Rodriguésia 74: e00192023. 2023
http://rodriguesia.jbrj.gov.br
DOI: http://dx.doi.org/10.1590/2175-7860202374054

Review Paper

Revision of *Liparis* (Orchidaceae, Epidendroideae, Malaxidinae) in Brazil

Thiago Faria dos Santos[1,2,4,6], *Alessandra Ike Coan*[1,3] & *Eric de Camargo Smidt*[1,2,5]

Abstract

The presence of *Liparis* occurring in Brazil was revised, resulting in three taxons confirmed in national territory. Nine lectotypifications and six neotypifications, together with *L. inundata* being demoted to a synonym of *L. nervosa*, are proposed. Species can be distinguished by the leaf blade, the number of leaves per pseudobulb and the presence of calluses in the lip. From those, only *L. cogniauxiana* is endemic to the country, being restricted to the Cerrado biome. *Liparis nervosa* occurs in all Brazilian biomes and is the only one registered in the Pampas and the Caatinga, while *L. vexillifera* occurs in the Atlantic Forest, Amazon and Cerrado biomes. According to the IUCN criteria, *L. cogniauxiana*, *L. nervosa* and *L. vexillifera* are in the ''Least Concern (LC)'' category due to a broad distribution, the number of occurrences, presence in protected areas and low pressure from indiscriminate collecting.

Key words: nomenclature, South America, systematics, taxonomy.

Resumo

A presença de *Liparis* no Brasil foi revisada, resultando em três táxons confirmados em território nacional. São apresentadas nove lectotipificações e seis neotipificações, junto com a proposta para rebaixar *L. inundata* a sinônimo de *L. nervosa*. As espécies podem ser distintas pela lâmina foliar, número de folhas por pseudobulbo e pela presença de calos no labelo. Dessas, apenas *L. cogniauxiana* é endêmica do país, estando restrita ao bioma Cerrado. *Liparis nervosa* ocorre em todos os biomas brasileiros e é a única registrada nos Pampas e Caatinga, enquanto *L. vexillifera* ocorre nos biomas Mata Atlântica, Amazônia e Cerrado. De acordo com os critérios da IUCN, *L. cogniauxiana*, *L. nervosa* and *L. vexillifera* estão na categoria de ''Pouco Preocupante (LC)'' devido a ampla distribuição, número de ocorrências, presença em áreas protegidas e baixa pressão de coleta indiscriminada.

Palavras-chave: nomenclatura, América do Sul, sistemática, taxonomia.

Introduction

Orchidaceae is one of the richest plant families (Chase *et al.* 2015) and is well represented in Brazil, with 251 genera and approximately 2,500 species, of which almost 1,500 are endemic to the country (BFG 2018). Although *Liparis* Richard (1817: 39) is a cosmopolitan group with more than 300 species (Cameron 2005), only three are traditionally recognized as occurring in Brazil (Santos & Smidt 2020).

Liparis was described in 1817 by Louis-Claude Marie Richard, with *Ophrys loeselii* Linnaeus (1753: 947) as the type species, based on a specimen from Sweden that honors the plant collector Peter Johann Loesel, a german botanist from the 1600s who studied the Prussian flora (Loesel 1703). Linnaeus described this species as plants with bifoliar and lanceolate leaves and glabrous inflorescence with 5 to 8 flowers, slightly reflexed petals, and a strongly ovate lip. The most complete taxonomic approach

[1] Universidade Estadual Paulista (Unesp), Inst. Biociências de Rio Claro, Prog. Pós-graduação em Ciências Biológicas (Biologia Vegetal), Bela Vista, Rio Claro, SP, Brazil.

[2] Universidade Federal do Paraná, Setor de Ciências Biológicas, Depto. Botânica, Lab. Sistemática e Ecologia Molecular de Plantas, Centro Politécnico, Curitiba, PR, Brazil.

[3] Universidade Estadual Paulista (Unesp), Inst. Biociências de Rio Claro, Depto. Biodiversidade, Bela Vista, Rio Claro, SP, Brazil. ORCID: <https://orcid.org/0000-0002-8584-1700>.

[4] ORCID: <https://orcid.org/0000-0002-0707-6345>.

[5] ORCID: <https://orcid.org/0000-0002-1177-1682>.

[6] Author for correspondence: thiaguerafaria@gmail.com

that classifies *Liparis* at the infrageneric level was carried out by Garay & Romero-Gonzalez (1999), who proposed a key for identifying the taxa. The authors reported four subgenera and 19 sections.

Liparis was historically split into different smaller groups based solely on morphological characteristics, and some of the subgenera and sections can be interpreted as separate genera according to some authors (du Petit Thouars 1809; Pfitzer 1887; Margońska & Szlachetko 2001; Jones & Clements 2005); nonetheless, these classifications rarely or never represent the evolutionary pattern for the group (Cameron 2005; Pridgeon *et al.* 2005). Since there is much historical confusion concerning the *Liparis* taxonomy, it is better to not adopt an infrageneric classification until a more robust phylogeny is proposed for the Neotropics (Pridgeon *et al.* 2005; Radins *et al.* 2014).

This research aimed to revise the *Liparis* species recorded in Brazil. We present taxonomic notes, complete descriptive comments with ecological information, diagnoses, illustrations, photographs, identification keys, distribution maps and an assessment of the conservation status of these species.

Material and Methods

Taxonomy, fieldwork and herbarium material

Morphological studies were realized based on exsiccates available online or deposited at visited national herbariums (acronyms according to Thiers, continuously updated): ALCB, ASE, BHCB, BHZB, BOTU, CEN, CEPEC, CESJ, CNMT, CRI, CTBS, EFC, ESA, ESAL, FCAB, FLOR, FUEL, FURB, HAS, HBG, HCF, HRJ, HRCB, HST, HUCS, HUCP, HUEFS, HUESB, HUFU, HUNI, HURB, HVASF, IAC, IAN, ICN, INPA, IPA, JOI, MAC, MBM, MBML, OUPR, PACA-AGP, PEL, R, RB, RBR, RFA, RON, SHPR, SJRP, SP, SPF, SPSF, TANG, UB, UEC, UESC, UFMT, UFP, UPCB, USP, VIC; data available online from the respective foreign herbaria were also consulted: AMO, AMES, BR, BM, G, GH, GOET, K, LE, M, MA, MO, NY, P, PO, R, UPS, US, YU. Additional analyses were made based on specimens obtained during field excursions around Brazil from 2019 to 2023, aiming to cover all vegetation types in the country. Illustrations and photographs were taken from live plants, exposing the plant habit, inflorescence and floral features. Collections were built according to Fidalgo & Bononi (1984) and deposited at the UPCB herbarium, and some material was also preserved in formalin-acetic acid-alcohol (FAA, Johansen 1940) for future studies. We delimited the species and proposed a dichotomous key for its recognition. Specimens were identified to the lowest taxonomic level through the analysis of the protologues and nomenclatural types consultation and compared with descriptions in other works that contemplate *Liparis* (Cogniaux 1896; Barbosa Rodrigues 1882; Pabst & Dungs 1977). For the descriptions, we adopted the terminology of Rizzini (1977), Weberling (1989) and Stearn (2004). Abbreviations of authors followed Brummitt & Powell (1992), and for scientific journals, we followed "The Botanical Periodicum Huntianum, Suppl. (BPH)". Distribution maps and conservation status of taxa were built using the programs DIVA-GIS 7.5 (Hijmans *et al.* 2012) and GeoCat (Bachman *et al.* 2011), respectively, following the IUCN (2020) guidelines.

Results and Discussion

A total of 767 exsiccates were studied, 736 from specimens collected in Brazil and 31 from other countries. A total of 50 vouchers belong to *Liparis cogniauxiana* F. Barros & L.R.S. Guimarães (2010: 31), 562 of *Liparis nervosa* (Thunberg 1784: 814) Lindley (1830: 26) and 124 of *Liparis vexillifera* Cogniaux (1896: 289). From those, only *L. cogniauxiana* is endemic to the country, being restricted to the Cerrado biome. *Liparis nervosa* occurs in all Brazilian biomes and is the only one registered in the Pampas and the Caatinga, while *L. vexillifera* occurs in the Atlantic Forest, Amazon and Cerrado biomes (Fig. 1).

We propose nine lectotypifications: *L. guineensis* Lindley (1834: 20), *L. kappleri* Reichenbach (1861: 218), *L. eggersii* Reichenbach (1885: 278), *L. elata* var. *latifolia* Ridley (1886: 22), *L. elata* var. *rufina* Ridley (1886: 22), *L. elata* var. *longifolia* Cogniaux (1896: 287), *L. vexillifera* var. *latifolia* Cogniaux (1896: 290), *L. otophyllon* Schlechter (1922: 41), and *Leptorchis campestris* (Barbosa Rodrigues 1877: 36) Kuntze (1891: 671), and six neotypifications: *L. elata* var. *purpurascens* Regel (1856: 374), *L. odontostoma* Reichenbach (1877: 97), *L. bituberculata* var. *khasiana* Hooker (1890: 696), *L. vexillifera* subsp. *lindeniana* (Richard & Galeotti 1845: 18) Dressler (1997: 264), *L. vexillifera* var. *galeottiana* (Richard & Galeotti 1845: 18) Ames & Correl (1942: 79), and *Leptorchis elliptica* (Reichenbach 1850: 833) Kuntze (1891: 671). *Liparis inundata* Barbosa Rodrigues (1877: 36) is demoted to synonym of *Liparis nervosa* (Thunb.) Lindl.

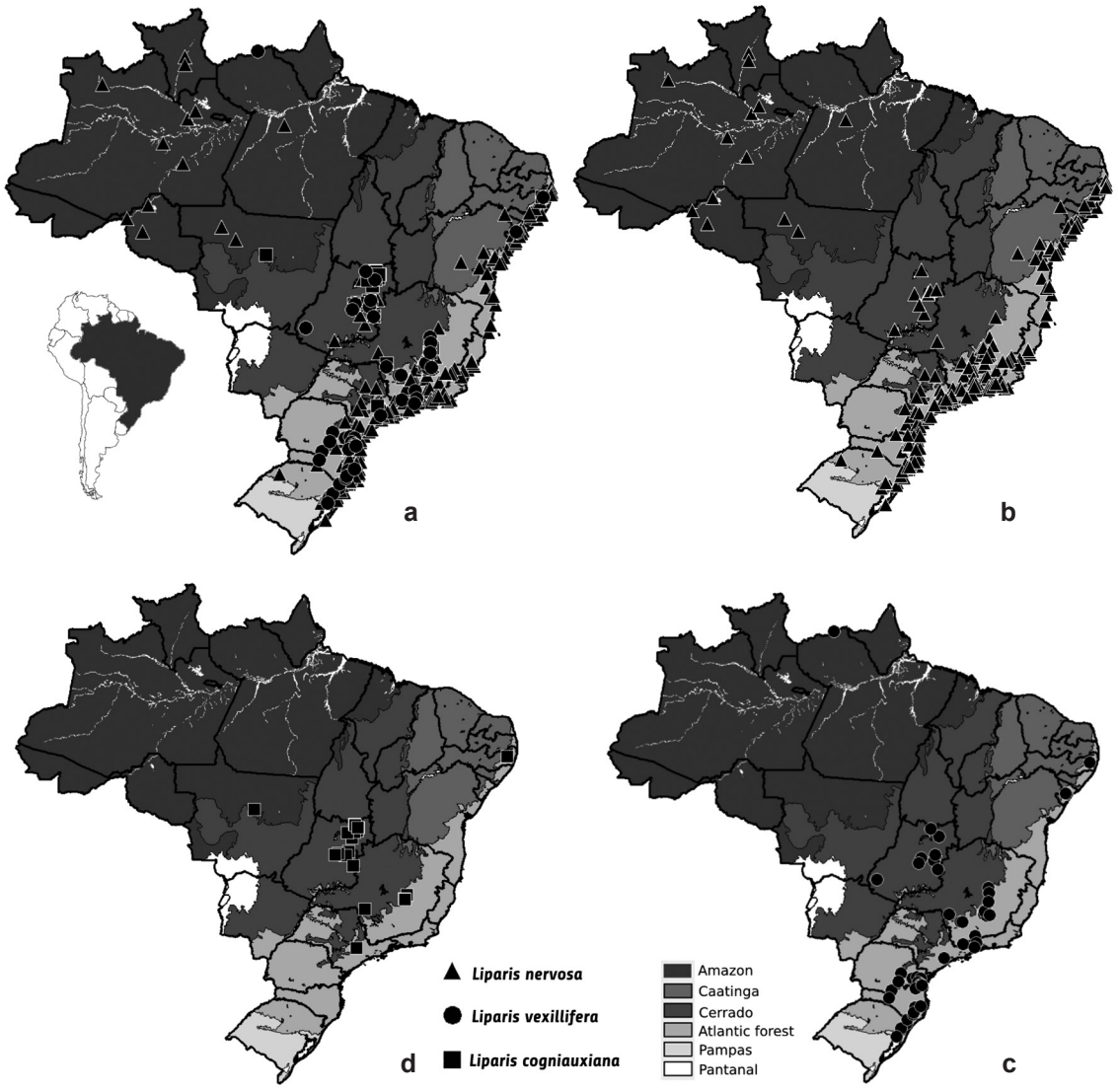

Figure 1 – a-d. Distribution of *Liparis* – a. occurrence of all species in Brazil and indication of the country's position in South America; b. occurrence of *Liparis nervosa*; c. occurrence of *Liparis cogniauxiana*; d. occurrence of *Liparis vexillifera*.

Taxonomy

Identification key for *Liparis* in Brazil

1. Leaves conduplicate or flat, 1 per pseudobulbs ..... 3. *Liparis vexillifera*
1'. Leaves plicate 2–5 per pseudobulbs..... 2
    2. Usually more than 3 leaves per pseudobulbs; lip with 2 prominent tooth-like calluses .... 2. *Liparis nervosa*
    2'. Usually 2–3 leaves per pseudobulbs; lip with 2 inconspicuous rounded calluses .... 1. *Liparis cogniauxiana*

Figure 2 – a-h. Species of *Liparis* from Brazil – a-b. *Liparis cogniauxiana* – a. habit; b. frontal view of flowers; c-e. *Liparis nervosa* – c. habit; d. lateral view of flower; e. frontal view of flower; f-h. *Liparis vexillifera* – f. habit; g. frontal view of flowers (yellow); h. frontal view of flowers (purple). (a-b. *J.A.N. Batista 2961*; c-e. *T.F. Santos 60*; f. *T.F. Santos 350*; g. *J.A.N. Batista 1704*; h. *J.A.N. Batista 3507*). (Photos: a, b, g, h, by J.A.N. Batista; c, d, e, f, by E.C. Smidt).

1. *Liparis cogniauxiana* (Cogn.) F. Barros & L.R.S. Guim., Neodiversity 5(1): 31. 2010. Type: BRASIL. SÃO PAULO: Itu, II.1834, *L. Riedel 81* (Holotype BR, Holotype image BR [0000006573621]!).

