SYNOPSIS OF THE *TRICHOCENTRUM*-CLADE (ORCHIDACEAE, ONCIDIINAE)

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Abstract: We present a synopsis of the *Trichocentrum*-clade of Oncidiinae. In this revision, we recognize 85 taxa assigned to four genera: *Cohniella* with 23 species in five complexes and two natural hybrids; *Lophiaris* with 27 species and eight natural hybrids, six of which are yet to be named; *Trichocentrum* with 27 species and two subspecies; and *Lophiarella* with three species. *Cohniella yuroraensis* is referred to the synonymy of *C. ultrajectina*, *C. allenii* and *C. christensoniana* to the synonymy of *C. nuda*, and *C. croatii* to *C. lacera*. *Trichocentrum perezii* is referred to the synonymy of *Lophiaris andreana*. A key to the genera of the *Trichocentrum*-clade is presented as well as keys to the complexes or groups of species and, when applicable, natural hybrids of *Cohniella*, *Lophiarella*, *Lophiaris*, and *Trichocentrum*.

Keywords: *Cohniella*, geographic distribution, *Lophiarella*, *Lophiaris*, nomenclature, *Trichocentrum*

The *Trichocentrum* Poeppig & Endlicher clade of Oncidiinae, as circumscribed here, includes four genera: *Cohniella* Pfitzer, *Lophiarella* Szlachetko, Mytnik-Ejsmont & Romowicz, *Lophiaris* Rafinesque, and *Trichocentrum* (Carnevali et al., 2013). Some authors recognize this clade as a single genus using a broad definition for *Trichocentrum* (Williams et al., 2001; Sosa et al., 2001; Chase, 2009; Neubig et al., 2012).

The taxa of *Trichocentrum*-clade are characterized by one or rarely two leaves per sympodial module and a low chromosome number (2n = 26–28) (Chase, 2009). They are found from southern Florida (a single species) and northern Mexico to southern Brazil and northern Argentina, including the Greater Antilles (Pupulin and Carnevali, 2005; Carnevali et al., 2010; Cetzal-Ix and Carnevali, 2010; Balam, 2011). *Lophiarella* is a genus with a more restricted distribution being confined to southwestern Mexico and northwestern Mesoamerica, hence Megamexico (Carnevali et al., 2013). The taxa of these four genera grow in a variety of tropical vegetation associations, ranging from lowlands from tropical deciduous forests and tropical rainforests to thorn scrub forests, but can also be found in pine-oak forests, from sea level up to 1700 (–2800) m elevation. Overall, the clade includes 85 taxa: 23 species in five complexes and two natural hybrids in *Cohniella*; 27 species and eight natural hybrids (six of which are yet to be named) in *Lophiaris*; 27 species and two subspecies in *Trichocentrum*; and three species *in Lophiarella*. The country with the highest species diversity is Mexico with 29 taxa, 18 of which are members of *Lophiaris* (10 endemic), seven belong in *Cohniella* (4 endemic), two (one endemic) in *Lophiarella*, and another two (one endemic) in *Trichocentrum*. Mexico is followed by Costa Rica (5 endemic), Colombia (4 endemic), Brazil (3 endemic), Venezuela (3 endemic) all with 14 taxa, Honduras with 12 taxa, and Bolivia (one endemic), Guatemala, and El Salvador all with 11 taxa. Other countries are represented by fewer than 10 taxa (Table 1).

Characters used to recognize taxa and hybrids within the genera are primarily floral, such as the size and color (especially color patterns) of the flowers, shape and ornamentation (including the calli) of the labellum, presence or absence as well as the shape and ornamentation of the lateral lobes, emargination at the apex of the central lobe of the labellum, length of the spur (as in *Trichocentrum sensu stricto*), column features (shape and size of the column base, shape and position of the column wings), and the type of indumentum of the anther (Pupulin, 1995; Cetzal-Ix and Balam, 2012; Cetzal-Ix et al., 2013a–b). The vegetative characters include the relative size of the pseudobulbs relative to the leaves, the size, shape, thickness and transversal section of the leaves, the length of the inflorescence relative to the subtending leaf, and the position, number, and arrangement of flowers in the inflorescence. Furthermore, species or species complexes can be easily identified using these characters in combination with discrete patterns of ecological and geographical distribution (Cetzal-Ix and Balam, 2012; Cetzal-Ix et al., 2013a–b).

The aim of this contribution is to provide an updated list of recognized species in the *Trichocentrum*-clade with their taxonomic status, typification, and geographical distribution by country. A key to the genera of the *Trichocentrum*-clade is presented as well as keys to the complexes or groups of species, and natural hybrids of *Cohniella*, *Lophiarella*, *Lophiaris*, and *Trichocentrum*. Furthemore, a table with distribution of species by country, endemic species by country, and iconography for some species are provided.

WC-I would like to acknowledge the support from CONACYT for postdoctoral studies. CONACYT partially funded this project *via* grant 49980-Q ("Filogenia molecular y morfológica, revisión sistemática y una exploración de cuatro regiones no-codificantes del genoma del cloroplasto para estudios filogeográficos en el complejo *Trichocentrum* (Orchidaceae: Cymbidieae: Oncidiinae") awarded to G. Carnevali; E. Mó, H. Vega, E. Noguera Savelli, and R. Balam provided images and collections of several *Lophiaris* species. GAR-G is grateful to the Arizona Orchid Society for their generous financial support. The authors thank (in alphabetical order) D. Bogarin, L. Carrera-Parra, R. Duno, J. Hunex, L. Ibarra, D. Jauregui, V. Paiva-Castro, L. Peraza, F. Pupulin, I. M. Ramírez Morillo, K. J. Romero, S. Salazar Vallejo, G. Silvera, J. L. Tapia Muñoz, A. Toscano de Brito, M. W. Whitten, N. H. Williams, and the horticultural community at large for supplying material critical for the completion of this project, S. Hernández Aguilar (CICY) for kindly handling literature requests and loans, and AMO, B, BHCB, BIGU, BM, BR, CEJ, CR, CTES, EAP, ECOSUR, F, FCQ, FLAS, G, HB, HEM, HOXA, HUA, HUESF, HVASF, IAN, IPA, IRBR, JAUM, K, LPB, M, MBM, MEXU, MO, NY, OAX, P, PMA, QCA, QCNE, QMEX, RB, RENZ, S, SEL, SI, SP, SPF, TFAV, U, UB, UCR, UNALM, US, USF, USJ, USM, USZ, VEN, W, and XAL for allowing access to their collections.

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Harvard Papers in Botany, Vol. 21, No. 2, 2016, pp. 141–169.

ISSN: 1938-2944, DOI: 10.3100/hpib.v21iss2.2016.n3, Published online: 31 December 2016

TABLE 1. Number of *Trichocentrum*-clade taxa by country.[5,6]

	Number of taxa by clade and genera				
	Trichocentrum-clade	*Cohniella*	*Lophiarella*	*Lophiaris*	*Trichocentrum*
Countries	85	25	3	29	28
Mexico	29 [16*]	7 [4*]	2 [1*]	18 [10*]	2 [1*]
Costa Rica	14 [5*]	4	0	1	9 [5*]
Colombia	14 [4*]	4 [1*]	0	5	5 [3*]
Brazil	14 [3*]	5 [2*]	0	5 [1*]	4
Venezuela	14 [3*]	6 [3*]	0	5	3
Honduras	12	2	2	8	0
Bolivia	11 [1*]	5 [1*]	0	3	3
Guatemala	11	2	2	6	1
El Salvador	11	2	2	6	1
Peru	10 [2*]	2	0	2	6 [2*]
Nicaragua	10	2	0	8	0
Panama	8 [2*]	3 [1*]	0	2 [1*]	3
Ecuador	6 [1*]	0	0	0	6 [1*]
Guyana	5	1	0	2	2
Belize	4	1	0	3	0
Suriname	4	1	0	1	2
Trinidad and Tobago	4	1	0	3	0
Argentina	3	2	0	1	0
Paraguay	3	2	0	1	0
Lesser Antilles	2 [1*]	1 [1*]	0	1	0
French Guiana	1	1	0	0	0
Greater Antilles	1	0	0	1	0
USA (Florida)	1	0	0	1	0

[5] [*] Endemic species;

[6] Compiled from Pupulin (1995, 1998, 2005), Pupulin et al. (2008), Balam (2007, 2011), Balam et al. (2010, 2011), Carnevali et al. (2010, 2013), Cetzal-Ix and Carnevali (2010), Cetzal-Ix (2012), Balam and Cetzal-Ix (2012), Cetzal-Ix and Balam (2012), Cetzal-Ix et al. (2008, 2012, 2013a, b, 2014), Bogarin and Karremans (2013).

