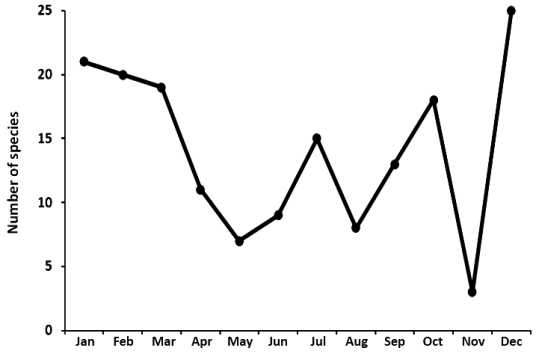

Figure 8 – Number of Orchidaceae species flowering in each month of the year in the Iguaçu National Park.

The species is widely distributed in the Neotropical region (WCSP). In Brazil, it occurs in the Northeast (BA, PE), Central-west (DF, GO), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). In the phytogeographic domains of the Amazon, *Cerrado* and Atlantic Forest. In the vegetational formations Riparian or Gallery Forest and Ombrophilous Forest (Rainforest) (Smidt 2020c).

Habit: Mycoheterotrophic.

Threat category: Least Concern (LC).

64. *Zygopetalum maxillare* G.Lodd., Bot. Cab. 18: t. 1776 (1832). Fig. 6h

It is easily recognized in the study area by having petals and sepals of a light green color with brown spots and the lip with an elevated portion at the base with a crenulate margin.

Material examined: Céu Azul, trilha Rio Azul, 11.I.2017, fl., *M.G. Caxambu et al. 7740* (HCF!); *L. Boff et al. 100* (UNOP!); trilha da Cachoeira Jacutinga, 6.IX.2011, fl., *M.T. Martinez & L.G. Temponi 153* (UNOP!); 7.XI.2011, fl, *M.T. Martinez & L.G. Temponi 152*; trilha do Rio Butu, 27.IV.2015, fl., *L. Boff & J.K. Hammes 152* (UNOP!). Foz do Iguaçu, parcelas na Linha Martins, 21.XII.2012, fl., *L.G. Temponi & D. Gris 906* (UNOP!).

The species is distributed in Brazil, Argentina and Paraguay (WCSP). In Brazil, it occurs in the Northeast (BA), Southeast (ES, MG, RJ, SP) and South (PR, SC, RS). Endemic to the Atlantic Forest, the species occurs in the vegetational formations Riparian or Gallery Forest, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Meneguzzo & Hall 2020b).

Habit: Epiphytic.

Threat category: Least Concern (LC).

65. ***Zygostates alleniana*** Kraenzl., Notizbl. Königl. Bot. Gart. Berlin 2: 55 (1898). Fig. 6i

Among the species of the study area, it can be confused with *Phymatidium delicatum*, however, it distinguishes itself by its lanceolate leaves and entire lip (*vs.* subtriangular leaves and trilobed lip).

Material examined: Foz do Iguaçu, primeira trilha ao lado direito da entrada da UC, 2.X.2017, fl., *M.G. Caxambu & E.L. Siqueira 7875* (HCF!); BR-469, km 23, 12.IX.2014, fl., *L. Boff et al. 65, 80* (UNOP!); trilha da Represa São João, 12.X.2009, fl., *L.G. Temponi et al. 694* (UNOP!); trilha da Represa São João, 12.X.2009, fl., *M.T. Martinez et al. 80* (UNOP!).

The species is distributed in Brazil, Paraguay and Argentina (WCSP). In Brazil, it occurs in the Southeast (SP) and South (PR, SC, RS). Endemic to the Atlantic Forest, the species occurs in the vegetational formations anthropic areas, Semideciduous Seasonal Forest, Ombrophilous Forest (Rainforest) and Mixed Ombrophilous Forest (Smidt & Brito 2020)

Habit: Epiphytic.

Threat category: Not evaluated (NE).

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Data availability statement

In accordance with Open Science communication practices, the authors inform that all data used in this manuscript is publicly available.

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