= *Liparis bifolia* Cogn. *Fl. bras.* 3(4): 289. 1896. *nom illeg.* Figs. 2a-b; 3

Herb 51–149 mm. Roots 30–69.3 mm length, cylindrical, thin or thick. Pseudobulbs 11–29 × 8–19 mm, ellipsoid; covered by white or brown deciduous foliaceous sheets. Leaves 52–94 × 27–45 mm, green, 2–3 per pseudobulbs, several layers of a sheath-like petiole 13–58 mm length; lamina plicate, membranaceous, elliptical, rarely lanceolate, margin undulate, apex acute or obtuse. Inflorescence 125–159 mm raceme; floral bracts in the base of the pedicels, acuminate. Flowers resupinate; green, purple or green with purple stains; pedicels 3–11 mm length; ovary 2–3 mm length. Dorsal sepal 4–7 × 0.6–3 mm, oblong or oblong-lanceolate, margin entire and revolute, apex obtuse or slightly acute. Lateral sepals 4–6 × 2–4 mm, free, oblong or oblong-lanceolate, margin entire and revolute, apex obtuse or slightly acute. Petals 4–7 × 0.2–2 mm; linear; margin entire and revolute; apex obtuse. Lip 4–7 × 2–6 mm, trilobate, glabrous; base with two rounded inconspicuous callus, with three internal thin vein;

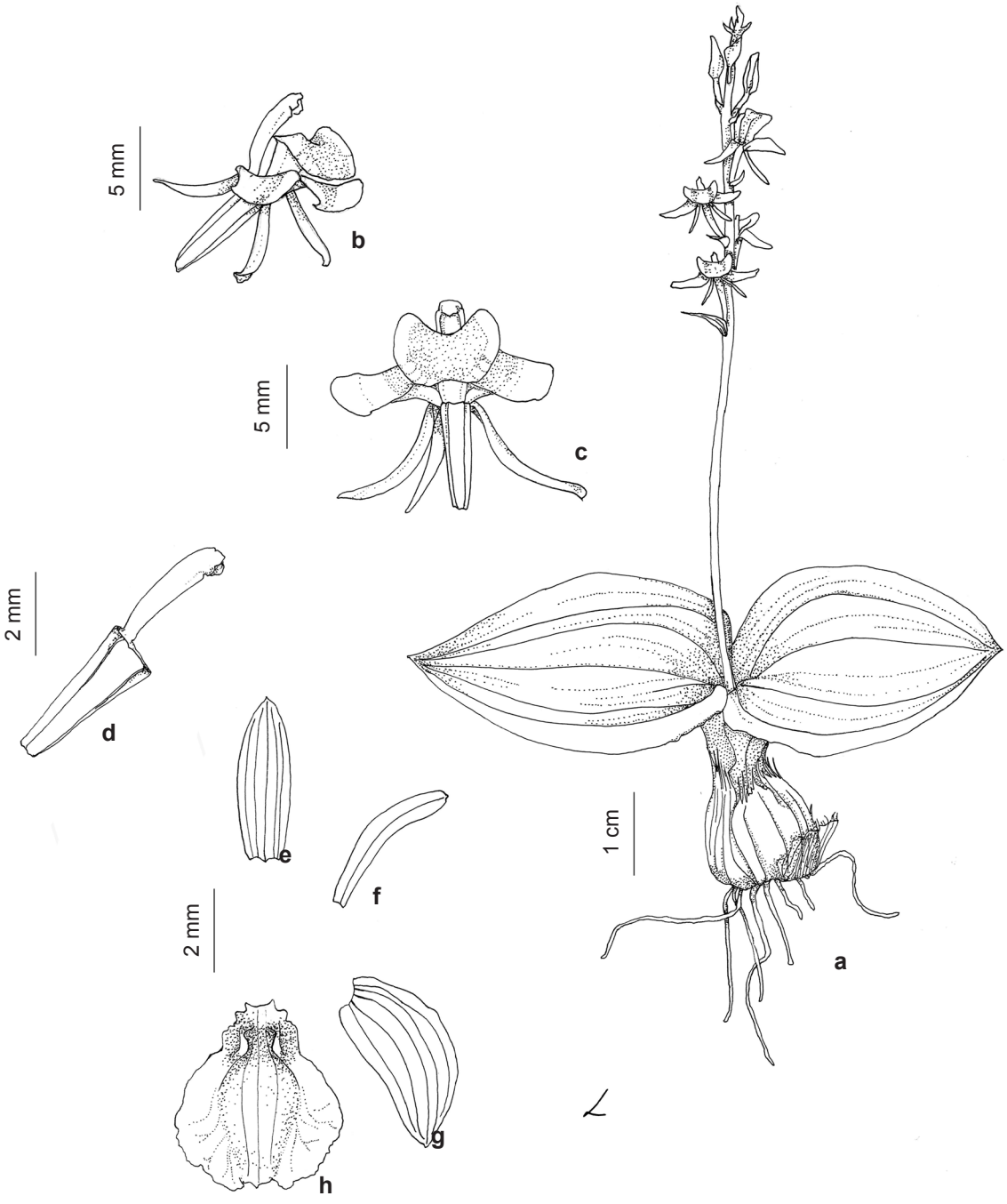

Figure 3 – a-h. Illustration of *Liparis cogniauxiana* – a. habit; b. lateral view of the flower; c. frontal view of the flower; d. lateral view of the column attached to the ovary; e. dorsal sepal; f. petal; g. lateral sepal; h. lip. (based on *J.A.N. Batista 2961*; *883*; *1134*).

lateral lobes in the base of the lip, inconspicuous, rounded; mid lobe obovate, strongly reflexed, margin entire, slightly undulate near the apex, apex emarginate. Column 4–6 mm length, slightly arched; foot short, apex winged; anther green, yellow or purple. Pollinarium with two ovoid, bipartite pollinia.

Selected examined material: DISTRITO FEDERAL: Brasília, Chapada da Contagem, 15.II.1973, *E.P. Heringer 12270* (UB); 8.II.1999, *D. Bertioli 37* (CEN); estrada para Santo Antônio do Descoberto, 7.III.1998, *J.A.N. Batista 785* (CEN); Lago Azul, 12.II.1995, *R.S. Oliveira 97* (UB); mansões do Lago Norte, 10.II.1992, *J.A.N. Batista 283* (CEN); Reserva Ecológica do Guará, 15.XI.1994, *Z.J.G. Miranda 6* (UB); Sobradinho, 20.IV.2009, *T.C.E. Meneguzzo 130* (RB; UB). GOIÁS: 1896, *A. Glaziou 22168* (K); Alto Paraíso, 8.I.2001, *J.A.N. Batista 1134* (CEN); estrada Alto Paraíso-Colina do Sul, 20.II.1991, *B.A.S Pereira 1505* (CEN; ICN); Alto Paraíso, 16.II.1979, *B. Gates 227* (RB; SP; UB); Chapada dos Veadeiros, 27.I.1993, *J.A.N. Batista 390* (CEN); Colinas do Sul, 27.I.1997, *B.M.T. Walter 3635* (CEN; SP); 8.II.1987, *S.R. Neto 617* (SP); Alto Paraíso de Goiás, 16.II.1979, *B. Gates 227* (SP; UB). Cavalcante, Cachoeira Santa Bárbara, 7.III.2003, *J.F.B. Pastore 395* (CEN; HUEFS); comunidade Kalunga, 3.II.2004, *J.F.B. Pastore 833* (CEN). Chapada dos Veadeiros, 15.II.1966, *H.S. Irwin 12573* (UB). Cocalzinho de Goiás, 26.IV.2016, *L.B. Bosquetti 498* (ESA). Cristalina, BR-040, 11.III.1999, *J.A.N. Batista 883* (CEN); Cristalina, 4.III.1966, *H.S. Irwin 13422* (UB). Pirenópolis. 15.I.1972, *H.S. Irwin 34217* (UB); 16.I.1991, *J.A.N. Batista 167* (CEN); Pirenópolis-Cocalzinho, 22.II.1993, *L. Bianchetii 1470* (CEN); Morro do Cabeludo, 19.II.1995, *J.A.N. Batista 537* (CEN); 17.I.1992, *J.A.N. Batista 236* (CEN). Teresina de Goiás, rod. GO-118, 2.I.2001, *E.R. Pansarin 887* (UEC). MATO GROSSO: Itaúba, Floresta do Planalto dos Parecis, 17.XII.2015, *M.E. Engels 4037* (CNMT; HCF; MBM; RB; TANG); Lote A de Supressão, 20.II.2017, *D.C. Dias 80* (CNMT). MINAS GERAIS: Jaboticatubas, Conceição do Mato Dentro, 4.I.1973, *M. Sazima 13417* (UEC); Serra do Cipó, 7.I.1973, *J. Semir 3809* (SP); 18.XII.2015, *A.C.D. Munhoz 110* (BHCB). Santana do Riacho, Serra do Cipó, 27.IV.2013, *J.A.N. Batista 3278* (BHCB); 27.I.1990, *R.S. Bianchini 11688* (SP); Cachoeira da Farofa, 10.I.2000, *J.A.N. Batista 1010* (CEN). São Roque de Minas, Serra da Canastra, 10.I.2007, *J.A.N. Batista 1820* (BHCB; CEN). PERNAMBUCO: Gravatá, 18.VII.1995, *L.P. Félix 7174* (FCAB; HST); 20.VII.1997, *L.P. Félix 8343* (HST).

This species is endemic to Brazil. Occurs in the central west, southeast and northeast regions in the states of Distrito Federal, Goiás, Mato Grosso, Minas Gerais, Pernambuco and São Paulo (POWO 2022).

Liparis cogniauxiana is characterized by its small size with a terrestrial habit and two or rarely three plicate leaves emerging from the lateral or apex of the entirely or mostly aboveground pseudobulb.

It can be recognized and distinguished from the other two species of the genus in its vegetative morphology, by the greater compactness between the pseudobulb and leaves with a short petiole, and its flowers, by the two inconspicuous calluses at the base of the lip. This species resembles *Liparis nervosa*, being distinguished by a tgetative size of 51–149 mm instead of 92–520 mm in length, by the presence of two or rarely three leaves per pseudobulbs, and by the rounded calluses on the lip.

Liparis cogniauxiana is endemic to the Cerrado biome, usually occurring in low-altitude areas within the forest formation of dry woods, but occasionally can be found exposed to the sun in the formations of dry or rupestrian fields. It blooms from December to April and is fertile from the beginning to the end of summer. With an extent of occurrence (EOO) of approximately 1,402,367.520 km², an area of occupancy (AOO) of approximately 200,000 km², together with several records inside protected areas, this taxon falls into the category of ‘‘Least Concern (NT)’’.

2. *Liparis nervosa* (Thunb.) Lindl., Gen. Sp. Orchid. Pl.: 26. 1830; *Ophrys nervosa* Thunb., Fl. Jap.: 27. 1784; *Epidendrum nervosum* (Thunb.) Thunb., Trans. Linn. Soc. London 2: 327. 1794; *Cymbidium nervosum* (Thunb.) Sw., Nova Acta Regiae Soc. Sci. Upsal 6: 76. 1799; *Malaxis nervosa* (Thunb.) Sw., Kongl. Vetensk. Acad. Nya Handl. 21: 235. 1800; *Iebine nervosa* (Thunb.) Raf., Fl. Teller. 4:39. 1838; *Sturmia nervosa* (Thunb.) Rchb.f., Bonplandia 3: 250. 1855. Type: JAPAN. Between Osaka and Tokyo: without date, *Thunberg without number* (Holotype UPS [V-091916]).

= *Liparis bituberculata* (Hook.) Lindl., Bot. Reg. 11: t. 882. 1825; *Cymbidium bituberculatum* Hook. Exot. Fl. 2(13): 116. 1824; *Leptorchis bituberculata* (Hook.) Kuntze, Revis. Gen. Pl. 2: 671. 1891; *Sturmia bituberculata* (Hook.) Rchb.f., Bonplandia 2: 22. 1854. Type: NEPAL. *J. Cooper without number* (Holotype lost, Lectotype designated here: illustration reproduced in Exot. Fl. 2(13), t. 166. 1824).

= *Liparis elata* Lindl., Bot. Reg. 14: 1175. 1828; *Diteilis elata* (Lindl.) M.A. Clem. & D.L. Jones, Orchadian 15(1): 40. 2005. Type: BRAZIL. Rio de

Janeiro: 1826, flowering in cultivation in August of 1827, *H. Chamberlain without number* (Holotype K! [000463109]).
= *Liparis guineensis* Lindl., Edwards's Bot. Reg. 20: 1671. 1834. Type: SIERRA LEONE: V.1834, *J. Ridgway 169* (Holotype lost; Lectotype designated here: illustration reproduced in Edwards's Bot. Reg. 20: t. 1671. 1834).
= *Liparis elata* var. *purpurascens* Regel, Ann. Sci. Nat., Bot. 4(6): 374. 1856. Type: BRAZIL. Alagoas: Marechal Deodoro, 24.V.2000, *R.P. Lyra-Lemos 4618* (Neotype HUEFS! [000127526] designated here).
= *Liparis kappleri* (Rchb. f.) Reichb.f., Ann. Bot. Syst. 6: 218. 1861; *Sturmia kappleri* Reichb.f., Linnea 22: 833. 1850. Type: SURINAMI. in paludibus distr. Para: IV.1844, *A. Kappler 1491* (Lectotype P designated here, Lectotype P! image [00347774]; Isolectotypes AMES! image [00052492, 00271895]).
= *Liparis elata* var. *inundata* Barb. Rodr., Gen. Sp. Orchid. 1: 36. 1877. Type: BRAZIL. Minas Gerais: Les marais des bordes du Ribeirão dos Bugres et du Rio Verde à Caldas, February, *J. Barbosa Rodrigues without number* (Holotype lost; Lectotype designated by Pansarin *et al*. (2020): illustration reproduced in Iconographie des orchidées du Brésil 1: t. 36, copied and reproduced in color in Sprunger *et al.* (1996)). *syn. nov.*
= *Liparis odontostoma* Rchb.f., Linnaea 41(1): 97. 1876. Type: INDIA. Sikkim: without date, *J.D. Hooker without number* (Holotype lost; Neotype K! [000387773] designated here: INDIA. Mount Khasi, *J.D. Hooker without number*).
= *Liparis eggersii* Reichb.f., Ber. Deutsch. Bot. Ges. 3: 278. 1885. Type: PUERTO RICO. Mayagüez: in sylvis montis Mesa, X.1884, *P. Sintenis 497* (Lectotype GOET designated here, Lectotype GOET! image [008575]; Isolectotype K! [000583624]; Isolectotype M! image [0226365]; Isolectotype LE! image [00006493]; Isolectotype G! image [00354719]; Isolectotype G! image [00354720].
= *Liparis elata* var. *latifolia* Ridl., J. Linn. Soc., Bot. 22: 260. 1886. Type: CUBA. Monte Verde, 1860, *C. Wright 1495* (Lectotype BM designated here, Lectotype BM! image [000074263]; Isolectotype P! image [00347787]; Isolectotype GOET! image [013954]; Isolectotype LE! image [00006494]; Isolectotype YU! image [030290]; Isolectotype MA! image [607121]; Isolectotype GH! image [00033805]; Isolectotype K! [000583625]). PARAGUAY. Vallée de l'Y-acan-guaja: près de Valenzuela, 16.III.1884, *B. Balansa 4542* (Remaining syntype P! image [00338289, 00338287, 00338288]).
= *Liparis elata* var. *rufina* Ridl., J. Linn. Soc., Bot. 22: 260. 1886. Type: NIGERIA. Lagos: *Barter without number* (Lectotype K! [000242156] designated here). SIERRA LEONE. without locality or date, *Morson without number* (Remaining syntype K! [000242155]).
= *Liparis bituberculata* var. *khasiana* Hook. f., Fl. Brit. India 5(16): 696. 1890. Type: INDIA. Mount Khasi, *W. Griffith without number* (Holotype lost, Neotype K designated here, Neotype K! image [000387771]): INDIA. East Bengal: without date, *W. Griffith 5068*).
= *Liparis bambusifolia* Makino, Bot. Mag. (Tokyo) 6(60): 48. 1892. *nom. nud.*
= *Liparis elata* var. *longifolia* Cogn., *Fl. bras.* (Martius) 3(4): 287. 1896. Type: PARAGUAY. Vallée de l'Y-acan-guaja: près de Valenzuela, 16.III.1884, *B. Balansa 4542* (Lectotype P designated here, Lectotype P! image [00338287]; Isolectotypes P! image [00338288, 00338289]).
= *Liparis violaceao-nervosa* Guillaumin, Bull. Mus. Natl. Hist. Nat. Série 2, 33: 434. 1961. Type: VIETNAM. Annam: Dalat, 1959, *Tixier 13-59* (Holotype P! image [P00327707]). Figs. 2c-e; 4