Material and Methods

The nomenclature and characters used in the keys presented here are based on Pupulin (1995, 1998, 2005), Pupulin et al. (2008), Balam (2007, 2011), Balam et al. (2010, 2011), Carnevali et al. (2010, 2013), Cetzal-Ix and Carnevali (2010), Cetzal-Ix (2012), Balam and Cetzal-Ix (2012), Cetzal-Ix and Balam (2012), Cetzal-Ix et al. (2008, 2012, 2013a–b, 2014), and Bogarin and Karremans (2013). Genera and taxa within are listed alphabetically. Distribution maps were produced by plotting the localities of the studies cited above on a DIVA-GIS base map (Hijmans et al., 2004) and outlines of biogeographic provinces from Morrone (Löwenberg-Neto, 2014) using ArcView 3.2 (ESRI, 1999).

Taxonomy treatment

Key to the genera of the *Trichocentrum*-clade

1a. Leaves terete (Fig. 1A), fleshy coriaceous; pseudobulbs relatively small and inconspicuous; unifacial leaves; cellular inclusions in the epidermis present . . . . . *Cohniella*

1b. Leaves conduplicate (Fig. 1B–D), either rigidly fleshy or coriaceous; pseudobulbs small, inconspicuous, to relatively large and conspicuous; bifacial leaves; cellular inclusions in the epidermis absent 2

2a. Plants small (leaves rarely exceeding 10 cm long); inflorescences shorter than the subtending leaves, mature plants bearing few [1–3(–5)], succesive flowers; labellum basally produced into a conspicuous spur . . . . . *Trichocentrum*

2b. Plants usually larger (leaves usually exceeding 12 cm long; however, they may be smaller in *Lophiaris pumila* and relatives but then flowers lacking a spur); inflorescences usually longer than subtending leaves (shorter in *Lophiaris pumila* and relatives), mature plants bearing many [(5–)10–50(–150)], more or less simultaneous, rarely succesive (e.g., *Lophiaris lindenii*) flowers; labellum lacking a spur 3

3a. Leaves rigidly and thickly fleshy coriaceous; pseudobulbs large and conspicuous, at least 2 cm long, but up to 4 cm long; inflorescences stiffly erect, peduncle and rachis glaucous, coated with a thin film of wax; plants usually lithophytic . . . . . *Lophiarella*

3b. Leaves coriaceous or fleshy coriaceous, rarely rigid; pseudobulbs small, rarely exceeding 1.5 cm long; inflorescences more commonly ascendent or arching to nutant, never stiffly erect; peduncle and rachis non-glaucous; plants usually epiphytic, rarely lithophytic . . . . . *Lophiaris*

Cohniella Pfitzer, Nat. Pflanzenfam. 2, 6: 194. 1889. *Cohnia* Rchb.f., Bot. Zeit. 10: 928. 1852, non *Cohnia* Kunth 1850 (Agavaceae). TYPE: *Cohnia quekettioides* Rchb.f. [= *Cohniella ascendens* (Lindl.) Christenson].

Synonyms: *Oncidium* sect. *Cebolletae* Lindl., Bot. Reg. 28: sub t .4. 1842. TYPE: *Epidendrum cebolleta* Jacq. [= *Cohniella cebolleta* (Jacq.) Christenson]

Oncidium sect. *Teretifolia* Lindl., Bot. Reg. 32: sub t. 27. 1846. TYPE: *Epidendrum cebolleta* Jacq.

Oncidium sect. *Teretoncidium* Kuntze, Lex. Gen. Phan. 399. 1903. TYPE: *Epidendrum cebolleta* Jacq.

Stilifolium Königer & Pongratz, Arcula 7: 186. 1997. TYPE: *Epidendrum cebolleta* Jacq.

Trichocentrum Poepp. & Endl. *sensu* Williams et al., 2001; Chase et al., 2003, 2005, 2009 *pro parte*.

Distribution: Northern Mexico to southern Brazil and northern Argentina (Fig. 2).

Key to the Complexes in *Cohniella*

1a. Flowers > 40 mm diameter; ovaries 25–30 mm long; sepals and petals as long as the labellum; labellum white or yellow with reddish spots; lateral lobes of the labellum lacerated or laciniate; teeth of the callus in the labellum with a denticulate surface; plants of Bolivia, Paraguay, northern Argentina, and southeastern Brazil . . . . . *C. jonesiana* complex

1b. Flowers < 37 mm diameter; ovaries 9–23 mm long; sepals and petals much shorter than the labellum; labellum yellow or rarely yellow with reddish spots; lateral lobes of the labellum entire; teeth of the callus in the labellum with a smooth surface; plants of Mexico, Central and South America, and the Lesser Antilles 2

2a. Inflorescences usually shorter than the leaves, rarely longer; sepals rounded to obovate and petals subquadrate to oblong, both with acute or subtruncate apexes; disc and callus yellowish brown; lateral margins of the disc concave without conical teeth or semielliptical plates; platform of the callus semicircular; column wings subtriangular or terete with an entire outline; plants mainly from rainforests (rarely in drier forests) of the Gulf slope in Mexico, into Central and northern South America . . . . . *C. ascendens* complex

2b. Inflorescences usually longer than the leaves, rarely shorter; sepals and petals obovate with acute or oblique apexes; disc and callus yellowish white; lateral margins of the disc convex with conical teeth or semielliptical plates; platform of the callus rectangular, subquadrate or absent; column wings oblong with bilobed or entire outline; plants mainly from dry forests (rarely in rainforests) of northern Mexico, Central, and South America 3

3a. Leaves 2–17 mm (in herbarium material) or 6–25 mm (in live plants, both cultivated and wild) thick, broader at the base, then abruptly constricted (forming a "neck" just above the pseudobulb), then thickening again and from there tapering distally; the width of the central lobe of the labellum usually much shorter than the distance across the apex of the spread lateral lobes; abaxial surface of labellum yellow with red spots that usually covers most of the surface (only the central area in *C. yucatanensis*); platform of the callus subquadrate; plants from Mexico into southwestern Costa Rica . . . . . *C. brachyphylla* complex

3b. Leaves 3–10 mm (in herbarium material) or 4–15 mm (in live plants, both cultivated and wild) thick, basal and distal width +/- homogeneous; the width of the central lobe is usually similar to the distance across the apex of the spread lateral lobes; abaxial surface of labellum yellow with red spots that cover only the central portion of the surface; platform of the callus rectangular or absent; plants from South America 4

4a. Lateral margins of the disc convex with conical teeth; column base conspicuous; callus 5-partite (3-partite in *C. croizatii*); disc covered by brown or reddish spots only at base; platform of the callus rectangular (absent in *C. croizatii*); plants from north of the Amazon River in South America and the Lesser Antilles . . . . . *C. cebolleta* complex

4a. Lateral margins of the disc convex with semielliptical plates (except *C. caatingaensis*); column base reduced or absent; callus 3-partite (5-partite in *C. caatingaensis*); disc with reddish spots throughout; platform of the callus absent; plants from south of the Amazon River . . . . . *C. cepula* complex

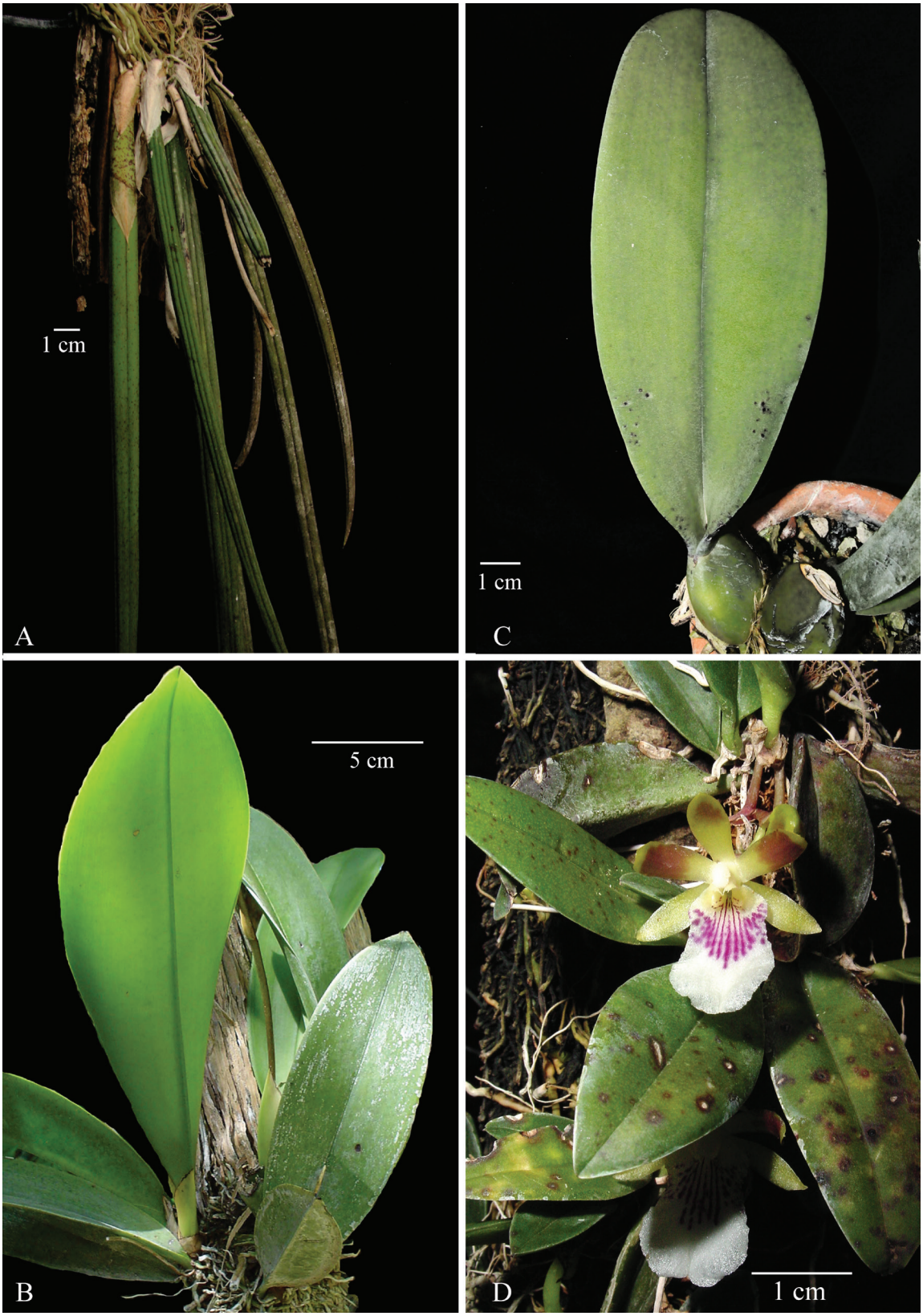

FIGURE 1. Vegetative morphology. **A**, *Cohniella pendula* Carnevali & Cetzal (based on *Carnevali & Ramírez 6897* CICY); **B**, *Lophiaris tapiae* Balam & Carnevali (*Balam et al. 114* CICY); **C**, *Lophiarella microchila* (Bateman ex Lindl.) Szlach., Mytnik & Romowicz (*Carnevali 7643* CICY); **D**, *Trichocentrum candidum* Lindl. (*Carnevali s.n.* CICY). Photographs: [A–C] W. Cetzal-Ix, [D] G. Carnevali.

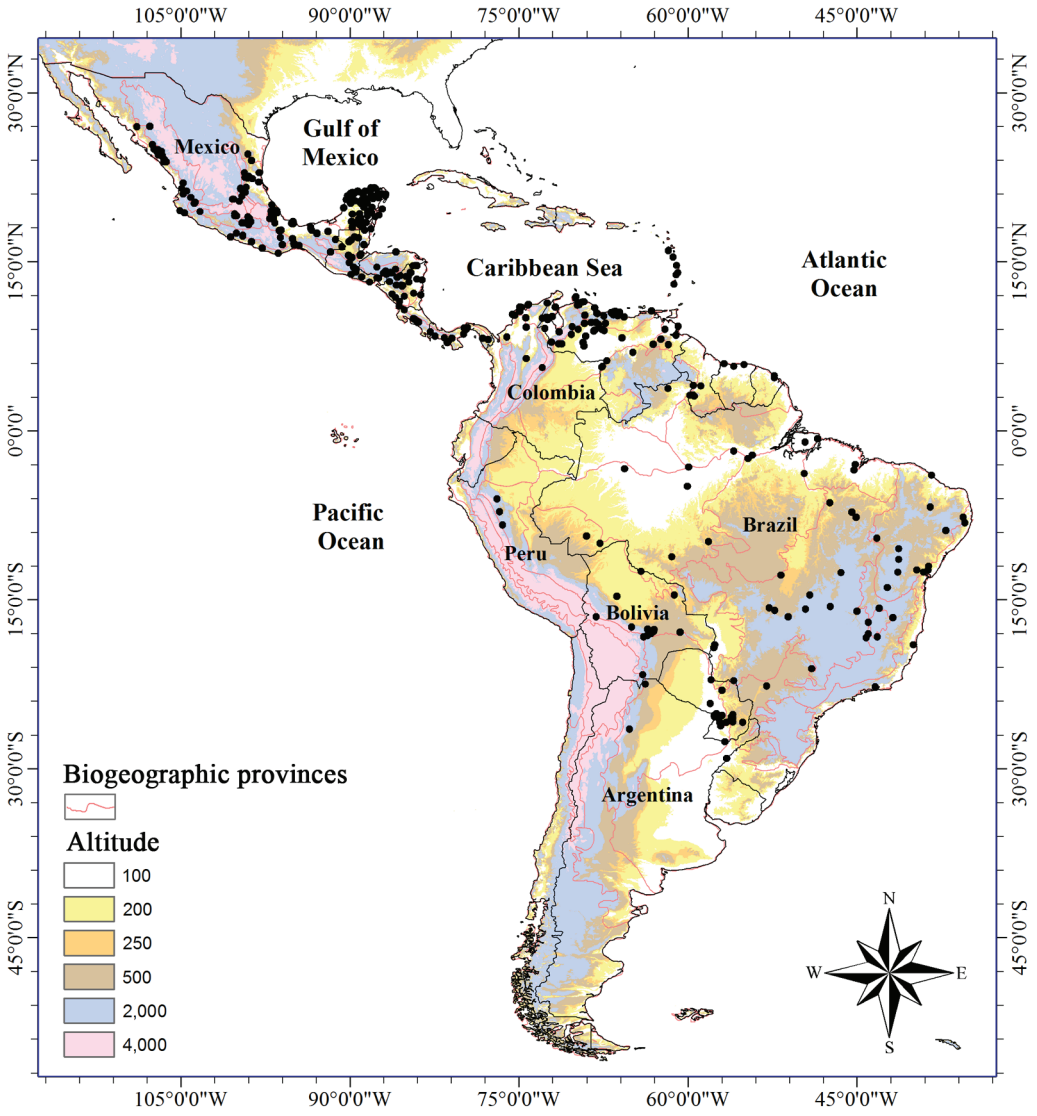

FIGURE 2. Distribution of *Cohniella* Pfitzer.