Herb 92–520 mm. Roots 32–153 mm length, cylindrical, thick. Pseudobulbs 23–78 × 8–46 mm, ellipsoid, fusiform or rarely oblongoid; covered by white, green or brown perennial foliaceous sheaths. Leaves 41–224 × 19–133 mm, green, 2–5 per pseudobulbs, several layers of a sheath-like petiole 22–124 mm length; lamina plicate, membranaceous, elliptical, rarely oblong-lanceolate or lanceolate, margin entire or undulate, apex acute or obtuse. Inflorescence 119–590 mm raceme; floral bracts in the base of the pedicels, acuminate. Flowers resupinate; purple or greenish-purple, rarely yellow; pedicels 3–10 mm length; ovary 3–5 mm length. Dorsal sepal 5–9 × 1–3 mm, oblong or oblong-lanceolate, margin entire, usually revolute, apex obtuse or slightly acute. Lateral sepals 5–6 × 2–4 mm, free, oblong or oblong-lanceolate, margin entire, usually revolute, apex obtuse or slightly acute. Petals 4–9 × 0.5–2 mm; linear; margin entire and revolute; apex obtuse. Lip 4–8 × 4–6 mm, trilobate, glabrous; base with two tooth-like calluses, with one to three internal thin vein; lateral lobes in the base of the lip, rounded; mid lobe obovate, strongly reflexed, margin entire, slightly undulate near the apex, apex emarginate or rarely rounded. Column 3–5 mm length, slightly

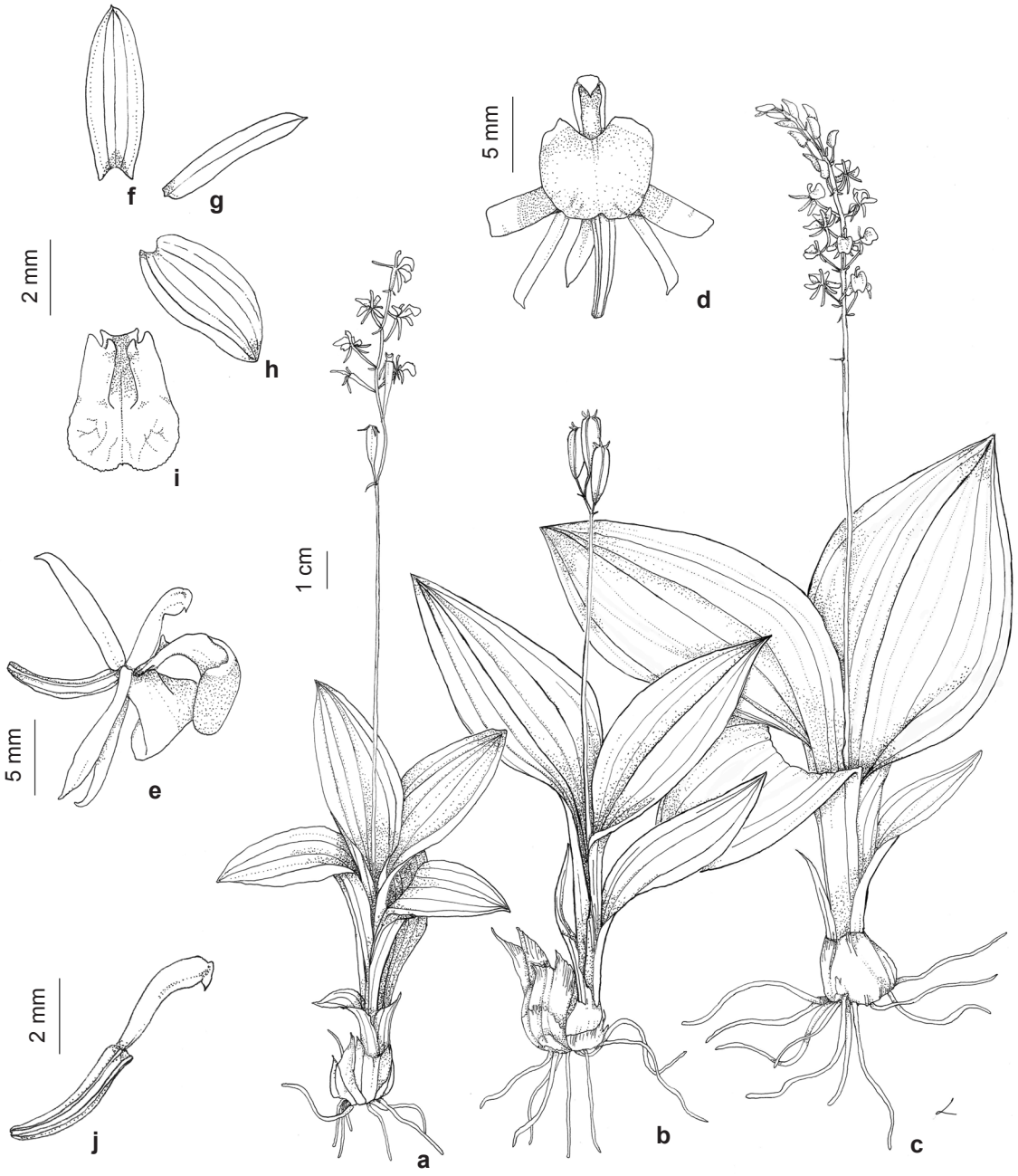

Figure 4 – a-j. Illustration of *Liparis nervosa* – a. habit of the morphotype previously called *Liparis inundata*; b. habit of the intermediate morphotype between *L. inundata* and common *Liparis nervosa*; c. habit of common *L. nervosa*; d. frontal view of the flower; e. lateral view of the flower; f. dorsal sepal; g. petal; h. lateral sepal; i. lip; j. lateral view of the column attached to the ovary (a. *G.A. Black 2749*, *2771*; b. *G.T. Prance 15906*; c, e, d, f, g, h, i, j. *T.F. Santos 60*).

arched; foot short, apex winged; anther green, yellow or greenish-purple. Pollinarium with two ovoid, bipartite pollinia.

Selected examined material: *Schwacke 7767* (RB). III.1837, *G. Gardner 675* (SP). ALAGOAS: Chã Preta, Serra Lisa, 28.VII.2009, *Chagas-Mota 4512* (MAC); 6.V.2009, *Chagas-Mota 3447* (MAC). Ibateguara, Cerrado da Burra, 1.VIII.2003, *A. Siqueira Filho 1388* (HVASF; USP); Coimbra, 7.V.2002, *M. Oliveira 930* (IPA; MAC; UFP). Maceió, Serra da Saudinha, 14. VI.2008, *Chagas-Mota 632* (MAC); 29.IX.2007, *Chagas-Mota 39* (MAC); APA do Catolé, 11.VIII.2010, *M.N. Rodrigues 51339* (MAC). Marechal Deodoro, 20.VIII.2007, *R.P. Lyra-Lemos 4618* (MAC); APA de Santa Rita, 16.V.1988, *G.L. Esteves 2021* (MAC); 20. II.1991, *F.B.P. Moura 20* (MAC); 16.V.1988, *G.L. Esteves 2021* (MAC); Campo Grande, 18.VI.2000, *A.M. Amorim 3477* (CEPEC); Dunas do Cavalo Russo, 27. VIII.2008, *Chagas-Mota 1063* (MAC); margem da AL-101, 24.V.2000, *R.P. Lyra-Lemos 4618* (HUEFS); Sítio Campo Grande, 18.VI.2000, *A.M. Amorim 3477* (MBM; MBML). Messias, Barra da Cachoeira, 11.VI.1980, *V.C. Lima 31* (IPA). Murici, Águas Belas, 24.IV.2008, *Chagas-Mota 547* (MAC); Fazenda Poço D'antas, 5. VI.1993, *R.P. Lyra-Lemos 2792* (MAC); Serra do Ouro, 3.IV.2009, *A.I.L. Pinheiro 658* (MAC). Paripueira, RPPN Sabiá, 29.VIII.2009, *Chagas-Mota 5135* (MAC). São José da Laje, Mata do Pinto, 18.VIII.2009, *Chagas-Mota 5098* (MAC). Tanque d' Arca, Morro do Cruzeiro, 8.VII.2016, *M.C.S. Mota 12859* (MAC). Quebrangulo, Reserva Biológica de Pedra Talhada, 13.V.2009, *A.A. Araújo 1268* (UFP); 22.V.2014, *L. Nussbaumer 4102* (MAC; UFP); 12.VI.2011, *R.P. Lyra-Lemos 13364* (MAC); 5.X.2010, *Chagas-Mota 8848* (MAC); 12. VI.2011, *R.P. Lyra-Lemos 13412* (MAC); 24.IX.1987, *M.N. Rodrigues 1180* (IPA; MAC); Serra dos Bois, 27.VI.1985, *R.P. Lyra-Lemos 947* (MAC); Serra das Guaribas, 25.VI.2009, *Chagas-Mota 4169* (MAC). AMAZONAS: Manicoré, Cachoeira do Paricá, 15. IV.1985, *C.A.C. Ferreira 5574* (INPA). Novo Airão, Parna Jaú, 27.VI.2019, *V.P. Klein 325* (INPA). Rio Negro, Morcego, 18.V.1948, *G.A. Black 2771* (IAN); Rio Içana, 17.V.1948, *G.A. Black 2749* (IAN; IPA). São Gabriel da Cachoeira, Camanaus, 31.X.1971, *G.T. Prance 15906* (INPA). BAHIA: Almadina, Serra do Corcovado, 19. III.2006, *J.L. Paixão 887* (CEPEC; HUEFS; MBML; RB). Amargosa, Serra do Timbó, 29.IV.2007, *J.L. Paixão 1173* (HUEFS). Belmonte, 2.XI.2014, *J.P. Souza 6097* (ESA). Cruz das Almas, Recôncavo Sul, II.1984, *G.C.P. Pinto* (ALCB). Entre Rios, estrada para Subaúma, 28.IV.1981, *S.A.Mori* (CEPEC); Fazenda Rio do Negro, 12.V.2011, *A.V. Popovkin 868* (HUEFS); Rio Subaúma Mirim, 5.VII.2009, *C.N. Fraga 2604* (RB). Esplanada, Fazenda Chapada, 9.V.2000, *M.R. Fonseca 1382* (ALCB; CEPEC; HUEFS; HUESB; UESC). Ipirá, Serra do Engenho, 15.V.2007, *E. Melo 4769* (HUEFS). Irajuba, Fazenda Alegre Nova, 8.IX.2017, *G.E.L. Macedo 2689* (HUESB). Mata de São João, 12.VI.2012, *A.M.Miranda 6522* (HST; HUEFS; RB); Sete Pontes, 17.IX.2016, *F.F.V.A. Barberena 385* (ALCB). Mucugê, Parque Nacional da Chapada da Diamantina, 23.VII.2014, *J.A. Siqueira Filho 3201* (HVASF). Cruz das Almas, Bosques Unidos, 1959, *G. Luiz* (CEPEC). Nova Viçosa, 27. VII.1979, *G. Martinelli 6011* (CEPEC; RB). Paulo Afonso, Estação Ecológica do Raso da Catarina, 9. VI.1983, *L.P. Queiroz 575* (ALCB). Prado, Praia da Amendoeira, 11.VI.1995, *E. Melo 1277* (BHCB; HUEFS). Salvador, 10.VI.1993, *L.P. Queiroz 3222* (HUEFS); Abaeté, 1.IV.1996, *B.F. Viana 133* (HUEFS); Barragem do Cobre, 16.IV.2012, *E.P. Queiroz 5317* (ALCB); Ilha dos Frades, IX.2012, *P.E. Mattos Andrade 102* (ALCB); Parque das Dunas, 6.VI.2016, *F.F.V.A. Barberena 369* (ALCB; HUEFS); 6.VI.2016, F.F.V.A. *Barberena 371* (ALCB; RB); 10.VI.2015, *F.F.V.A. Barberena 337* (ALCB); Itapuã, 19.VI.1985, *R. Rebouças* (ALCB). Santa Luzia, Piatã, 16.VII.2007, *C. van den Berg 1848* (HUEFS). São Gonçalo dos Campos, Fazenda do Azulão, 12.V.2011, *W.O. Fonseca 486* (HURB). Una, Fazenda Bolandeira, 17.VII.2007, *L.A. Mattos Silva 4655* (ALCB). Vera Cruz, Catu, 28.IX.2011, *E.N. Matos 565* (HUEFS). Wenceslau Guimarães, 14.I.2011, *P.A. Ferreira 14* (ALCB); Nova Esperança, 22.V.2005, *A.M. Amorim 5077* (CEPEC); 4.V.2007, *J.G. Jardim 5023* (CEPEC). DISTRITO FEDERAL: Brasília, 18.II.1989, *L. Bianchetti 844* (CEN); 11.XII.1989, *L. Bianchetti 830* (CEN); Brazlândia, 8.I.2020, *J.A.N. Batista 3653* (BHCB); Parque Nacional de Brasília, 5. III.2017, *C.R. Martins 2557* (CEN); Parque Zoobotânico, 2.II.1961, *E.P. Heringer 7896* (UB); Reserva Ecológica do Guará, 18.XI.1989, *L.B. Bianchetti 844* (HUFU); Reserva Ecológica do Recanto, 29.I.1995, *J.A.N. Batista 515* (CEN). Sobradinho. 20.IV.2009, *J.E.Q. Faria 492* (UB). ESPÍRITO SANTO: Alfredo Chaves, São Bento de Urânia, 1987, *A. Toscano* (RB). Cariacica, Duas Bocas, 18.VI.1997, *C.N. Fraga 368* (MBML). Castelo, Parque Estadual do Forno Grande, 2.V.2008, *C.N. Fraga 1978* (MBML; RB); 8.IV.2009, *A.P. Fontana 5858* (MBML; RB; UPCB); 29.IV.2006, *L. Kollmann 8956* (MBML). Mimoso do Sul, Pedra dos Portões, 15.II.2004, *D.R. Couto 19* (MBML). Santa Leopoldina, Rio das Farinhas, 20.IV.2006, *A.P. Fontana 2101* (RB). Santa Teresa, Serra do Gelo, 16.VII.2003, *A.M. Assis 915* (MBML). GOIÁS: Goiás, Formosa, 2.V.1966, *H.S. Irwin 15578* (UB); Rio Maranhão, 23.I.1968, *H.S. Irwin 19073* (UB); Pires do Rio, 17.III.1978, *H. Magnago 263* (RB). Pirenópolis, 22.VI.1905, *A. Hatschbach 70082* (ESA). Silvânia, Fazenda Olho D'Água, 11.I.1989, *T.S. Filgueiras 1692* (SP; UB). Quirinópolis, Fazenda Boa Sorte, 8.VI.2014, *I.L. Moraes 2762* (RB). MATO GROSSO: XI.1911, *F.C. Hoehne 5574* (R). Juara, Fazenda Santa Maria Tapayumi, 18.XII.2007, *A.P. Benelli 382* (UFMT); XII.1911, *F.C. Hoehne 5548* (R). Mato Grosso, 8.I.1968, *D. Philcox 3925* (IAN; MO; RB; UB). MATO GROSSO DO SUL: 8.I.1968, *D. Philcox 3925* (MO, RB). MINAS GERAIS: V.1856, *H. Magalhães 1285* (R). Alto Caparaó, Vale Verde, 23.