KEY TO THE SPECIES OF THE *COHNIELLA JONESIANA* COMPLEX

1a. Labellum yellow with orange-brown spots or blotches; distal portions of the lateral lobes of the labellum long laciniate . . . . . *C. stacyi*

1b. Labellum entirely white or rarely with a few red spots along the proximal rim of the central lobe; distal portions of the lobes of the labellum entire to lacerate 2

2a. Sepals and petals pale yellow-green or chartreuse colored with a few, widely separated red-brown spots; plants from Bolivia, Paraguay, northern Argentina, and neighboring areas of Brazil . . . . . *C. jonesiana*

2b. Sepals and petals pale yellow-green or chartreuse, almost entirely covered by confluent dark red-brown blotches which render the perianth segments almost unicolor; plants from Minas Gerais and Espírito Santo in SE Brazil . . . . . *C. binotii*

KEY TO THE SPECIES OF THE *COHNIELLA ASCENDENS COMPLEX*

1a. Isthmus of the labellum much longer than broad (2–4 × 0.5–2.0 mm); callus consisting of 3 teeth or keels 2

1b. Isthmus of the labellum approximately as long as broad (0.5–4.0 × 0.5–3.0 mm); callus consisting of 5 teeth or keels. 3

2a. Flowers 18–25 mm diameter; labellum with the lacerated margin; column wings conspicuous; callus of the labellum 1-partite; plants endemic to the central portion of Panama . . . . . *C. lacera*

2b. Flowers 13–16 mm diameter; labellum with the entire or slightly lacerated; column wings reduced or absent; callus of the labellum 3-partite; plants from the eastern portion of Panama and northern Colombia and Venezuela . . . . . *C. nuda*

3a. Central lobe of the labellum 5–6 mm wide; lateral margins of the labellum smooth; column wings bipartite; plants from Venezuela . . . . . *C. amazonica*

3b. Central lobe of the labellum 7–13 mm wide; lateral margins of the labellum rugose; column wings terete; plants from Mexico to Colombia 4

KEY TO THE SPECIES OF THE *COHNIELLA JONESIANA* COMPLEX CONT.

4a. Flowers non resupinate; lateral lobes of the labellum triangular, short and thin (2–3 × 0.7–1.0 mm); plants from Panamá and Colombia . . . . . *C. helicantha*

4b. Flowers resupinate; lateral lobes of the labellum various (obovate, oblong or triangular), lengths and widths (3–8 × 2–4 mm); plants from Mexico to Colombia 5

5a. Lateral lobes of the labellum erect, usually spathulate, broadly obovate; column wings terete; plants of northwestern Mexico ranging into southeastern Costa Rica . . . . . *C. ascendens*

5b. Lateral lobes of the labellum patent, not spathulate, oblong-triangular; column wings subtriangular; plants from the valleys between the Central and Eastern Andean Cordilleras from Colombia . . . . . *C. aguirrei*

KEY TO THE SPECIES OF THE *COHNIELLA BRACHYPHYLLA COMPLEX*

1a. Central lobe of the labellum approximately similar in shape and size to the lateral lobes, 5.8–8.0 mm wide; leaves pendent; plants from the western extreme of the Transmexican Volcanic Belt in coastal Jalisco and Nayarit. . . . . *C. pendula*

1b. Central lobe of the labellum different in shape and size from the lateral lobes, usually much larger, 9–21 mm wide; leaves usually erect or patent, rarely pendent; plants from other areas and not from western extreme of the Neovolcanic Transversal Axis 2

2a. Leaves rigidly erect, 5.5–16.0 (–26.0) cm long, many on the plant simultaneously (5–15); inflorescences rigidly erect, racemose, more rarely with a single lateral branch when well-developed; plants from north of the Neovolcanic Transversal Axis in Sinaloa with outliers in Durango, Chihuahua, and Sonora . . . . . *C. leptotifolia*

2b. Leaves various, 12–52 cm long, usually few to a plant (3–5); inflorescences various but usually patent to somewhat pendent, more rarely erect, usually a panicle with 2 or more branches in well-developed plants; plants from the Gulf coast or from the Pacific coast south of the Trans-Mexican Volcanic Belt 3

3a. Lateral lobes of the labellum as broad as long, almost as broad as the central lobe (0.85/1–1/1); plants from the Gulf states west and north of the Tehuantepec isthmus (Querétaro, San Luis Potosí, Tamaulipas, Veracruz) . . . . . *C. biorbicularis*

3b. Lateral lobes of the labellum always longer than wide; plants from the Yucatan peninsula or from the Pacific coast of Mexico southward into Costa Rica 4

4a. Central lobe of the labellum rounded to truncate, not emarginate at all or only very shallowly so and then the emargination making an obtuse angle; labellum usually bearing spots on most of the undersurface; leaves 6–10 mm wide, conspicuously wider basally but abruptly tapering at base (forming a "neck" just above the pseudobulb) and more gradually tapering distally; plants from the Pacific drainage from Mexico into northwestern Costa Rica . . . . . *C. brachyphylla*

4b. Central lobe of the labellum deeply emarginate, the emargination making an acute angle; labellum lacking spots on the undersurface, if present only on the underside of the disk; leaves 2.5–4.0 mm wide, of homogeneous width, not tapering basally and distally; plants from the northern portion of the Yucatan peninsula. . . . . *C. yucatanensis*

KEY TO THE SPECIES OF THE *COHNIELLA CEBOLLETA* COMPLEX

1a. Callus of the labellum 3-partite; callus platform absent; plants from Amazonas State in southern Venezuela . . . . . *C. croizatii*

1b. Callus of the labellum 5-partite; callus platform rectangular; plants from northern Colombia, northern and eastern Venezuela, the Guianas (French Guiana, Guyana, and Suriname), and the Lesser Antilles 2

2a. Flowers > 31 mm diameter; central lobe of the labellum 14–16 × 18–24 mm; central portion of the callus platform with two globose teeth; plants from Bolívar, Sucre, and Delta Amacuro states in eastern Venezuela . . . . . *C. macrocebolleta*

2b. Flowers < 25 mm diameter; central lobe of the labellum 5–10 × 8–15 mm; central portion of the callus platform smooth; plants of northern Colombia and Venezuela, the Guianas (French Guiana, Guyana, and Suriname), and the Lesser Antilles 3

3a. Lateral lobes of the labellum narrowly elliptic (1.8–2.5 mm wide); callus with distal teeth partially separated of the central keel; plants from the Lesser Antilles . . . . . *C. juncifolia*

3b. Lateral lobes of the labellum oblong, rounded or subquadrate (3.5–5.0 (–7) mm wide); callus with distal teeth completely attached to the central keel, giving the appearance of one unit; plants from northern Colombia, Venezuela, and the Guianas (French Guiana, Guyana, and Suriname) 4

4a. Flowers 16–19 mm diameter; lateral lobes of the labellum subquadrate (3.5–3.8 × 3.0–3.5 mm); lateral margins of the callus platform in the labellum ear shaped; callus with distal teeth about the same size as proximal teeth; plants from southern Venezuela and the Guianas (Guyana, Suriname, and French Guiana) . . . . . *C. ultrajectina*

4b. Flowers 20–25 mm diameter; lateral lobes of the labellum oblong to rounded (5–6 × 4–5(–7) mm); lateral margins of the callus platform of the labellum entire and truncated; callus with distal teeth twice smaller than proximal teeth; plants from northern Colombia and northern Venezuela . . . . . *C. cebolleta*

KEY TO THE SPECIES OF THE *COHNIELLA CEPULA* COMPLEX

1a. Callus composed of 5 teeth or keels, provided with lateral extensions conical of the callus at each side of the labellar isthmus; proximal lobes of the column wings relatively large (3.5–5.0 × 2.0–2.5 mm); labellar isthmus relatively broad [(3-)4–6 mm wide]; base of column conspicuous, flat, subquadrate; plants from the Caatinga region of NE Brazil . . . . . *C. caatingaensis*

1b. Callus composed of 3 teeth or keels, without lateral extensions of the callus; proximal lobes of the column wing smaller (0.8–3.0 × 1.2–2.0 mm); labellar isthmus relatively narrow [1.7–3.5 mm wide]; base of column short and inconspicuous, concave; plants from elsewhere in Brazil, Peru, Bolivia, Paraguay, and Argentina 2

2a. Flowers large, 30–37 mm long from the apex of the dorsal sepal to the apex of the central lobe of labellum; isthmus long and proportionally narrow, 2.5–6 × 2–3.5 mm; plants from the Amazonian Basin in Brazil, known also from a single locality in Amazonian Bolivia . *C. sprucei*

2b. Flowers small, (18–)20–24(–26) mm long from the apex of the dorsal sepal to the apex of the central lobe of labellum; isthmus shorter and proportionally broader 2–4 × 1.7–2.0(–3) mm; plants from elsewhere in South America mostly from the southern portion of the Amazon Basin . . . . . *C. cepula*

Cohniella aguirrei (Königer) Königer, Arcula 10: 280. 2000. Fig. 3A.