VI.1996, *L.S. Leoni 3378* (RB). Barroso, Mata do Baú, 22.III.2003, *L.C.S. Assis 756* (BHZB). Belo Horizonte, 20.I.1934, *M. Barreto 4856* (RB); Estação Ecológica da UFMG, 20.II.2002, *L.H.Y. Kamino 252* (BHCB); Estação Experimental, 21.XII.1936, *H.L.M. Barreto 8315* (SP); 20.XII.1939, *H.L.M. Barreto 10550* (BHCB; R); Ressaca, 18.VII.1934, *H.L.M. Barreto 4857* (BHCB); 26.VII.1934, *H.L.M. Barreto 4858* (SP); 20.I.1934, *H.L.M. Barreto 4856* (BHCB; SP). Boa Esperança, Fazenda Caxambu, 4.I.2007, *A.R. Silva 152* (HCF; MBM). Bom Sucesso, 14.XII.1991, *E.T. Neto 719* (MBM); Macaia, 14.XII.1991, *N.E. Tameirão 719* (BHCB); *R.A. Lourenço 306* (ESAL); *R.A. Lourenço* (ESAL). Carandaí, 27.XI.1946, *A. Duarte 777* (ICN; RB). Carangola, Serra da Araponga, 28.III.1991, *L.S. Leoni 1464* (RB). Camanducaia, Mata dos Vargas, 22. III.2000, *R.B. Torres 1167* (IAC). Camargos, 17. XII.1991, *M.L. Gavilanes* (RB). Carmópolis de Minas, Estação Ecológica Mata do Cedro, 23.I.2005, *L. Echternacht 808* (HRCB); Mata do Cedro, 23.I.2005, *L.A. Echternacht 808* (BHCB); 23.I.2005, *L.A. Echternacht 391* (BHZB). Carbonita, 6.I.2010, *T.C.E. Meneguzzo 482* (UB). Carrancas, Camargos, *M.L. Gavilanes* (ESAL); Serra de Bicas, VI.1998, *R.B. Singer* (UEC); 4.XII.1998, *A.O. Simões 653* (UEC); 4.XII.1998, *A.O. Simões 658* (UEC). Cocais, Barão de Cocais, 5. XII.2018, *M.S. Mendes* (BHCB). Conceição do Mato Dentro, Fazenda da Boa Esperança, 29.VI.2016, *J.E.Q. Faria 6085* (RB). Conceição do Rio Acima, Santa Bárbara, 17.XII.2017, *J.A.N. Batista 3468* (BHCB). Contagem, Ressaca, 20.I.1934, *H.L. Mello 4856* (R); *H.L. Mello 4857* (R). Cristais, 20.VII.2013, *B.M. Carvalho 111* (BHCB). Cumbuquira, 24.XII.1935, *H.L.M. Barreto 5352* (BHCB; RB; SP). Descoberto, Reserva Biológica da Represa do Grama, 23.III.2002, *R.C. Forzza 2103* (MBM). Fazenda Neblina, 1.II.1992, *L.S. Leoni 1754* (RB). Itabira, Fazenda dos Coelhos, 28.I.1943, *G.M. Magalhães 2712* (SP); Parque Estadual da Mata do Limeiro, 25.III.2009, *A.P.R.O. Silva 39* (BHCB). Lagoa Santa (OUPR). Lavras, 10.IX.1941, *E.P. Heringer* (SP); Reserva Biológica de Poço Bonito, 11.XII.1980, *F. Barros 591* (UEC). Mariana, 11.XI.2018, *F.F.F. Mazziero 3890* (MBM); Mina de Alegría, 4. XII.2006, *R.C. Mota 3213* (BHCB). Moeda, Serra da Moeda, 5.I.1990, *L.M.P. Paula* (BHZB). Ouro Preto, Mendes, 23.III.2000, *R.E.Nogueira 207* (OUPR); Parque Estadual do Itacolomi, 1.II.2020, *L.G. Pedrosa 2561* (OUPR); 22.XII.2019, *L.G. Pedrosa, 2386* (OUPR). Pedra Dourada, Cachoeira Mãe d'água, 28.II.2007, *A.P. Fontana 3006* (RB). Perdizes, Unidade de Conservação dos Galheiros, 5.I.1995, *N.E. Tameirão 1604* (BHCB). Pocinho, Aiuruoca, I.2008, *J.A.N. Batista* (BHCB). Poços de Caldas, 7.II.2018, *J.A.N. Batista 382* (BHCB). Rio Acima, ponte do Rio das Velhas, 27.XII.2013, *C.A.J. Ferreira 1324* (BHZB). Rio Preto, Serra Negra, 3. II.2009, *N.L. Abreu 306* (CESJ); 21.V.2004, *F.R.G. Salimena 1306* (CESJ); 26.I.2007, *L. Menini Neto 251* (CESJ). Santa Bárbara, Estação Ambiental de Peti, 8.XII.2004, *R.M. Ferreira 63* (BHCB); Sapucaí, *C.F.P. von Martius 701* (M). Santa Luzia, Fazenda da Chica, 20.XI.1945, *V. Assis 107* (RB). Serra do Brigadeiro, Fervedouro, 16.II.2008, *J.A.N. Batista 3468* (BHCB). Serra do Caraça, Catas Altas, 3.IV.2000, *R.C. Mota 817* (BHCB); 3.IV.2000, *J. Ordones 159* (BHZB); 16. XII.2000, *R.C. Mota 1140* (BHCB); 5.I.2005, *R.C. Mota 2366* (BHCB); 16.XII.2000, *J. Ordones 622* (BHZB). Serra do Ouro Branco, Mata do Agrives, 6.XII.201, *T.L. Vieira 169* (SP). Unaí, 1.VII.2003, *A.A. Santos 2055* (CEN). PARAÍBA: Caaporã, 1980, *A. Caldasso 5601* (IPA). PARÁ: 4.I.1965, *G. Hatschbach 13399* (US). AMZA Camp, 26.V.1982, *C.R. Sperling 5843* (US). PARANÁ: Adrianópolis, Fazenda Primavera, 22.II.2000, *J.M. Silva 3174* (MBM); Parque Estadual das Lauráceas, 20.II.2013, *M.E. Engels 1071* (MBM; RB); 16.I.2017, *E.D. Lozano 350* (HCF). Antonina, Rio Cachoeira, 1. III.2011, *E.C. Smidt 1030* (UPCB); Sapitanduva, 17. II.1976, *G. Hatschbach 38083* (MBM). Campina Grande do Sul, Ibitiraquire, 22.2014, *M.E. Engels 2358* (MBM); Jaguatirica, 10.II.2012, *E. Barbosa 3379* (MBM); Morro Alpino, 2.II.2012, *M.G. Caxambu 3722* (HCF); Morro Getúlio, 30.I.2019, *A. Souza* (EFC). Campo Largo, Flona de Açungui, XI.2008, *M.E. Engels* (EFC). Cerro Azul, Mato Preto, 22.III.1974, *G. Hatschbach 33864* (MBM). Colombo, 10.XII.2015, *R.A. Kersten 1623* (HUCP). Guaraqueçaba, Morro do Quitumbe, 9.II.1994, *R.X. Lima 227* (UPCB); Superagui, 8.I.2014, *M.E. Engels 2298* (FURB; HCF; JOI; MBM; RB; UPCB). Guaratuba, I.1958, *P.E.L. Kieger 7146* (RB); Brejatuba, 6.XI.1957, *G. Hatschbach 3823* (MBM); 5.II.1987, *J.M. Silva 197* (MBM); Candeias, 20.III.1993, *J.M. Silva 1244* (MBM). Jaguariaíva, 25.XII.1914, *P. Dusén 16191* (RB); Rio Jaguariaíva, 28.VI.2017, *J.M. Silva 9861* (HCF); 16. XII.2017, *J.M. Silva 10013* (HCF). Matinhos, Parque Estadual Rio da Onça, 14.I.2014, *M.E. Engels 2327* (FURB; HCF; MBM; RB); Rio da Onça, 30.III.2017, *I. Souza* (EFC); 10.I.2020, *R.A. Kersten 2046* (HUCP). Morretes, Prainhas, 4.I.1965, *G. Hatschbach 13399* (MBM); Barro Branco, 1.II.1996, *J.M. Silva 1620* (MBM; SPF); Rio Sagrado, 8.VII.2011, *E.D. Lozano 596* (MBM). Paranaguá, 8.II.2010, *M.L. Brotto 422* (UPCB); Floresta Estadual do Palmito, 13.VIII.2013, *R.A. Bonaldi 855* (MBM); 24.I.2014, *R.A. Bonaldi 938* (HUEFS; MBM); 1.II.2014, *R.A. Kersten 1606* (HUCP); 13.IV.2015, *T.F. Santos 60* (HUCP); Ilha do Mel, 2. IX.1995, *S.M. Silva* (UPCB); 3.II.1998, *R.B. Singer 31* (MBM); 20.I.1998, *V.A.O. Dittrich 328* (UPCB); 14. III.1999, *M.P. Petean* (UPCB); Ilha das Peças, 16.I.2011, *C.T. Blum 880* (EFC); Ponta do Poço, 27.I.1981, *G. Hatschbach 43542* (MBM; SPF); Porto de Cima, 24.I.1919, *P. Dusén 1442* (RB); Pontal do Sul, 1.II.1966, *G. Hatschbach 13659* (MBM); Sítio do Meio, 17.II.1951, *G. Hatschbach 2152* (MBM; SP). Pontal do Paraná, Guaraguaçu, *J. Carneiro 1291* (MBM); Guaraguaçu, 21.II.2016, *E.D. Lozano 3168* (MBM; RB; SP). Tamara, Faz Prata, 8.VI.1999, *D.A. Estevan 110* (FUEL; SP). PERNAMBUCO: Bonito, Reserva Biológica Municipal,