Basionym: *Stilifolium aguirrei* Königer, Arcula 9: 259. 1999. TYPE: COLOMBIA. Huila: Departamento Girardot, 1200 m, *W. Königer 95* (Holotype: M; Isotypes: JAUM, K, Herb. Königer [none seen]).

Homotypic synonym: *Trichocentrum aguirrei* (Königer) M.W.Chase & N.H.Williams, Lindleyana 16: 218. 2001.

Distribution: Endemic to Colombia.

Cohniella amazonica Cetzal & Carnevali, Lankesteriana 13(3): 208. 2014. TYPE: VENEZUELA. Amazonas: Puerto Ayacucho, flowered in cultivation in the collection of Carlos García Esquivel in Caracas, Venezuela; leaf terete; flowers yellow, December 1991, *C. García Esquivel s.n. sub G. Carnevali 3080* (Holotype: CICY; Isotypes: AMES, VEN). Fig. 3B.

Homotypic synonym: *Trichocentrum ayacuchense* J.M.H. Shaw, Orchid Rev. Suppl., 122(1305): 17. 2014.

Distribution: Endemic to Venezuela.

Cohniella ascendens (Lindl.) Christenson, Lindleyana 14(4): 177. 1999.

Basionym: *Oncidium ascendens* Lindl., Edwards's Bot. Reg. 28: sub t. 4. 1842. TYPE: GUATEMALA. Without any other locality, Apr 1841, *K. T. Hartweg s.n.* (Holotype: K-Lindl.). Fig. 3C.

Homotypic synonyms: *Stilifolium ascendens* (Lindl.) Königer & Pongratz, Arcula 7: 186. 1997.

Trichocentrum ascendens (Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001.

Heterotypic synonyms: *Cohnia quekettioides* Rchb.f., V. Schl. Bot. Zeitung (Berlin): 10: 928. 1852. TYPE: GUATEMALA. Chantalas, "Mons Espina," 1841, *E. R. von Friedrichsthal 834* (Holotype: presumably at W, not seen).

Cohniella quekettioides (Rchb.f.) Pfitzer, Nat. Pflanzenfam 2(6): 194. 1889.

Oncidium subulifolium Schltr., Repert. Spec. Nov. Regni Veg. Beih. 10: 79. 1922.

Basionym: *Oncidium bolivianense* Oppenheim, Orchis 10: 93. 1916. (*non Oncidium boliviense* Rolfe, 1907). TYPE: BOLIVIA. Río Itenez, *O. N. Witt s.n.* (Holotype: B, destroyed; Lectotype: Orchis 10, No. 5, Tafel IV, Fig. 2 1916; designated by Carnevali et al. (2010)).

Distribution: Mexico, Belize, El Salvador, Guatemala, Honduras, Nicaragua, and Costa Rica.

Cohniella binotii (Pabst) G.A.Romero & Carnevali, Brittonia 62(2): 161. 2010.

Basionym: *Oncidium jonesianum* var. *binotii* Pabst, Bradea 2: 170. 1977. TYPE: Brazil. Minas Gerais: regione Montes Claros, 24 Feb 1972 (*sub* 17-2-1971), *Casa Binot s.n. sub Verboonen s.n* (Holotype: HB).

Homotypic synonym: *Trichocentrum binotii* (Pabst) J.M.H. Shaw, Orchid Rev. Suppl., 120(1297): 16. 2012.

Distribution: Endemic to southeast Brazil.

Cohniella biorbicularis Balam & Cetzal, Brittonia 62(2): 162 (-163; figs. 2A–G). 2010. TYPE: MEXICO. Querétaro: Municipio Landa de Matamoros, Camino de Matzacintla al Río Moctezuma, 21°20'04"N, 99°20'04" W, 1100 m, cañada orientada SE con vegetación de bosque tropical caducifolio sobre laderas de roca caliza; colectada originalmente en el año 2006 por I. M. Ramírez (#1432); floreciendo en cultivo el 10 Marzo 2008, *G. Carnevali & I. M. Ramírez 7308* (Holotype: CICY; Isotypes: AMES, AMO, MEXU, SEL, QMEX, US). Fig. 3D.

Homotypic synonym: *Trichocentrum biorbiculare* (Balam & Cetzal) R.Jiménez & Solano, Acta Bot. Mex. 97: 53. 2011.

Distribution: Endemic to Mexico.

Cohniella brachyphylla (Lindl.) Cetzal & Carnevali, Brittonia 62(2): 163. 2010.

Basionym: *Oncidium brachyphyllum* Lindl., Edwards's Bot. Reg. 28: sub t. 4. 1842. TYPE: MEXICO. Without any other locality, *K. T. Hartweg s.n.* (Holotype: K-Lindl.). Fig. 3E.

Homotypic synonyms: *Trichocentrum brachyphyllum* (Lindl.) R.Jiménez, Acta Bot. Mex. 97: 53. 2011. *Trichocentrum brachyphyllum* (Lindl.) J.M.H.Shaw, Orchid Rev. Suppl., 120(1297): 16. 2012.

Distribution: Mexico, Guatemala, El Salvador, Honduras, Nicaragua, and Costa Rica.

Cohniella caatingaensis Cetzal, V.P.Castro & Marçal, Sys. Bot. 37(1): 61. 2012. TYPE: BRAZIL. Ceará: Río Pacoty, 6 km north & Aquiraz, 15 Oct 1935, *F. Drouet 2613* (Holotype: SP; Isotypes: AMES, NY, U, fragment at CICY). Fig. 3F.

Homotypic synonym: *Trichocentrum caatingaense* (Cetzal, V.P.Castro & Marçal) J.M.H.Shaw, Orchid Rev. 122(1305): 17. 2014.

Distribution: Endemic to Brazil.

Cohniella cebolleta (Jacq.) Christenson, Lindleyana 14: 177. 1999.

Basionym: *Epidendrum cebolleta* Jacq., Enum. Syst. Pl. 30. 1760. TYPE: COLOMBIA. [Bolívar], Cartagena [*Carthagenae*]. 1758, *N. J. von Jacquin s.n.* (Holotype: not located and most likely lost; Lectotype: Select. Stirp. Amer. Hist., ed. 2, t. 217 [text on page 111], 1781, designated, albeit incorrectly, by Garay and Sweet 1974: 205; amended lectotype: Select. Stirp. Amer. Hist. [text on pages 230–231] t. 131, Fig. 2, 1763), designated by Carnevali et al., 2010). Fig. 3G.

Homotypic synonyms: *Oncidium cebolleta* (Jacq.) Sw., Kongl. Vetensk. Acad. Nya Handl. 21: 240. 1800.

Stilifolium cebolleta (Jacq.) Königer & Pongratz, Arcula 7: 186, 187. 1997.

Trichocentrum cebolleta (Jacq.) M.W.Chase & N.H.Williams, Lindleyana 16: 137. 2001.

Heterotypic synonyms: *Oncidium humboldtii* Schltr., Repert. Spec. Nov. Regni Veg. 23: 65. 1926.

Basionym: *Oncidium ottonis* Rchb.f. ex Kraenzl., Pflanzenr. (Engler) IV, Fam. 50: 92, fig. 10. 1922. (*non* Schltr., 1914). TYPE: VENEZUELA. Without

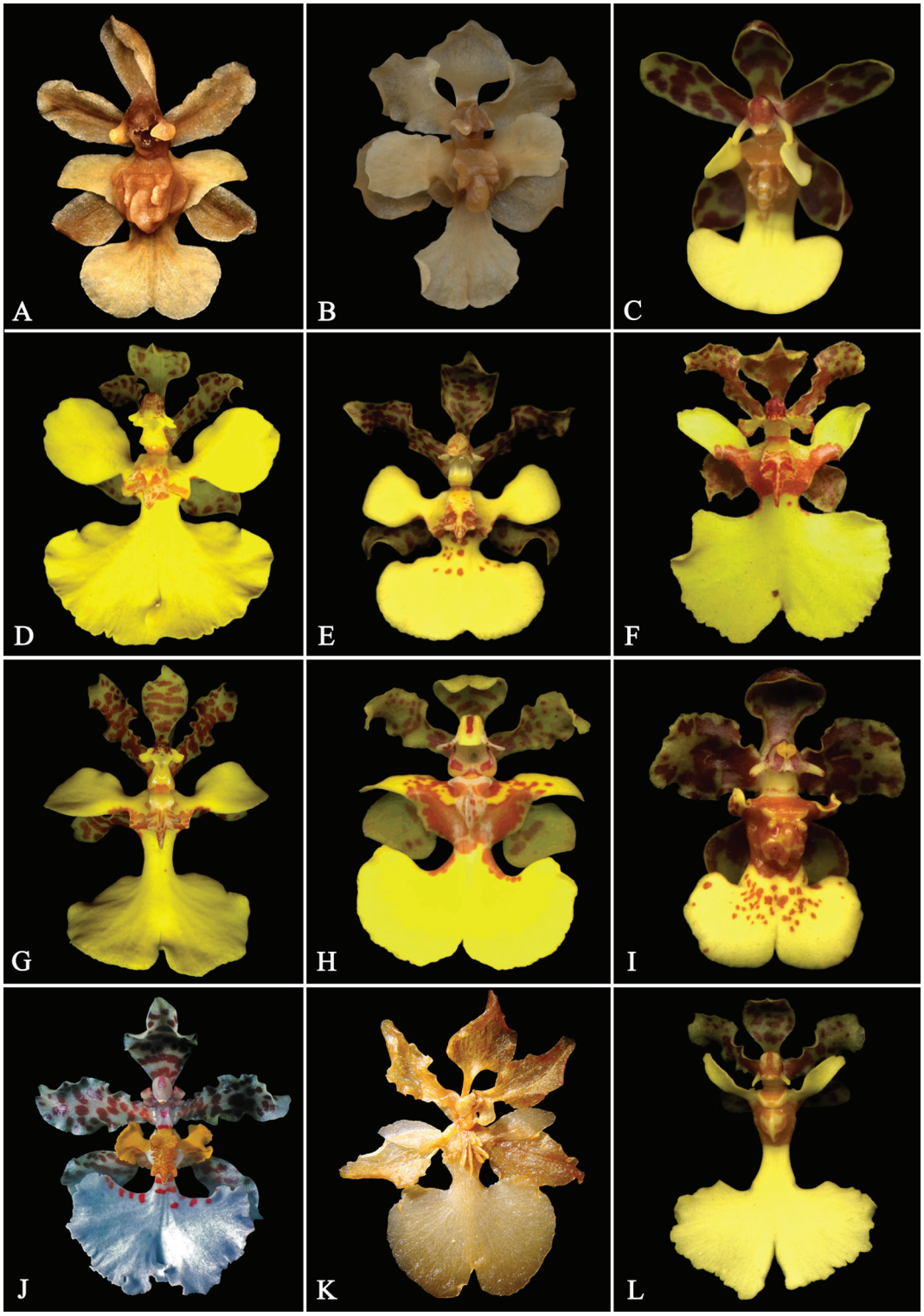

FIGURE 3. Floral morphology. **A**, *Cohniella aguirrei* (Königer) Königer (*Königer 95* M); **B**, *Cohniella amazonica* Cetzal & Carnevali (*Carnevali 3080* CICY); **C**, *Cohniella ascendens* (Lindl.) Christenson (*Cetzal 3* CICY); **D**, *Cohniella biorbicularis* Balam & Cetzal (*Carnevali & Ramírez 7308* CICY); **E**, *Cohniella brachyphylla* (Lindl.) Cetzal & Carnevali (*Carnevali 7310* CICY); **F**, *Cohniella caatingaensis* Cetzal, V.P.Castro & Marçal (*Paiva s.n.* CICY); **G**, *Cohniella cebolleta* (Jacq.) Christenson (*Carnevali 7222* CICY); **H**, *Cohniella cepula* (Hoffmanns.) Carnevali & G.A.Romero (*Carnevali & Ramírez 7367* CICY); **I**, *Cohniella helicantha* (Kraenzl.) Cetzal & Carnevali (*Carnevali 7027* CICY); **J**, *Cohniella jonesiana* (Rchb.f.) Christenson (*Kennedy s.n.* AMES); **K**. *Cohniella juncifolia* (L.) Cetzal & Carnevali (*Duss 2078* NY); **L**, *Cohniella lacera* (Lindl.) Cetzal (*Carnevali 7311* CICY). Photographs: [A–E, G–I, K–L] W. Cetzal-Ix, [F] V. Paiva-Castro, [J] G. Kennedy.

locality precise, 1840, *C. F. E. Otto 997* (Syntype: B, destroyed; Isosyntype: W-*Reichenbach 27863*); Guárico: Orituco, *Otto 541* (Syntype: B, destroyed; Isosyntypes: W-Reichenbach 27869 & 27872); Carabobo: Puerto Cabello, *A. von Humboldt & A. Bonpland s. n.* (Syntype: B–W); lectotype, designated by Carnevali et al. (2010), *Humboldt & Bonpland s. n.* (B–W).

Distribution: Northern Colombia, northern Venezuela, and Trinidad and Tobago.

Cohniella cepula (Hoffmanns.) Carnevali & G.A.Romero, Brittonia 62(2): 167. 2010. Fig. 3H.

Basionym: *Oncidium cepula* Hoffmanns., Verz. Orchid. Ed. 2, 56. 1843. TYPE: Brazil. Río de Janeiro: *ex icon.* ["N. Icon. ined"] (Holotype: B, destroyed; Lectotype: designated by Carnevali et al., 2010: tracing in Herbarium Reichenbach Nr. 15230, upper left corner, W).

Homotypic synonym: *Trichocentrum cepula* (Hoffmanns.) J.M.H.Shaw, Orchid Rev. Suppl., 120(1297): 16. 2012.

Heterotypic synonyms: *Oncidium glaziovii* Cogn., Fl. Bras. 3, 6: 440. 1906. TYPE: Brazil. Goias: *A. F. M. Glaziou 22179* (Holotype: G; Isotypes: BR, MO, P; photo: AMES, NY).

Oncidium ostenianum Schltr., Repert. Spec. Nov. Regni Veg. 21: 341. 1925. *Cohniella osteniana* (Schltr.) Christenson, Lindleyana 14: 177. 1999. TYPE: Paraguay. Epiphyt auf Bäumen am Río Salado, bei San Bernardino, blühend im März 1916, *T. Rojas 1671* (Holotype: Herbarium Ostenianum *8557*; Isotype: AMES).

Homotypic synonym: *Trichocentrum ostenianum* (Schltr.) M.W.Chase & N.H.Williams, Lindleyana 16: 138. 2001.

Stilifolium ostenianum (Schltr.) Königer & Pongratz, Arcula 7: 189. 1997.

Oncidium cebolleta var. *purum* L.C.Menezes, Schlechteriana 2: 132. 1991. TYPE: Brazil. Minas Gerais: Arinos, 700 m, March 1991, *C. García s.n.* (Holotype: UB-14, sterile; epitype: designated by Barros and Batista (2004): photograph in Schlechteriana 3(4): 132. 1992).

Oncidium cebolleta f. *purum* (L.C.Menezes) F.Barros & J.A.N. Batista, Orquidologia Sul-Americana: uma compilacão científica: 103. 2004.

Trichocentrum cepula f. *purum* (L.C.Menezes) Meneguzzo, Harvard Pap. Bot. 9: 74. 2014.

Oncidium wittii Oppenheim, Orchis 10: 93. 1916. TYPE: Bolivia. Río Iténez, *Ost s.n.* (Holotype: B, destroyed; lectotype: designated by Carnevali et al., 2010: plate 4, Orchis 10, No. 5, Tafel IV, Fig. 1. 1916; Epitype: designated by Carnevali et al., 2010: Bolivia, Santa Cruz: Provincia Andrés Ibañez, 12 km de Santa Cruz, 11 August 1987, *M. H. Nee 35623* [NY]).

Lophiaris wittii (Oppenheim) Braem, Schlechteriana 4: 21. 1993.

Stilifolium wittii (Oppenheim) Königer & Pongratz, Arcula 7: 190. 1997. *Trichocentrum wittii* (Oppenheim) M.W.Chase & N.H.Williams, Lindleyana 16: 138. 2001.