6.V.1998, *L.P. Félix 8356* (HST); Reserva Ecológica Bonito, 24.IV.1995, *M.B.V.* (UFP). Gravatá, Fazenda Harmonia, 10.X.1970, *A. Lima 70-6034* (IPA). Igarassu, Usina São José, 1971, *A. Lima 71-6458* (IPA). Jaqueira, Usina Colônia, 21.V.2000, *J.A. Siqueira-Filho 1085* (UFP). RIO DE JANEIRO: 1878, *E.T. Siqueira* (R). Angra dos Reis, Ilha Grande, 15.VIII.2009, (HRJ); 28.IV.2009, (HRJ). Araruama, 22.VI.1938, *A. Passarelli* (R). Baía de Sepetiba, Ilha Furtada, 5.XI.1967, *D. Sucre 1879* (ICN; RB). Cabo Frio, Arraial do Cabo, 14. XII.2005, *R.J.V. Alves 7627* (R); 30.X.2013, *H.F. Uller 534* (RB). Duque de Caxias, Rio Pedra Branca, 28. VIII.1997, *S.J.S. Neto 1004* (RB). Guapimirim, Granja Monte Olivete, 19.XII.1995, *J.M.A. Braga 3131* (RB); Serra dos Órgãos, VI.1975, *P. Occhioni 7383* (RFA); 4.IV.1956, *E. Pereira 1962* (RB); Monte Olivete, 16. III.1994, *J.R. Figueiredo* (RB). Itatiaia, 17.XI.2013, *P. Ormindo* (RB); 25.XII.1960, *E. Pereira 5652* (PEL); Parque Nacional do Itatiaia, 26.V.1993, *W.D. Barros 976* (RB); 23.I.2008, *F.F.V.A. Barberena 2* (RB); I.1939, *L. Lanstyah 249* (RB); 7.I.1960, *O.M. Barth 54* (RFA); 24.I.1996, *J.M.A. Braga 3137* (RB); 6.III.2013, *J.A.N. Batista 3262* (BHCB); 9.IV.2015, *B.F. Falcão 9* (BHCB); 26.XII.2020, *L. Biral 2478* (SHPR). Macaé, Frade, 4. III.2004, *R.C. Forzza 2887* (RB). Magé, Barreira, *J. Vidal 730* (R). Mangaratiba, Ilha da Marambaia, 9. XI.1998, *L.F.T. Menezes 442* (RBR); 27.XI.1999, *L.F.T. Menezes 541* (RBR); 14.VII.2004, *L.F.T. Menezes 1202* (RBR). Nova Friburgo, II.1883, *7673* (R); Macaé de Cima, 30.III.1998, *D. Miller* (RB). Nova Iguaçu, Reserva Biológica do Tinguá, 16.II.1993, *M.M.T. Rosa 312* (RBR); 26.V.1993, *M.M.T. Rosa 342* (RB). Paraty, APA Cairuçu, 12.IV.1994, *C. Duarte 51* (RB); Rio Carisquinho, 11.V.1994, *R. Marquete 1803* (RB). Petrópolis, II.1929, *C. Spannagel 220* (SP). Resende, Rio Preto, 21.XII.1999, *N.E. Tameirão 2788* (BHCB); estrada para Serrinha, 10.XII.2002, *R. Marquete 3421* (RB). Rio de Janeiro, 3.I.1932, *A.C. Brade 11241* (R); 2000, *R.L. Moura 261* (R); Serra dos Órgãos, VII.1974, *P. Occhioni 6009* (RFA); Tijuca, II.1917, *F.C. Hoehne* (SP). Saracuruna, Reserva da Petrobras, 27.VIII.1997, *J.A. Lira 665* (MBM; RB). Silva Jardim, Reserva Poço das Antas, 18.VIII.1995, *J.M.A. Braga 2739* (MBM; RB); 14. IX.1997, *G. Martinelli 2885* (RB). Teresópolis, Bairro Taquara, 22.VII.2016, *C. Baez 642* (RB; SP). RIO GRANDE DO SUL: Campo Bonito, 10.II.1983, *A. Krapovickas 38536* (MBM). Dom Pedro de Alcântara, 4.IV.1998, *S. Dalpiaz* (ICN). Giruá, Granja Sodal, 1966, *K. Hagelund 4434* (ICN). Glorinha, cânion das Ciateáceas, VII.2019, *R.M. Senna 1807* (HAS). Maquiné, Fundos da Solidão, 4.VIII.2001, (ICN). Novo Hamburgo, Parcão, 28.V.1995, *J. Mauhs 454* (PACA-AGP). Osório, Lagoa do Horácio, 19.IV.2015, *F. Gonzatti 1782* (FUEL; HUCS). Paco de Magera, 30.X.1901, *G.A. Malme 88* (HBG). Porto Alegre, Morro Santana, 1.III.1986, *M.L. Tissot* (ICN). São Leopoldo, III.1937, *A.A. Rohr 1* (RB); 5.IX.1954, *B. Rambo* (PACA-AGP). Tavares, Parque Nacional Lagoa do Peixe, 18.VII.2003, *R. Záchia 5626* (ICN). Torres, Faxinal, 1976, *J.L. Waechter 2697* (ICN). RONDÔNIA: Abunã, Rio Madeira, 16.XII.2012, *G. Pereira-Silva 16541* (CEN). Fortaleza, Rio Abunã, 15.XI.1968, *G.T. Prance 8479* (INPA). Porto Velho, BR-364, 26.XI.2013, *M.F. Simon 2078* (CEN; INPA; RON). RORAIMA: Caracaraí, Parque Nacional do Viruá, 19.IX.2011, *E.M. Pessoa 667* (INPA; UFP); 24.VII.2010, *T.D.M. Barbosa 1316* (UEC); 27.XI.2006, *F.A. Carvalho 927* (INPA). SANTA CATARINA: Agrolândia. Vila dos Koch, 29.IV.2010, *A. Korte 2922* (FURB). Águas Mornas. 4. XII.2017, *A.K. Filho 1942* (FURB); RPPN Rio das Lontras, 15.I.2009, *N.L. Souza 113* (FURB); Vargem Grande, 19.V.2010, *A.S. Santos 2729* (FURB). Angelina, Barra Clara, 24.IV.2010, *A.S. Santos 2562* (FURB). Alto Alegre, Capinzal, 18.IV.2011, *A. Korte 6668* (FURB). Angelina, Linha do Chaves, 6.IV.2010, *A.S. Santos 2404* (FURB); Rancho das Tábuas, 1.II.2010, *A. Stival-Santos 1621* (CRI; FURB; UPCB). Anitápolis, Rio das Pedras, 14.VII.2011, *A. Korte 7053* (FURB; HUCS); Rio do Meio, 17.VI.2009, *M. Verdi 2405* (FURB). Apiúna, Ribeirão Vinte, 19.V.2010, *A. Korte 3302* (FURB). Araquari, Ilha dos Papagaios, 14.IV.2005, *W.S. Mancinelli 240* (JOI); 27.IV.2005, *G. Amaral 108* (JOI); 6.V.2005, *D.B.G. Bussmann 107* (JOI); Ilha dos Barcos, 8.VI.2004, *D. Minatti* (JOI); 6.V.2005, *A. Bachtold 205* (JOI). Areião, Armazém, 6.IV.2010, *M. Verdi 4166* (FURB). Barra Velha, Itajubá, 1.II.1990, *A. Krapovickas 43552* (MBM). Balneário Camboriú, Estaleiro, 22. IV.2017, *A. Medeiros* (CRI). Benedito Novo, Alto Benedito, 30.III.2011, *J.O. Caetano* (FURB). Blumenau, Ribeirão Fresco, 13.III.2017, *L.A. Funez 6210* (FURB); Rua Pastor Oswaldo Hesse, 22.I.2014, *L.A. Funez 2741* (FURB). Bom Jardim da Serra, Pico do Rinoceronte, 1.I.2020, *J.P.G. Just* (CRI). Bombinhas, ARIE, 6.V.2011, *A. Nuernberg 108* (FLOR); 8.III.2012, *A. Nuernberg 614* (FLOR). Brusque, Fundos da Empresa Benetex, 26.I.2011, *H.F. Uller 143* (FURB). Cocal do Sul, Florística IFFC, 1.XI.2010, *M. Verdi 3556* (UPCB); Linha Cabral, 1.II.2010, *M. Verdi 3557* (FURB). Criciúma, 30.IV.1992, *V.C. Zanetti 1416* (CRI); Bairro Ceará, 18.VI.1991, *V.C. Zanetti 1516* (CRI); Parque Municipal José Milanese, 8.IX.2015, *G.W. Girardi* (CRI). Florianópolis, 12.III.1952, *L.B. Smith 6158* (R); 20.II.1945, *A. Rohr* (PACA-AGP); bairro Vargem do Bom Jesus, 13.III.2010, *A.S. Santos 2040* (FURB); Lagoa do Peri, *A. Bresolin 1392* (FLOR); Lagoinha do Leste, 9.I.2020, *L.A. Funez 9440* (FURB); Morro do Ribeirão, 16.I.1967, *R.M. Klein 7054* (FLOR; PACA-AGP); Morro da Lagoa da Conceição, 2.VII.1991, *M.Q. Hering 496* (FLOR); Pantano do Sul, 9.III.2010, *J.L. Schmitt 1569* (FURB); Parque Estadual do Rio Vermelho, 17.I.2020, *L.A. Funez 9664* (FURB); Parque Municipal Lagoa do Peri, 10.III.2010, *A.S. Santos 1986* (FURB); Praia dos Ingleses, 9.III.1993, *F.F.D. Neves 07* (FLOR); Represa da Lagoa, 6.I.1978, *A. Bresolin 1301* (FLOR); Saco Grande, 18.I.1967, *R.M. Klein 7116* (FLOR); Santo Amaro da Imperatriz, 26.XII.2006, *J.Z.*

Matos (FLOR); Trindade, 15.II.1945, *A. Rohr* (PACA-AGP); Vargem Grande, 12.III.2010, *J.L. Schmitt 1613* (FURB). Forquilhinha, Parque Ecológico, 20.VII.1992, *J.J. Zocche* (CRI); Imaruí, 28.I.2010, *J.L. Schmitt 1175* (FURB). Gaspar, Gasparinho, 15.X.2009, *A.S. Santos 1025* (FURB). Garopaba, Morro da Ressaca, 28.IV.2010, *M. Verdi 4616* (FURB). Guaricanas, Ascurra, 15.III.2010, *A. Korte 2833* (FURB). Imaruí, Forquilhinha, 28.I.2010, *J.L. Schmitt 1175* (UPCB). Itapoá, Reserva Volta Velha, 2.III.1993, *R. Negrelli 799* (UPCB); II.1996, *C.I. Salimon without number* (UPCB). Joinville, Sambaqui do Cubatão, 11.I.2015, *W.S. Mancinelli 1503* (JOI). Laguna, Laranjeiras, 3.IV.2010, *M. Verdi 4604* (FURB). Lauro Muller, 1.VII.2020, *R. Colares* (CRI). Lauro Muller, Rio Oratório, 19.II.2010, *M. Verdi 3697* (FURB; UPCB). Navegantes, bairro Costa Azul, 24.II.2011, *A. Korte 5790* (FURB. HUCS). Nova Trento, Valsugana, 14.VII.2010, *A. Korte 4000* (FURB). Orleans, Barracão, 30.III.2010, *M. Verdi 4127* (FURB); Barra do Rio Novo, 22.II.2010, *M. Verdi 3705* (FURB); Chapadão, *R. Santos-Junior* (ICN); Parque Nacional de São Joaquim, 22.V.2009, *M. Verdi 2187* (FURB; RB); Rio Minador, 23.IV.2010, *J.L. Schmitt 1979* (FURB). Palhoça, Pedra Branca, 2. VI.2010, *A.S. Santos 2956* (FURB). Paulo Lopes, Serra do Tabuleiro, 10.VI.2010, *M. Verdi 4941* (FURB). Porto Belo, Trevo, 22.I.1976, *A. Reis 125* (FLOR). Praia Grande, PARNA Aparados da Serra, 25.V.2010, *M. Verdi 4744* (FURB); trilha das Mulas, 25.VII.2000, *R. Santos* (CRI); trilha do Rio do Boi, 24.VI.2010, *J.L. Schmitt 2825* (FURB); 27.IV.2010, *J.L. Schmitt 2057* (FURB). Rodeio, 8.III.2017, *A.K. Filho 26* (R). Santa Rosa de Lima, Nova Fátima, 5.V.2010, *M. Verdi 4662* (FURB). São Bento do Sul, 7.II.2015, *P. Schiwirkowski 987* (FURB); CEPA Rugendas, 25.III.2004, *G.P. Nascimento* (JOI); 20.XII.2008, *F.S. Meyer 873* (FURB; JOI). São Francisco do Sul, Herdeiros, 26.III.2004, *R.R. Leite* (JOI); 26.III.2004, *Equipe 50* (MBM); 23.I.2004, *F.C.S. Vieira 768* (JOI); 7.IV.2006, *P.E. Hogrefe 33* (JOI); Praia do Ervino, 22.II.2011, *A. Korte 5752* (FURB); Vila da Glória, *J.Z. Berger 596* (MBM); 15.V.2004, *J.Z. Berger 1* (MBM); 29.V.2002, *F.S. Meyer* (JOI); 4.II.2004, *R.C. Hering* (JOI). São João Batista, 30.IX.2010, *A. Korte 4452* (FURB). São Pedro de Alcântara, 2.II.1996, *A. Reis 2445* (FLOR). São Martinho, 10.IV.2010, *M. Verdi 4324* (RB). Siderópolis, 12.I.2003, *V.C. Zanette* (CRI). Siderópolis, Belvedere Baixo, 28.I.2010, *M. Verdi 3441* (FURB); Serrinha, 17.V.2010, *J.L. Schmitt 2403* (FURB); 19.XI.2009, *J.L. Schmitt 652* (FURB). Timbé do Sul, Serra da Rocinha, 3.II.2008, *J.A.N. Batista 2510a* (BHCB). Três Barras, Pingador, 8.I.1997, *V.C. Zanetti 2385* (CRI); 16.I.1995, *V.C. Zanetti* (CRI). Treviso, Brasília, 19.V.2010, *J.L. Schmitt 2509* (FURB); Cirenaica, 27.I.2010, *M. Verdi 3396* (FURB; UPCB). Urussanga, 20.IX.1996, *V.C. Zanetti* (CRI); Linha Pacheco, 17.II.2010, *M. Verdi 3617* (CRI; FURB; UPCB); Rio Carvão Alto, 2006, *A.S. Klein* (CRI); Rio Caeté, 8.III.2014, *A.V. Guislon 8* (CRI). SÃO PAULO: Angatuba. 20.II.1966, *M. Emmerich 2791* (R). Apiaí, estrada do Pinhalzinho, 13.XII.1997, *F. Chung 105* (ESA; UEC). Araraquara, Cerrito, 1.XII.1888, *A. Loefgren 1116* (SP). Bertioga, Rio Guaratuba, *M. Kuhlmann* (Sp). Butantan, 23.II.1918, *F.C. Hoehne* (SP). Botucatu, Distrito de Rubião, 23.I.2009, *Y.R. Arbex 26* (BOTU; SP); Fazenda São Roque, 5.I.1973, *A. Amaral Jr. 1367* (BOTU; SP); Sorocaba, 25.I.1973, *B. Amaral Jr. 1405* (BOTU). Campinas, Arraial dos Souzas, 11. XII.1938, *N.G. Blanco* (IAC; RB; SP); Joaquim Egídio, 28.X.1938, *N.G. Blanco* (IAC). Cananéia, 8.I.1999, *M. Sztutman 168* (ESA); 28.VIII.2005, *M.C. Martins* (ESA); Ilha do Cardoso, 8.VI.1983, *F. Barros 830* (HUEFS; RB; SP); 26.VIII.2007, *A.M.V. Hertwig 104* (ESA); 9.II.1979, *D.A. De-Grande 217* (SP); 22.II.1979, *D.A. De-Grande 247* (SP); 6.III.1985, *M.M.R.F. Melo 549* (SP); 11. VII.1985, *S.R. Neto 283* (SP); 24.II.2006, *R.P. Romanini 261* (SP). Campos de Jordão, Umuarama, 6.II.1935, *M. Kuhlmann* (SP). Eldorado, *J.E. Meireles 243* (ESA); 22.III.2005, *A. Oriani 81* (ESA); Parque Nacional Jacupiranga, 22.III.2005, *A. Oriani 481* (SPSF; UEC). Guarujá, 5.II.1932, *F. Zoéga* (SP). Guarulhos, Lote 5, 8.I.2014, *R.T. Shirasuna 3159* (SP). Iporanga, 22.I.1990, *J.M.D. Torezan 27* (FUEL); estrada Eldorado-Iporanga, 23.I.2002, *F.N. Costa 333* (SPF). Itanhaém, Praia Grande, 16.XII.1989, *O. Yano 13726* (SP). Jundiaí, 24.III.2008, *J.A. Lombardi 7345* (HRCB); Serra do Japi, 24.III.2008, *J.A. Lombardi 7345* (HRCB); 13.IX.1998, *R.B. Singer* (UEC); 28.V.1997, *R.B. Singer 97* (UEC); 14.XII.1997, *E.R. Pansarin 97* (UEC); 15.I.2004, *E.R. Pansarin 1111* (UEC). Mogi das Cruzes, Serra do Itapeti, 1.II.2003, *V.T. Rodrigues 15* (SP). Monte Alegre, 11. II.1944, *M. Kuhlmann 741* (SP). Paranapanema, Estação Ecológica de Paranapanema, 23.XI.2006, *R. Cielo-Filho 505* (SPSF). Pariquera-Açu, *N.M. Ivanauskas 31* (ESA); *N.M. Ivanauskas 1098* (ESA); estrada para Cananéia, 7.II.1995, *H.F.L. Filho 32847* (UEC). Pindamonhangaba, Fazenda São Sebastião do Ribeirão Grande, 25.I.1997, *S.A. Nicolau 1299* (SP). Porto Ferreira, Parque Estadual Porto Ferreira, *E.P. Dickfeldt* (HRCB). Santa Isabel, Franco da Rocha, 7.V.1905, *V.C. Souza 36525* (ESA); 7.V.1905, *V.C. Souza 36526* (ESA); 7.V.1905, *V.C. Souza 36565* (ESA). Santo André, Alto da Serra, II.1899, *G. Edwall 6014* (SP). São Bernardo do Campo, Via Anchieta, 14.VI.1994, *J.V. Godoi 424* (SP). São José do Barreiro (RB); Serra da Bocaina, 3.II.2018, *J.A.N. Batista 3534* (BHCB). São Lourenço da Serra, Reserva Natural Paiol Maria, 18.I.2012, *J.A. Lombardi 8956* (HRCB). São Paulo, I.1913, *Tamandaré 437* (RB); 1.III.1894, *G. Edwall 2526* (SP); Santo Amaro, 20. XII.1943, *L. Roth 871* (SP). Subaúma, 9.VII.1994, *P.H. Miyagi 113* (ESA). Tapiraí, trilha Boatudo, 29.III.2013, *J. Kuntz 985* (ESA). Ubatuba, XI.1998, *F. Pinheiro 20* (SP); Ilha Anchieta, 21.I.1998, *E.C. Smidt 32* (SJRP); Morro Escuro, 7.XI.1961, *J. Fontella 90* (SP); Núcleo Picinguaba, 3.V.2001, *J.A. Lombardi 4352* (BHCB); Parque Estadual da Serra do Mar, 5.II.2018, *J.A.N. Batista 3543* (BHCB; CEN); Picinguaba, *F.C.P. Garcia* (HRCB); *J.E.L.S. Ribeiro* (HRCB); *A. Furlan* (HRCB);

8.V.1994, *M.D. Moraes 13* (UEC). SERGIPE: Areia Branca, Serra de Itabaiana, 14.VI.2010, *L.A.S. Santos 185* (ASE); 21.V.2018, *F.O. Silva 301* (ASE); 20. VII.2010, *L.A.S. Santos 190* (ASE); 11.VI.2007, *M.F.A. Lucena 1774* (UFP). Capela. Mata do Junco, 17.IX.2013, *J.L. Costa-Lima 1025* (UFP); 5.VII.2014, *E. Pessoa 1240* (UFP); 4.VII.2010, *A.P. Prata 2296* (ASE); 31.V.2011, *A.P. Prata 2594* (ASE). Indiaroba, Fazenda São José, 21.IX.2012, *M.C.V. Farias 235* (ASE). Itabaiana, Serra de Itabaiana, 11.VI.2007, *M.F.A. Lucena 1774* (ASE); 11.VI.2007, *M.F.A. Lucena 1768* (ASE); 21.V.1987, *G. Viana 1738* (ASE); 21.VII.2006, *J.R. Maciel 301* (ASE); 15.X.2007, *P. Gomes 654* (ASE). Japaratuba, Mata da Sambaíba, 13.V.2010, *L.A.S. Santos 174* (ASE). Lagarto, assentamento Che Guevara, 16.X.2009, *E. Santos 28* (ASE); 16.VIII.2018, *E. Santos 269* (ASE). Santo Amaro das Brotas, povoado Estiva, 12.VI.1982, *G. Viana 507* (ASE; IPA; UPCB). Santa Luzia do Itanhy, RPPN Mata do Castro, 18.V.2012, *L.A. Gomes 488* (ASE; FURB; RB; UFP); 26.VI.1995, *M. Landim 439* (ASE). São Cristóvão, rodovia João Bebe Água, 12.VI.2006, *L.V. Ribeiro 120* (ASE; HUNI).