Cohniella wittii (Oppenheim) Senghas, Orchideen (Schlechter) 173–181. 2001.

Stilifolium pongratzianum Königer, Arcula 9: 261. 1999. TYPE: Peru. San Martin: Juanjui, ca. 300 m, from M. Arias, Lima, cultived at Rosenheim, *W. Königer WK-99* (Holotype: M; Isotypes: USM, UNALM, Herb. Königer).

Homotypic synonyms: *Cohniella pongratziana* (Königer) Königer, Arcula 10: 280. 2000.

Trichocentrum pongratzianum (Königer) M.W.Chase & N.H.Williams, Lindleyana 16: 218. 2001.

Distribution: Peru, Bolivia, Brazil, Paraguay, and Argentina.

Cohniella croizatii Cetzal & Carnevali, Novon 21: 179. 2011. TYPE: VENEZUELA. Amazonas: Mpio. Alto Orinoco, 1951, *L. Croizat 984* (Holotype: NY; Isotype: CICY [fragment]).

Homotypic synonym: *Trichocentrum croizatii* (Cetzal & Carnevali) J.M.H.Shaw, Orchid Rev. 122(1305): 17. 2014.

Distribution: Endemic to Venezuela.

Cohniella helicantha (Kraenzl.) Cetzal & Carnevali, J. Torrey Bot. Soc. 137(2–3): 210. 2010. Fig. 3I.

Basionym: *Oncidium helicanthum* Kraenzl., Pflanzenr. (Engler) 95: 281. 1922. TYPE: COLOMBIA. Without any other locality or collector (Holotype: B, destroyed; Lectotype, designated by Carnevali et al., 2010, Das Pflanzenreich (A. Angler) heft 80, 4, 50: 282, Fig. 24C, a–d. 1922).

Homotypic synonym: *Trichocentrum helicanthum* (Kraenzl.) J.M.H.Shaw, Orchid Rev. Suppl., 120 (1297): 16. 2012.

Heterotypic synonyms: *Cohniella teres* (Ames & C.Schweinf.) Christenson, Lindleyana 14: 177. 1999. *Oncidium teres* Ames & C.Schweinf., Sched. Orch. 8: 78. 1925. *Stilifolium teres* (Ames & C.Schweinf.) Königer & Pongratz, Arcula 7: 190. 1997. *Trichocentrum teres* (Ames & C.Schweinf.) M.W.Chase & N.H.Williams, Lindleyana 16: 138. 2001. TYPE: PANAMA. Veraguas: San Francisco, 1000 feet [350 m], *C. W. Powell 383* (Holotype: AMES).

Distribution. Costa Rica, Panama, and Colombia.

Cohniella jonesiana (Rchb.f.) Christenson, Lindleyana 14: 177. 1999. Fig. 3J.

Basionym: *Oncidium jonesianum* Rchb.f., Gard. Chron. N.S. 20: 781. 1883. TYPE: Paraguay. Without any other locality or collector, ex Hort., *Horsman & Company s.n.* (Holotype: W-Reichenbach 27551).

Homotypic synonyms: *Stilifolium jonesianum* (Rchb.f.) Königer & Pongratz, Arcula 7: 189. 1997.

Trichocentrum jonesianum (Rchb.f.) M.W.Chase & N.H.Williams, Lindleyana 16: 137. 2001.

Heterotypic synonyms: *Oncidium jonesianum* var. *flavens* Rchb.f., Gard. Chron. S. 3., 4: 234, V. 237, 1888. TYPE: Without locality, but presumably from Paraguay, *ex Hort. B. S. Williams* (Holotype: W-Reichenbach 27550 [upper left figure]).

Oncidium jonesianum var. *phaeanthum* Sander, Reichenbachia S. I.,1: 47, t. 21, fig. 2, 1886–1891. TYPE: Paraguay. Without further locality, Saint-Leger *ex Hort. Sir Trevor Lawrence* (Holotype: presumably at W-Reichenbach, not seen).

Distribution: Bolivia, Brazil, Paraguay, and Argentina.

Cohniella juncifolia (L.) Cetzal & Carnevali, Sys. Bot. 38(3): 614. 2013. Fig. 3K.

Basionym: *Epidendrum juncifolium* L., Sp. Pl. (ed. 2) 1351. 1763. TYPE: presumably collected in Haiti ["habitat in America"], Plant. Amer. fasc. 8: t. 184, f. 2. 1759; lectotype: designated by Cribb in Cafferty and Charles 1999: [Icon] "*Epidendrum foliis radicalibus subulatis*" in Burman, Pl. Amer. t. 184; epitype: designated by Carnevali et al. (2010), Martinique, *A. Duss 2078* (NY).

Homotypic synonym: *Cymbidium juncifolium* (L.) Willd., Sp. Pl. 4: 102. 1805. *Oncidium juncifolium* (L.) Lindl., Coll. Bot. 27. 1821.

Distribution: Endemic to the Lesser Antilles.

Cohniella lacera (Lindl.) Cetzal, Ann. Bot. Fenn. 49(1–2): 139. 2012. Fig. 3L.

Basionym: *Oncidium lacerum* Lindl., Bot. Reg. 30. Misc. 38. 1844. TYPE: PANAMA. Without precise locality, ex Hort. Loddigges (Holotype K-Lindl., photograph seen).

Homotypic synonym: *Trichocentrum lacerum* (Lindl.) J.M.H.Shaw, Orchid Rev. Suppl., 120(1297): 16. 2012.

Heterotypic synonyms: *Oncidium stipitatum* Lindl., Bot. Voy. Sulphur 172. 1846. TYPE: PANAMA. Island of Taboga, 30 January–11 February 1837, *G. W. Barclay 958* (Holotype: BM, photograph seen).

Stilifolium stipitatum (Lindl.) Königer & Pongratz, Arcula 7: 189. 1997.

Cohniella stipitata (Lindl.) Christenson, Lindleyana 14: 177. 1999.

Trichocentrum stipitatum (Bateman ex Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16: 138. 2001.

Trichocentrum nudum (Bateman ex Lindl.) M.W.Chase & N.H.Williams subsp. *stipitatum* (Lindl.) Dressler & N.H.Williams, Selbyana 24: 45. 2003.

Oncidium stipitatum Lindl. var. *platyonyx* Rchb.f., Gard. Chron. N.S. 9: 788. 1878. TYPE: PANAMA. Without precise locality, ex Hort. *W. Bull*. (Holotype: W-Reichenbach 27554, flowers in envelope in the upper left, photograph seen).

Heterotypic synonym: *Cohniella croatii* Kolan. & Szlach. Phyton (Horn) 56(1): 22. 2016. ***Syn nov.*** TYPE: PANAMA. Canal Zone: Barro Colorado Island. Cove, S, SE of Peña Blanca Point, 5 March 1969, *T. Croat 8396* (Holotype: MO).

Distribution: Endemic to Panama.

The type specimen of *Cohniella croatii* can be distinguished from *C. laceras* by minor morphological variations; flowers of *C. croatii* are only slightly larger in the central lobe ("middle lobe") of the labellum: 11.5 × 18 mm vs. 7–10 × (12–)14–16 in *C. lacera* (Cetzal-Ix et al., 2014).

Cohniella leptotifolia Cetzal & Carnevali, J. Torrey Bot. Soc. 137(2–3): 198 (-201; fig. 6). 2010. TYPE: México. Sonora: ca. Álamo Gordo, aprox. 27°1'1.56"N, 108°55'48"E, collected by M. Gómez, 2002, flowered in cultivation 2 May 2003, *G. Carnevali & M. Gómez-Juárez 6803* (Holotype: CICY; Isotypes: AMES, AMO, MEXU, NY, US). Fig. 4A.

Homotypic synonym: *Trichocentrum leptotifolium* (Cetzal & Carnevali) R.Jiménez & Solano, Acta Bot. Mex. 97: 54. 2011.

Distribution: Endemic to Mexico.

Cohniella longifolia (Lindley) Cetzal & Carnevali, Brittonia 62(2): 169. 2010.

Basionym: *Oncidium longifolium* Lindl., Edwards's Bot. Reg. 27: 22. 1841. TYPE: MEXICO. Without any other locality, collected by *K. T. Hartweg*, ex Hort. Royal Horticultural Society and Loddiges (Holotype: K-Lindl.).