Additional material examined: BENIN. Dahomey: Route de Porto Novo, 19.IX.1964, (P). CAMEROON. Rocher Philippe: Reserve du Dja, 26.VI.2002, *Stévart 383* (PO). CENTRAL AFRICAN REPUBLIC. Manovo Gounda: Pende-Koumbala, 14.V.1985, *J.M. Fay 7291* (P). CONGO. Rumangabo: 3.I.1945, *R. Germain 3189* (P). CUBA. Trinidad Mountains: VIII.1940, *R.A. Howard 4675* (P). DOMINICAN REPUBLIC. 23.VIII.1968, *A.H. Liogier 13163* (P). ECUADOR. Napo-Pastaza. Mera: 7.XII.1955, *E. Asplund 18715* (P). FRENCH GUIANA. Mitaraka Sud: 13.III.2001, *Sarthou 892* (P). GABON. Ogooue. Ivindo National Park: 8.IV.2017, *N. Texier 1239* (P). GHANA. Amedzofe: 27.IX.1969, *J.B. Hall 40016* (P). GUINEA. Nzerekore: Lola Prefecture, 29.IX.2011, *D. Bilivogui 18* (P). IVORY COAST. 27.VI.1974, *O. Boka 654* (P). JAPAN. Insula Sakuzajima: VII.1900, *U.J. Faurie 4274* (P). LIBERIA. Memmeh's Toron: 27.VIII.1926, *D.H. Linder 345* (P). NIGERIA. Eugu: Milkir Hill, 2.VII.1964, *B.O. Daramola 55172* (P). PARAGUAY. Isla Guavira: 12.VIII.1992, *E. Zardini 32870* (P). SENEGAL. 1954, *R. Schnell 2* (P). SIERRA LEONE. Loma Daoulé: Prairie Sur Dalle, 16.XII.1965, *J.G. Adam 22605* (P). SURINAME. Wilhelmina Gebergte: 29.VIII.1963, *H.S. Irwin 55150* (P). TANZANIA. 16.II.1932, *H.J. Schlieben 1764* (P). VIETNAM. Quangnam-Danang: Ngoc Linh Mountain, 23.III.1995, *L. Averyanov 883* (P).

This species is pantropical. In Brazil, it occurs in practically all national territories, with record lacking only in Acre, Amapá, Ceará, Maranhão, Paraíba, Piauí, Rio Grande do Norte and Tocantins states (POWO 2022).

The *Cymbidium bituberculatum* protologue mentions a collection by *J. Cooper* from Nepal that could not be found in any herbarium, and the information in the text is insufficient to confidently determine if it was ever herborized. In the same work from Hooker (1824), an illustration based on the specimen used to describe his species is presented; hence, it is designated as the lectotype here.

The collection of ''*Ridgway J. 169*, May of 1834'' used in the description for *Liparis guineensis* could not be found and is probably lost; hence, the illustration based on the same exemplar (Lindley 1834) is here designated as the lectotype.

The identity of *Liparis elata* var. p*urpurascens* is uncertain. The protologue lacks indication of an original material, and the only two pieces of information given are -''purple leaves and erect bracts''. Although the diagnosis of this taxon as a variety of *Liparis nervosa* is unclear, for taxonomical balance, we still opted to designate a collection as the neotype: ''*R.P. Lyra-Lemos 4618*'' (MAC11091), as it bears the purplish leaves mentioned in the protologue.

There are three syntypes of *Liparis kappleri* (AMES00052492; AMES00271895; P00347774). As no holotype is indicated among these duplicates in the protologue of the species and the material deposited at P (00347774) is of better quality, it is designated here as the lectotype.

The *Liparis odontostoma* holotype collection made by *Hooker J.D.* in the Sikkim state region of India is probably lost, and as no other original material seems to exist, we choose to designate the collection of *Hooker J.D. without number* (K000387773) from Mount Khasi in the Meghalaya state region as the neotype, due to it being well preserved and found in a nearby area in India, representing the taxon accordingly.

There are multiple syntypes of *Liparis eggersii* deposited in distinct herbariums. Therefore, we here designate the collection of GOET (008575) as the lectotype, choosing it among the duplicates due to the good condition of the exsiccate, which presents complete inflorescence with fruits and flowers.

The description of *Liparis elata* var. *latifolia* by Ridley (1886) emphasizes broad leaves as a morphological characteristic for recognizing the species. The protologue indicates two distinctive collections as types, with multiple duplicates spread among different herbaria. The collection of *Balansa B. 4542* from Paraguay presents specimens with narrower leaves than the collections of *Wright C. 1495* from Cuba, thereby being ruled out as a lectotype. Among the duplicates of *Wright C.*

1495, the material deposited at BM (000074263) is chosen to be designated here as the lectotype due to the good condition of the exsiccate - with complete vegetative and reproductive parts as well as for displaying morphological characteristics closely related to the original description of the taxon.

The *Liparis elata* var. *rufina* protologue indicates two distinguished materials that are herborized in the same exsiccate, while the collection of *Morson without number* (K000242155) comprises only an inflorescence and a drawing of a flower belonging to one specimen. The collection of *Barter without number* (K000242156) is complete - composed of vegetative and reproductive parts from two individuals, in addition to the drawing of a flower; hence, it is here designated as the lectotype.

The *Liparis bituberculata* var. *khasiana* holotype is lost, and no other original material seems to exist; thus, we designated the collection of *Griffith W. 5068* (K000387771) as the neotype, as it supports the characteristics described by the author and was also collected in India. This same exsiccate includes another collection (K000387770) identified as *L. bituberculata* var. *khasiana*; however, this one lacks information about the collector, and the specimen could even belong to another species, as it does have some unique features such as an elongated stem and the absence of pseudobulbs; therefore, it should be disregarded.

Three duplicate collections of original material belonging to *Liparis elata* var. *longifolia* are deposited at P (P00338287; P00338288; P00338289). Even though they are all in good condition, we opted to designate the collection of P (00338287) as the lectotype here, as it is the only one with flowers and fruits in the same exsiccate.

While studying *Liparis nervosa* we noticed that some plant collections had smaller sizes and oblong-lanceolate leaves. These exemplars with these morphological features generally inhabit wetlands in open fields, with some exceptions in the Amazon Forest, where this morphotype (Fig. 3a) is also found in the forests near the Rio Negro River.

The variations in vegetative morphology of these specimens have caused taxonomic controversy, even though the shape and size of floral parts are not different from those of common *L. nervosa*. This morphotype was recognized previously as *Liparis elata* var. *inundata* (Barbosa Rodrigues 1877; Cogniaux 1896; Hill 1926), a synonym of *L. nervosa* that was recently elevated from the variety position to species status as *Liparis inundata* by Pansarin *et al*. (2020). Nonetheless, the difference in phenology within populations was used as a comparative feature between this morphotype and a common *L. nervosa.* However, we recommend caution when using this characteristic since populations may differ in their flowering season depending on their occurrence; these varieties could be attributes of the habitat itself, driving populations to flower at different times of year.

For now, we prefer to keep *L. inundata* as a synonym of *L. nervosa* since the morphological and ecological characteristics used to discern them are not sufficient, and it is not hard to find plants with intermediate morphology (Fig. 3b), which can cause even more taxonomical instability in this taxon. One future approach could be to manually cross-pollinate these different morphotypes, monitor the offspring generated between populations, and compare the morphological characteristics of the different individuals generated.

Liparis nervosa is characterized by its highly variable vegetative size and terrestrial habit, but occasionally, it is found growing on organic matter accumulated between tree trunks or rocks. Mature individuals always have more than two leaves, which are deciduous and show rapid growth after falling, emerging from the side or apex of the entirely or mostly aboveground pseudobulb. The flowers are usually fertile in succession in a spiral conformation from the base of the inflorescence to its apex.

It can be recognized and distinguished from the other two native species by its usually larger size and many leaves, and its pseudobulbs always bear long and thick roots. The flowers are similar to those of *Liparis cogniauxiana* but can be distinguished by the two tooth-like calluses presented at the base of the lip.

Liparis nervosa can be found in all Brazilian biomes, flowering from January to December. It commonly occurs in lowland forests, montane forests, and marshes but can sometimes be exposed to the sun in open flooded fields or on roadsides near forests. With an extent of occurrence (EOO) of approximately 6,702,407.731 km², an area of occupancy (AOO) of approximately 2,128.000 km², and a presence in all Brazilian biomes, the taxon falls into the category of ‘‘Least Concern (LC)’’.

3. *Liparis vexillifera* (Lex.) Cogn., *Fl. bras.* 3(4): 289. 1896. *Cymbidium vexilliferum* Lex., Nov.Veg. Descr. 2: 11. 1825; *Leptorkis vexillifera* (Lex.) Kuntze, Revis. Gen. Pl. 3(3): 300. 1898. Type: MEXICO. MICHOACAN: Morelia, 28 August 1986, *Espejo S. 2723* (Neotype AMO designated by Espejo, A. (1987)).

= *Liparis vexillifera* subsp. *lindeniana* (A. Rich. & Galeotti) Dressler, Orquideologia 20(3): 264. 1997; *Liparis lindeniana* (A. Rich. & Galeotti) Hemsl., Gard. Chron. n.s., 11: 559. 1879; *Malaxis lindeniana* A. Rich. & Galeotti, Ann. Sci. Nat., Bot. ser 3, 3: 18. 1845. Type: MEXICO. CORDILLERA: Près Morelia, 1840, *H. Galeotti 5213* (Neotype P designated here; Neotype P! image [00347743]).

= *Liparis campestris* Barb. Rodr., Gen. Sp. Orchid. 1: 36. 1877; *Leptorchis campestris* (Barb. Rodr.) Kuntze, Revis. Gen. Pl. 2: 671. 1891. Type: BRAZIL. SÃO PAULO: Serra do Cajuru, February, *J. Barbosa Rodrigues without number* (Holotype lost; lectotype designated here: illustration reproduced in Iconographie des orchidées du Brésil 1: t. 443B, copied and reproduced in colour in Sprunger *et al.* (1996)).

= *Liparis jamaicensis* (Rchb.f.) Lindl. *ex* Griseb., Cat. Pl. Cub. [Grisebach] 261. 1866; *Leptorchis elliptica* (Rchb.f.) Kuntze, Revis. Gen. Pl. 2: 671. 1891; *Liparis elliptica* (Rchb.f.) Reichb.f., Ann. Bot. Syst. (Walpers) 6(2): 218. 1861; *Sturmia elliptica* Reichb.f., Linnaea 22(7): 833. 1850. Type: BRAZIL. MINAS GERAIS: Serra do Espinhaço, 21.III.1970, *H.S. Irwin 28030* (Neotype K! [000940647] designated here, isoneotype UB! [0016698]).

= *Liparis vexillifera* var. *latifolia* Cogn., *Fl. bras.* 3(4): 290. 1896. Type: ARGENTINA. SIERRA DE TUCUMÁN: Cuesta del Garabatal, January 1874, *Lorentz P.G. 876* (Lectotype GOET designated here, lectotype GOET! image [008576]; isolectotype NYBG! image [00004197]); ARGENTINA. SALTA: Yacone, March 1873, *Lorentz P.G. 306* (Remaining syntype GOET! image [013960]).

= *Liparis colombiana* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 75. 1920. Type: COLOMBIA. CAUCA: Steinige bei Quentama, *F.C. Lehmann 8862* (Holotype image K! [000583623]).

= *Liparis otophyllon* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 10: 41. 1922. Type: BOLÍVIA. Pinos Bei Tarija, 11 January 1904, *K. Friebrig 2634a* (Lectotype K designated here, lectotype K! image [000583622]; isolectotype GH! image [00100901]; isolectotype BM! image [000058845]; isolectotype M! image [0226379].

= *Liparis vexillifera* var. *galeottiana* (A. Rich. & Galeotti) Ames & Correl, Bot. Mus. Leafl. 10: 79. 1942. *Liparis galeottiana* (A. Rich. & Galeotti) Hemsl., Gard. Chron. n.s., 11: 559. 1879. *Malaxis galeottiana* A. Rich. & Galeotti, Ann. Sci. Nat., Bot. ser. 3, 3: 18. 1845. Type: MEXICO. VERA CRUZ: Champ de terre chaude, 1840, *Galeotti H. 5138* (Neotype P designated here; Neotype P! image [00347727]). Figs. 2f-h; 5

Herb 67–196 mm. Roots 4–42 mm length, cylindrical, thin. Pseudobulbs 8–18 × 6–16 mm, ellipsoid or rarely oblongoid; covered by white, green or brown deciduous foliaceous sheaths. Leaves 47–160 × 10–83 mm, green, one per pseudobulbs, several layers of a sheath-like petiole 8–58 mm length; lamina conduplicate or flat, sometimes involving the floral stem, coriaceous, oblong-lanceolate, lanceolate, rarely elliptical, margin entire or undulate, apex acute, rarely obtuse. Inflorescence 25–163 mm raceme; floral bracts in the base of the pedicels, acuminate. Flowers resupinate; yellow or green, sometimes purplish or reddish only in the lip; pedicels 3–8 mm length; ovary 2–7 mm length. Dorsal sepal 6–8 × 1–2 mm, oblong or oblong-lanceolate, margin entire and revolute, apex obtuse or slightly acute. Lateral sepals 5–7 × 0.5–2 mm, free, oblong or oblong-lanceolate, margin entire and revolute, apex obtuse or slightly acute. Petals 5–9 × 0.4–1 mm; linear; margin entire and revolute; apex obtuse. Lip 6–7 × 4–6 mm, trilobate, glabrous; base with two longitudinal calluses that extend up to the apex of the lip, with one internal robust vein; lateral lobes extending from the base up to the middle of the lip, rounded; mid-lobe ovate or rarely obovate, slightly reflexed, margin entire, slightly undulate near the apex; apex rounded, rarely emarginate. Column 4–5 mm length, slightly arched; foot short, apex winged; anther green or yellow. Pollinarium with two ovoid, bipartite pollinia.

Selected examined material: DISTRITO FEDERAL: Brasília, Mansões do Lago Norte, 22.II.1992, *J.A.N. Batista 290* (CEN); Saia Velha, 31.III.1964, *E.P. Heringer 9657* (UB). Sobradinho, 24.III.1964, *E.P. Heringer 9623* (IAN). GOIÁS: Alto Paraíso de Goiás, 5.II.1979, *B. Gates 163* (RB; SP; UB). Cristalina, Cristalina, 2.II.1967, *E.P. Heringer 11321* (UB). Minaçu, 10.III.1992, *T.B. Cavalcanti 1125* (RB; SP); 10.III.1992, *T.B. Cavalcanti* (CEN). Mineiros, 15.II.1974, *G. Hatschbach 34263* (MBM). Pirenópolis, 22.II.1993, *Bianchetti 1469* (CEN); Fazenda Solar dos Pireneus, 12.II.2000, *G. Hatschbach 70082* (MBM); Morro do Cabeludo, 19.II.1995, *Bianchetti 538* (CEN); Serra dos Pireneus, 19.II.2013, *M.J.R. Rocha 910* (BHCB); 19.II.2013, *M.J.R. Rocha 912* (BHCB); 16.I.1991, *J.A.N. Batista 169* (CEN); 30.I.2004, *J.F.B.*

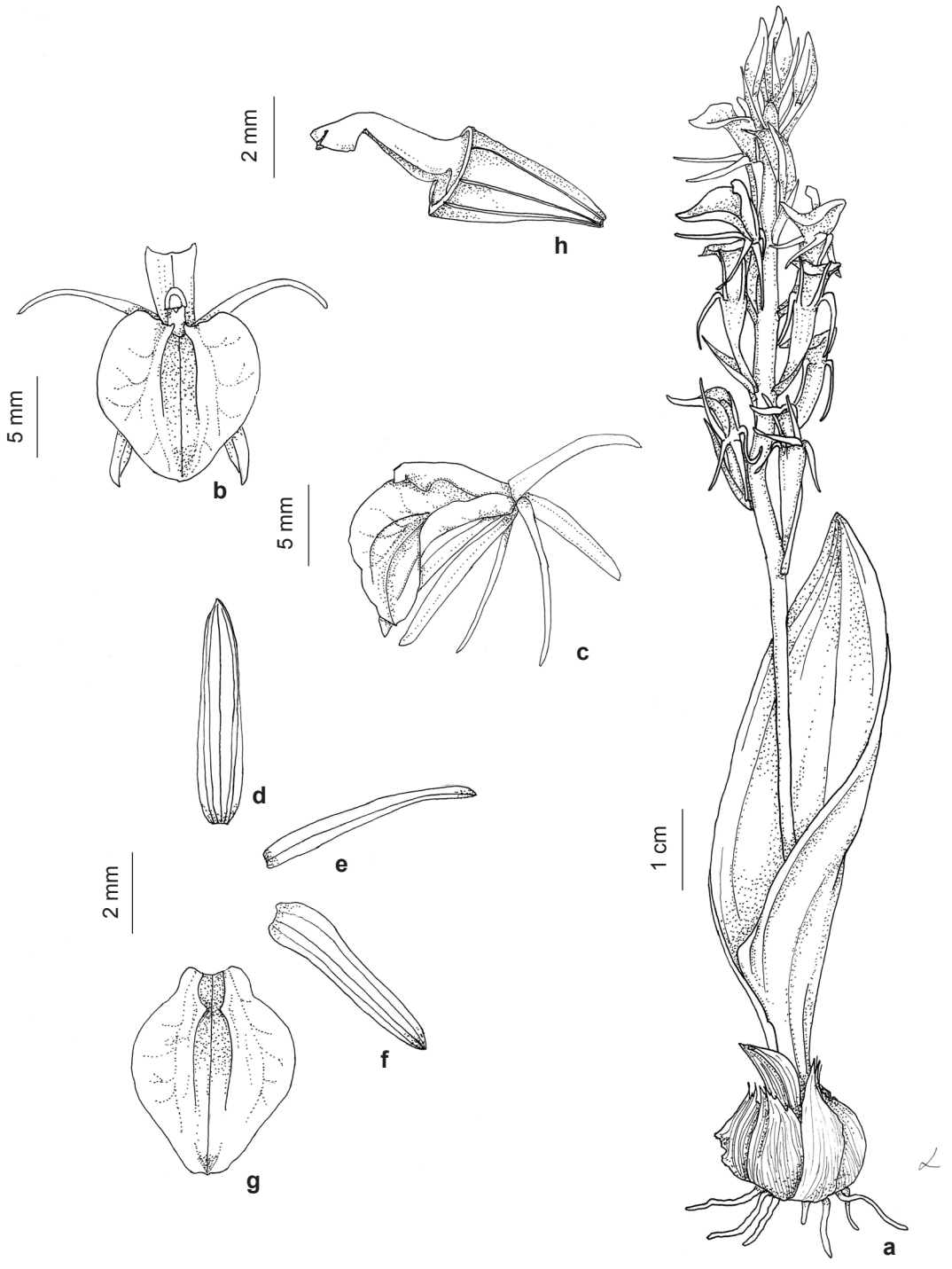

Figure 5 – a-h. Illustration of *Liparis vexillifera* – a. habit; b. frontal view of the flower; c. lateral view of the flower; d. dorsal sepal; e. petal; f. lateral sepal; g. lip; h. lateral view of the column (a-h. *T.F. Santos 350*).

Pastore 766 (CEN). São Patrício. 1879, *C.A.W. Schwacke 2016* (RB). MINAS GERAIS: Aiuruoca, Parque Estadual Serra do Papagaio, 29.I.2018, *J.A.N. Batista 3481* (BHCB; CEN); 10.I.2008, *J.A.N. Batista 2464* (BHCB); 11.III.2008, *P.L. Viana 3840* (BHCB; RB). Baependi, Parque Estadual da Serra do Papagaio, 10.II.2013, *L. Menini Neto 1126* (CESJ). Belo Horizonte, Serra da Moeda, 14.I.2007, *J.A.N. Batista 1829* (BHCB); Serra do Taquaril, 15.I.1934, *H.L.M. Barreto 4828* (BHCB). Boa Esperança, Ilicínea, 18.I.2009, *B.M. Carvalho 6* (BHCB). Brumadinho, Serra da Calçada, 9.II.1990, *L.A. Martens* (SPF). Delfinópolis, Condomínio de Pedra, 17.V.2003, *R.L. Volpi 716* (HUFU). Diamantina, Morro do Coco, 21.III.1989, *J.R. Pirani* (SPF). Ilicínea, Parque estadual Serra da Boa Esperança, 29.I.2009, (CEN). Itabirito, Pico do Itabirito, 20.I.1994, *W.A. Teixeira* (BHCB). Jaboticatuba, Serra do Cipó, 14.II.1973, *G. Hatschbach 31574* (MBM). Marinho da Serra, Moeda, 30.I.2011, *F.F. Carmo 5384* (BHCB). Miguel Burnier, 27.I.1921, F.C. *Hoehne* (SP; SPF). Nova Lima, Morro do Chapéu, 20.I.2007, *J.A.N. Batista 1908* (BHCB). Ouro Preto, Morro da Cruz, 16.I.1942, *G.M. Magalhães 1063* (SP). Ouro Branco, 5.III.2008, *J.A.N. Batista 2624* (BHCB). Ouro Preto, Serra do Ouro Preto, (OUPR); 21.XII.1891, *C.A.W. Schwacke 7688* (RB); VI.1897, *C.A.W. Schwacke* (OUPR); 14.II.2009, *G.E. Valente 2443* (SP; VIC). Presidente Kubitschek, 2.IV.2003, *J.A.N. Batista 1438* (CEN); 15.II.2007, *J.A.N. Batista 1939* (BHCB). Santana do Riacho, Serra do Cipó, 1.II.1987, *F. Barros 1298* (SP). São João del Rei, Serra do Lenheiro, 18.II.2004, *C. Van den Berg 1336* (HUEFS). Serra do Cipó, Serra do Espinhaço, 20.II.1968, *H.S. Irwin 20586* (IAN; UB); 28.III.1970, *H.S. Irwin 28482* (RB; UB); 20.II.1972, *W.R. Anderson 36381* (UB). PARÁ: Tiriós, Serra Macupina, 17.III.1962, *E.J. Fitkkau 12804* (INPA). PARANÁ: Campo Largo, São Luiz do Purunã, 6.II.2013, *E.D. Lozano 122* (MBM). Curitiba, 26.I.1904, *P.K.H. Dusén 3279* (R). General Carneiro, Galinhas, 10.II.1966, *G. Hatschbach 13661* (MBM). Guaratuba, Serra do Araçatuba, 10.III.1959, *G. Hatschbach 5589* (MBM). Ipiranga, 7.II.1904, *P.K.H. Dusén 3540* (R). Piraquara, Pinhal, 4.II.1946, *R. Hertel 38* (FUEL). Rio Azul, estrada Rio Azul-Rebouças, 24.II.1972, *G. Hatschbach 29191* (MBM). São José dos Pinhais, Matulão, 2.III.1957, *G. Hatschbach 3815* (MBM); Rio Pequeno, 12.XII.1969, *G. hatschbach 23208* (MBM). Tijucas do Sul, Serra do Papanduva, 19.I.2010, *O.S. Ribas 8349* (MBM); 19.I.2010, *O.S. Ribas et al. 8363* (MBM); 15.XII.1997, *O.S. Ribas et al. 2209* (MBM); 15.XII.1997, *O.S. Ribas et al. 2127* (MBM). PERNAMBUCO: Gravatá, 18.VII.1995, *L.P. Félix 7175* (BHCB; FCAB; HST; HUESB); 20.VII.1997, *L.P. Félix 8342* (HST). RIO GRANDE DO SUL: Cambará do Sul, 1.II.2008, *J.A.N. Batista 2473a* (BHCB). Cerro do Poeta, Fazenda São Maximiano, 10.IX.1993, *V.F. Nunes* (ICN). Porto Alegre, Morro São Pedro, 3.IX.2005, *R. Setubal 92* (ICN). São Francisco de Paula, 14.I.1937, *B. Rambo* (PACA-AGP); *J. Klein 38* (UPCB). São José dos Ausentes, Serra da Rocinha, 3.II.2008, *J.A.N. Batista 2509* (BHCB). Viamão, Morro do Araçá, 28.VII.2003, *M. Pinheiro 505* (ICN). SANTA CATARINA: Água Doce, próximo à Usina Eólica, 24.I.2013, *S. Campestrini 414* (FLOR). Bom Jardim da Serra, Campos de Santa Bárbara, 25.I.2019, *L.A. Funez 8617* (FURB). Bom Retiro, Serra do Panelão, 9.II.2019, *A.K. filho 4638* (FURB). Campos de Santa Bárbara, Parque Nacional de São Joaquim, 23.I.2018, *J.F.B. Pastore 5445* (BHCB; CTBS). Joinville, Serra da Queimada, 17.I.2015, *W.S. Mancinelli 1504* (JOI). Porto União, 15.III.1957, *L.B. Smith 1215* (R). Rancho Queimado, 16.X.1981, *T. Stützel* (ICN). São Bento do Sul, Rio Natal, 21.X.2019, *P. Schwirkowski 3812* (FURB). Serra do Quiriri, 15.II.2020, *T.F. Santos 350* (UPCB). Urubici, Parque Nacional de São Joaquim, 10.II.2007, *G. Hatschbach 79898* (MBM). SERGIPE: Areia Branca, Serra de Itabaiana, 10.IX.2012, *D.A. Campos 163* (ASE); 20.VII.2010, *L.A.S. Santos 190* (UPCB). Itabaiana, Serra de Itabaiana, 11.VII.1962, *A. Lima 62-4091* (IPA); 22.VII.2006, *J.R. Maciel 329* (ASE; UFP); 20.VII.2010, *T. Carregosa 98* (ASE); 3.VIII.2013, *L.A.S. Santos 866* (ASE). SÃO PAULO: 1871, *L.S.M. Netto 1871* (R). Campos do Jordão, 16.II.1937, *C. Porto 3203* (RB); II.1945, *P.E. Leite* (FCAB). Campos do Jordão, I.1944, *E. Frederichs* (PACA-AGP). Campos do Jordão, 23.II.1945, *P.E. Leite 3403* (SP); São José dos Alpes, 6.II.2018, *J.A.N. Batista 3555* (BHCB). Lageado, 2.III.1913, *A.C. Brade 6222* (SP). Santos, Serra de Paranapiacaba, 2.II.1922, *A. Gerdt* (SP). São José do Barreiro, III.1951, *F. Segadas-Vianna 3022* (R); Fazenda Ponte Alta, 21.II.2000, *L. Freitas 848* (UEC); Parque Nacional Serra da Bocaina, 2.II.2018, *J.A.N. Batista 3520* (CEN); 1.II.2018, *J.A.N. Batista 3507* (BHCB). São Paulo, Serra da Bocaina, 24.IV.1951, *A.C. Brade 20717* (RB); III.1937, *A.C. Brade 15720* (RB); III.1940, *A.C. Brade 16250* (RB). Serra da Bocaina, Pico da Bacia, 2.II.2018, *J.A.N. Batista 3520* (BHCB); Rio Mambucaba, 8.IX.1981, *G.J. Shepherd 12900* (UEC).

Additional material examined: ARGENTINA. 22.I.1929, *S. Venturi 8885* (US). COLOMBIA. Quetame: 10.VII.1897, *Gul* (K). CUBA. Santa Clara: Trinidad Mountains, 4.VIII.1936, *L.B. Smith 3323* (AMES). ECUADOR. Baños: *R. Spruce* (K). EL SALVADOR. Boquerón: Crater of San Salvador, 12.VII.1970, *P. Hamer 214* (AMES). GUATEMALA. Tujimach: Sierra de Los Cuchumatanes, 8.IX.1942, *J.A. Steyermark 51991* (AMES). JAMAICA. Clydesdale: I.1912, *B.B. Brues* (AMES). MEXICO. Chihuahua: Bocoyna, 27.IX.1973, *R.A. Bye 4963* (AMES). PANAMÁ. El Volcan: 31.V.1931, *H.P. Butcher* (AMES). PERU. Chachapoyas: Road to Caclic, 23.III.1964, *P.C. Hutchison 4502* (AMES).

This species is native to El Salvador, Guatemala, Honduras, México, Nicaragua and Panamá (POWO 2022), but this occurrence does not consider *Liparis jamaicensis* Lindley *ex* Grisebach (1866) as a synonym of *L. vexillifera*, proposed already by Cogniaux (1896). When treating both as a single species, Argentina,

Bolivia, Brazil, Colombia, Costa Rica, Cuba, Ecuador, Guyana, Jamaica, Puerto Rico, Trinidad-Tobago and Venezuela should be included in the distribution.

In Brazil, it occurs from the south to the north and from the east to the central-west regions in the following states: Goiás, Minas Gerais, Pará, Paraná, Pernambuco, Rio Grande do Sul, Santa Catarina, São Paulo, Sergipe and Distrito Federal.

The *Malaxis lindeniana* and *Malaxis galeottiana* protologues lack any typification. The illustrations cited as ''tab.4, f.1 and tab.4, f.2'' were never published, and the sketches could not be found. It is unclear which *H. Galeotti* collection from Mexico was used in the description for both and as no other original material seems to exist, the collection of *H. Galeotti 5213* deposited at P (00347743) is here designated as the neotype for *M. lindeniana*, since it has an ''oblong erect lip'', the same feature described by Richard & Galeotti (1845). The collection of *H. Galeotti 5138* deposited at P (00347727) is selected here as the neotype for *M. galeottiana*, as it possesses "elliptic leaves with acute apex", the same morphological characteristic described in the protologue.

Since the collections from Barbosa Rodrigues were all lost (Mori & Ferreira 1987; Sprunger *et al.* 1996), the only original material of *Liparis campestris* is the illustration "t. 443B" deposited in the Rio de Janeiro Botanical Garden library and reproduced in Sprunger *et al.* (1996), this material is here designated as the lectotype.

Reichenbach (1850) cited two distinct collections while describing *Sturmia elliptica*, *J.W.K. Moritz 889* in Colombia and *Schomburgk s.n.* in Guyana; neither could be found deposited at any herbarium and are probably lost. Since no other original material exists, we designated here as the neotype the collection identified as *Liparis elliptica* of *H.S. Irwin 28030* deposited at K (000940647), as it is in good condition and has morphological features similar to those described for *S. elliptica*.

There are three syntypes of *Liparis vexillifera* var. *latifolia*, of which one is a duplicate. The collection of *P.G. Lorentz 876* deposited in GOET (008576) is of better quality than the rest of the original material and is designated as the lectotype. The duplicate deposited at NYBG (00004197) becomes an isolectotype, and the collection of *Lorentz P.G. 306* deposited at GOET (013960) is considered a remaining syntype.

Liparis otophyllon has four syntypes deposited in distinct herbaria. Therefore, due to the good condition of the exsiccate, exhibiting complete vegetative and reproductive parts on two specimens, here we designated the material deposited at K (000583622) as the lectotype.

Liparis vexillifera is characterized by a small to medium size, a terrestrial habit, a conduplicate or rarely flat single leaf, and normally erect growth parallel to the floral stem, which emerges from the side of the completely or mostly buried pseudobulb.

It can be recognized and distinguished from the other two species by pseudobulbs with short and thin roots, with only one flat or conduplicate leaf, and by flowers with two prominent longitudinal calluses with one internal robust vein that extends from the base to the apex of the lip.

It is similar to *Liparis loeselii* (L.) Richard, a species that does not occur in Brazil (POWO 2022). In addition to the differences in calluses on the lip, *Liparis vexillifera* is also distinguished by the number of leaves per pseudobulb since the foreign species always has more than one.

Liparis vexillifera occurs mainly in high-altitude areas in the rupestrian fields of the Atlantic Forest, in the Amazon and Cerrado biomes, flowering from January to December. It is usually found close to flooded environments and exposed to the sun, but it can also be seen in dry areas near roads mixed with the low vegetation of the natural fields. With an extent of occurrence (EOO) of approximately 3,687,567.586 km² and an area of occupancy (AOO) of approximately 460,000 km², despite being restricted to high-altitude environments and having several records inside protected areas, this taxon falls into the category of ''Least Concern (NT)''.

Acknowledgements

The authors are especially thankful to curators of herbaria, for making studying material available; the illustrator L.K.R. Hinoshita, for the plates; to J.A.N. Batista, for helping with information and photos of species; to M. Klingelfus, for helping with fieldwork; to IAT (61.16) and ICMBio (SISBio-54416-1), for the authorization to collect botanical material. The first author would like to thank CAPES (88887.596880/2021-00), UFPR and UNESP, for supporting research. E.C.S. was supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), for Bolsa de Produtividade em Pesquisa CNPq-Nível 1D (proc. 314642/2020-0), and CNPq/MCTI/FNDCT Nº 18/2021 - Universal, Faixa B (proc. 405493/2021-5).

Data availability statement

In accordance with Open Science communication practices, the authors inform that all data are available within the manuscript.

References

Ames O & Correll DS (1942) Some new or noteworthy Guatemalan orchids. Botanical Museum Leaflets Harvard University 10: 61-111.

Bachman S, Moat J, Hill AW, De La Torre J & Scott B (2011) Supporting Red List threat assessment with GeoCAT: geospatial conservation assessment tool. ZooKeys 150: 117-126.

Barbosa Rodrigues J (1877) Genera et species orchidearum novarum. C. et H. Fleiuss, Rio de Janeiro. 206p.

Barros F & Guimarães LRS (2010) New combinations and a new name in Brazilian Orchidaceae. Neodiversity 5: 26-33.

BFG - The Brazil Flora Group (2018) Brazilian Flora 2020: innovation and collaboration to meet Target 1 of the Global Strategy for Plant Conservation (GSPC). Rodriguésia 69: 1513-1527.

Brummitt RK & Powell CE (1992) Authors of plant names. Royal Botanic Gardens, Kew. 732p.

Cameron KM (2005) Leave it to the leaves: a molecular phylogenetic study of Malaxideae (Epidendroideae, Orchidaceae). American Journal of Botany 92: 1025-1032.

Chase MW, Cameron KM, Freudenstein JV, Pridgeon AM, Salazar G, van den Berg C & Schuiteman A (2015) An updated classification of Orchidaceae. Botanical Journal of the Linnean Society 177: 151-174.

Cogniaux AC (1896) Orchidaceae, Tribus IV: Liparidinae. *In*: Martius CFP, Eichler AW & Urban I (eds.) *Flora brasiliensis*. F. Fleischer, Monarchii. Vol. 3, pars 4, pp. 276-292.

Dressler RL (1997) *Liparis vexillifera* subsp. *lindeniana*. *In*: Orquideología. Revista de la Sociedad Colombiana de Orquideología 20: 264.

du Petit Thouars AA (1809) Extrait de trois Mémoires lus à la première classe de l'institut, sur l'histoire des plantes Orchidées des îles australes d'Afrique. Nouveau Bulletin des Sciences par la Société Philomathique de Paris 1: 314-319.

Espejo A (1987) Neotipificación de *Cymbidium vexilliferum* La Llave & Lexarza (= *Liparis vexillifera*) y descripción de *Liparis greenwoodiana*. Orquídea (Mexico City) 10: 370.

Fidalgo O & Bononi VLR (1984) Técnicas de coleta, preservação e herborização de material botânico. Instituto de Botânica, São Paulo. 40p.

Garay LA & Romero-Gonzalez GA (1999) Schedulae orchidum II. Harvard Papers in Botany: 475-488.

Grisebach AHR (1866) Catalogus Plantarum Cubensium exhibens collectionem Wrightianam aliasque minores ex insula Cuba missas. G. Engelmann, Leipzig. 301p.

Guillaumin A (1961) Plantes nouvelles, rares ou critiques des serres du muséum. Notules sur quelques orchidées d'Indochine. XXVII. Bulletin du Muséum National d'Histoire Naturelle, ser. 2, 33: 434-435.

Hemsley WB (1879) Mexican and Central American Orchids. The Gardeners' Chronicle, new series, 11: 559

Hijmans RJ, Guarino L, Jarvis A, O'Brien R & Mathuer P (2012) DIVA-GIS Version 5.4. Available at <https://www.diva-gis.org>. Access on 9 November 2022.

Hill AW (1926) Index Kewensis Plantarum Phanerogamarum; Supplementum 6. Oxford: Clarendon, London. 116p.

Hooker JD (1890) Orchideae. *In*: Flora of British India 5. Reeve L & Co., London. 696p.

Hooker WJ (1824) Exotic flora, containing figures and descriptions of new, rare, or otherwise interesting exotic plants, especially of such as are deserving of being cultivated in our gardens; together with remarks upon their generic and specific characters, natural orders, history, culture, time of flowering, &c. Vol. 2. William Blackwood, Edinburgh and T. Cadell, London. 116p.

IUCN (2020) The IUCN Red List of threatened species. Version 2020-1. Available at <https://www.iucnredlist.org>. Access on 9 November 2022.

Johansen DA (1940) Plant microtechnique. McGraw-Hill, New York. 523p.

Jones DL & Clements MA (2005) Miscellaneous nomenclature notes and changes in Australian, New Guinea and New Zealand Orchidaceae. The Orchadian 15: 33-42.

Kuntze O (1891) Revisio Generum Plantarum vascularium omnium atque cellularium multarum leges nomenclaturae internationales cum enumeratione plantarum exoticarum in itinere mundi collectarum 2. Arthur Felix, Leipzig. 1011p.

Kuntze O (1898) Revisio Generum Plantarum vascularium omnium atque cellularium multarum leges nomenclaturae internationales cum enumeratione plantarum exoticarum in itinere mundi collectarum 3. pars. 1. Arthur Felix, Leipzig. 420p.

Lexarza JM (1825) Orchidianum opusculum. *In*: La Llave, P & JM Lexarza (eds). Novorum vegetabilium descriptiones. Fasciculus 2. México City. Pp. 11-12.

Lindley J (1825) Liparis foliosa. Many-leaved Liparis. In: Edward's Botanical Register 11. Ridgway, London. Pl. 882.

Lindley J (1828) *Liparis elata*. Tall liparis. *In*: Edward's Botanical Register 14. Ridgway, London. Pl. 1175.

Lindley J (1830) The genera and species of orchidaceous plants. Ridgway, London. 553p.

Lindley J (1834) Edwards's botanical register; or, flower garden and shrubbery. Palala Press, London. 1671p.

Linnaeus C (1753) *Species Plantarum* 2. Impensis Laurentius Salvius, Stockholm. 560p.

Loesel L (1703*)* Flora Prussica sive Plantae in Regno Prussiae sponte nascentes. Typographia Georgiana, Regio Monti. 295p.

Makino T (1892) Notes on Japanese plants, XV. Botanical Magazine (Tokyo) 6: 45-56.

Margońska HB & Szlachetko DL (2001) *Alatiliparis* (Orchidaceae, Malaxidinae), a new orchid genus with two new species from Sumatra. Annales Botanici Fennici 38: 77-81.

Mori SA & Ferreira FC (1987) A distinguished Brazilian botanist, João Barbosa Rodrigues (1842-1909). Brittonia 39: 73-85.

Pabst GFJ & Dungs F (1977) Orchidaceae Brasilienses, 2. Kurt Schmersow, Hildesheim. 418p.

Pansarin ER, Augusto SG & Ferreira AW (2020) Resurrection of *Liparis inundata* (Orchidaceae). Phytotaxa 441: 294-300.

Pfitzer EHH (1887) Entwurf einer natürlichen Anordnung der Orchideen. C. Winter's Universitäts-buchhandlung, Heidelberg. 108p.

POWO (2022) Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Available at <http://www.plantsoftheworldonline.org/>. Access on 9 November 2022.

Pridgeon AM, Cribb PJ, Chase MW & Rasmussen FN (2005) Genera Orchidacearum. 4. Epidendroideae (Part I). Oxford University Press, Oxford. 672p.

Radins JA, Salazar GA, Cabrera LI, Jiménez-Machorro R & Batista JAN (2014) A new paludicolous species of *Malaxis* (Orchidaceae) from Argentina and Uruguay. Phytotaxa 175: 121-132.

Rafinesque CS (1838) Synoptical flora Telluriana, centuria IX, X, XI, XII. Flora Telluriana 4 : 1-135.

Regel E (1856) Adnotationes botanicae. *In*: Regel E, Körnicke F & Rach L (eds.) Index seminum quae Hortus botanicus imperialis Petropolitanus pro mutua commutatione offert: accedunt Animadversiones botanicae nonnullae. Hortus Botanicus Imperialis Petropolitanus, Petersburg. 40p.

Reichenbach HG (1850) Linnaea; ein journal für die botanik in ihrem ganzen umfange. D.F.L. von Schlechtendal ed., Berlin. 899p.

Reichenbach HG (1855) Orchideae Hongkongensis. Bonplandia 3: 249-250.

Reichenbach HG (1861) *Liparis kappleri*. *In*: Walpers WG (ed.) Annales botanices sistematae, tomus VI, London. 218p.

Reichenbach HG (1877) Orchideae Roezlianae novae seu criticae. Linnaea 41: 97.

Reichenbach HG (1885) *Liparis eggersii*. *In*: Gebruder Borntraeger (ed.) Berichte der Deutschen Botanischen Gesellschaft 3, Berlin. 278p.

Richard A & Galeotti HG (1845) Orchidographie Mexicaine. Annales des Sciences Naturelles, Botanique 3: 18.

Richard LC (1817) De Orchideis Europaeis Annotationes, praesertim ad genera dilucidanda spectantes. A. Berlin, Paris. 152p.

Ridley HN (1886) A monograph of the genus *Liparis*. Botanical Journal of the Linnean Society 22: 244-297.

Rizzini CT (1977) Sistematização terminológica da folha. Rodriguésia 42: 103-125.

Rodrigues JB (1877) Genera et species Orchidearum Novarum 1. Typografia Nacional, Rio de Janeiro. 206p.

Rodrigues JB (1882) Genera et species Orchidearum Novarum 2. Typografia Nacional, Rio de Janeiro. 295p.

Schlechter R (1920) Die orchideenfloren der südamerikanischen Kordillerenstaaten, II. Colombia. Repertorium Specierum novarum Regni Vegetabilis, Beihefte 7, Berlin. 301p.

Schlechter R (1922) Die Orchideenfloren der südamerikanischen Kordillerenstaaten V. Bolivia. Repertorium Specierum Novarum Regni Vegetabilis, Beihefte 10, Berlin. 80p.

Santos TF & Smidt EC (2020) *Liparis*. *In*: Flora e Funga do Brasil (continuously updated). Jardim Botânico do Rio de Janeiro. Available at <https://floradobrasil.jbrj.gov.br/FB11796>. Access on 3 November 2022.

Sprunger S, Cribb PJ & Toscano de Brito ALV (1996) João Barbosa Rodrigues: iconographie des orchidées du Brésil. 2 vols. Friedrich Reinhardt Verlag, Basle. 324p.

Stearn WT (2004) Botanical Latin. Timber Press, Portland. 546p.

Swartz OP (1799) Dianome epidendri generis. Linn. Nova Acta Regiae Societatis Scientiarum Upsaliensis 6: 61-88.

Swartz OP (1800) Kongl[iga]. Vetenskaps Academiens Handlingar 21: 235.

Thiers B (continuously updated) Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available at <http://sweetgum.nybg.org/science/ih/>. Access on 1 January 2023.

Thunberg CP (1784) *Liparis nervosa*. *In*: Murray JA (ed.) Systema vegetabilum. 14 ed. Dieterich, Göttingen. 814p.

Weberling F (1989) Morphology of flowers and inflorescences. Cambridge University Press, Cambridge. 423p.

Area Editor: Dr. Luiz Menini Neto

Received on February 23, 2023. Accepted on May 19, 2023.