Homotypic synonyms: *Trichocentrum longifolium* (Lindl.) R.Jiménez, Acta Bot. Mex. 97: 54. 2011.

Trichocentrum longifolium (Lindl.) J.M.H.Shaw, Orchid Rev. Suppl., 120(1297): 16. 2012, *nom. superfl*. (Homonym.)

Distribution: Only known from type material from Mexico.

Cohniella macrocebolleta Cetzal & Carnevali, Sys. Bot. 38(3): 616. 2013. TYPE: VENEZUELA. Sucre: vecindades de la ciudad de Carúpano, aprox. 10°40'12"N, 63°13'48"W, 50–100 m, epífita colectada originalmente por Agustín Prieto; flores tomadas en una exposición de orquídeas en Maracay, 22 May 2007, *sub G. Carnevali 7220* (Holotype: VEN; Isotypes: AMES, CICY, MO). Fig. 4B.

Distribution: Endemic to Venezuela.

Cohniella nuda (Bateman ex Lindl.) Christenson, Lindleyana 14: 177. 1999. Fig. 4C.

Basionym: *Oncidium nudum* Bateman ex Lindl., Edwards's Bot. Reg. 23: t. 1994. 1837. TYPE: VENEZUELA. Distrito Capital: Caracas, 1837, ex Hort. Bateman (Holotype: K-Lindl., photograph seen).

Homotypic synonyms: *Stilifolium nudum* (Bateman ex Lindl.) Königer & Pongratz, Arcula 7: 189. 1997.

Trichocentrum nudum (Bateman ex Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16: 138. 2001.

Heterotypic synonyms: *Oncidium ebrachiatum* Ames & C.Schweinf. Sched. Orch. 2: 75. 1923. TYPE: PANAMA. Canal and vicinity, 4 Apr. 1908, *R. S. Williams 975* (Holotype: AMES; Isotype: NY, photograph seen).

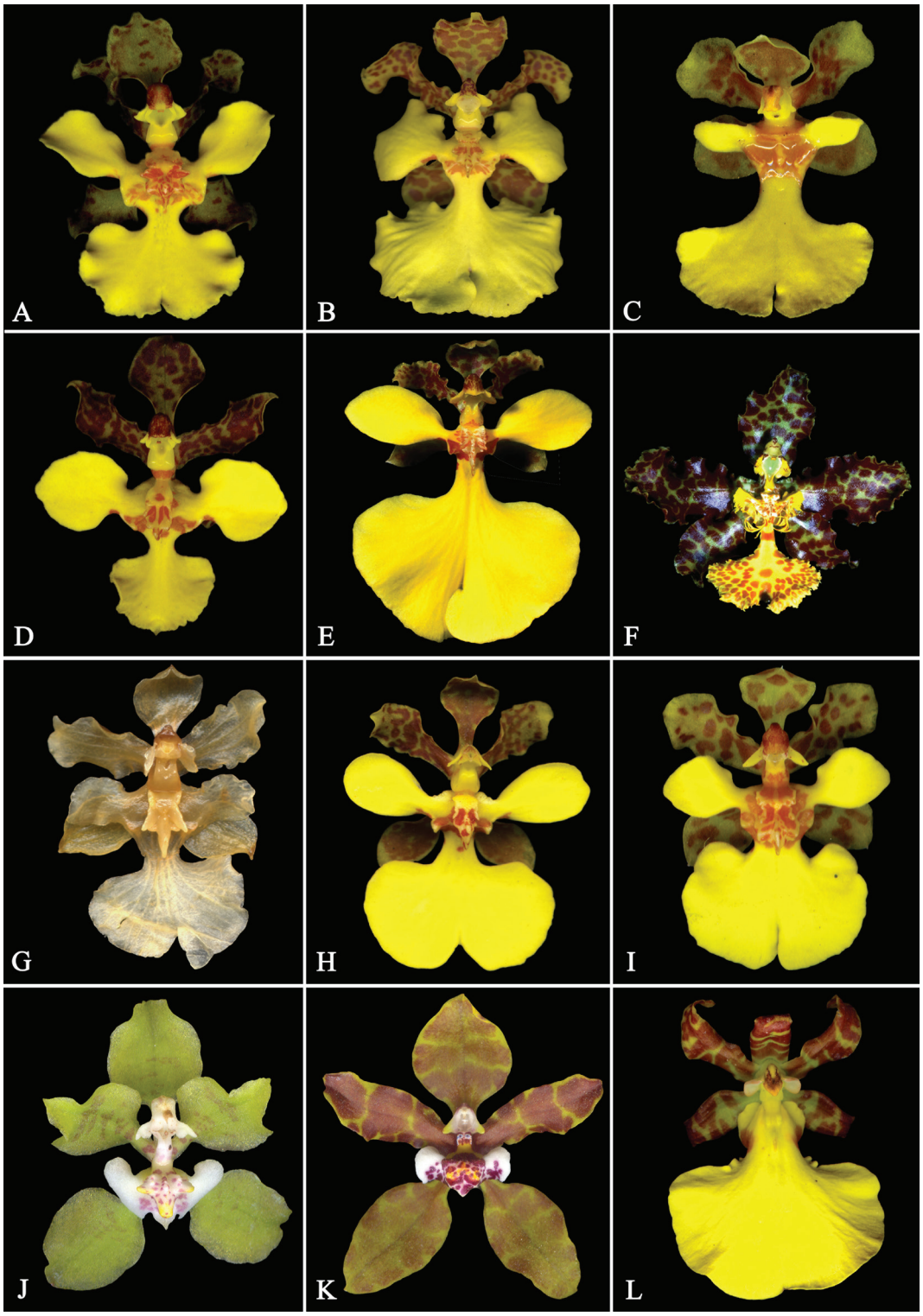

FIGURE 4. Floral morphology. **A**, *Cohniella leptotifolia* Cetzal & Carnevali (*Carnevali & Gómez-Juárez 6903* CICY); **B**, *Cohniella macroceboll*eta Cetzal & Carnevali (*Carnevali 7220* CICY); **C**, *Cohniella nuda* (Bateman ex Lindl.) Christenson (*Carnevali 7283* CICY); **D**, *Cohniella pendula* Carnevali & Cetzal (*Carnevali & Ramírez 6897* CICY); **E**, *Cohniella sprucei* (Lindl.) Königer & Pongratz (*Kennedy s.n*. AMES); **F**, *Cohniella stacyi* (Garay) Christenson (*Kennedy s.n*. AMES); **G**, *Cohniella ultrajectina* (Pulle) Cetzal & Carnevali (*Prop. 575/60* NY); **H**, *Cohniella yucatanensis* Cetzal & Carnevali (*Cetzal 22* AMES); **I**, *Cohniella* × *francoi* Cetzal & Carnevali (*Pupulin s.n. sub Carnevali 7257* CICY); **J**, *Lophiarella flavovirens* (L.O.Williams) Carnevali & Balam (*Carnevali 7269* CICY); **K**, *Lophiarella microchila* (Bateman ex Lindl.) Szlach., Mytnik & Romowicz (*Carnevali 7643* CICY); **L**, *Lophiarella splendida* (A. Rich. ex Duch.) Carnevali & Cetzal (*Carnevali 7232* CICY). Photographs: [A–D, G–L] W. Cetzal-Ix, [E–F] G. Kennedy.

Cohniella allenii Kolan. & Szlach. Phyton (Horn) 56(1): 21. 2016. ***Syn nov.*** TYPE: PANAMA. Panamá: Swamp between El [La] Jagua Hunting Club on Río Jagua and El Congor Hill, 2 m, 10 February 1935, *A. A. Hunter & P. H. Allen 471* (Holotype: MO).

Cohniella christensoniana Kolan. & Szlach. Phyton (Horn) 56(1): 24. 2016. ***Syn nov.*** TYPE: Colombia: Bolivar: Arjona, Las Piedras, 150 m, 1 March 1983, *H. Cuadros V. 1490* (Holotype: MO).

Distribution: Eastern Panama, northern Colombia, and Venezuela.

Cohniella allenii is no doubt referable to *Cohniella nuda*. The latter is characterized by its minute column wings, often almost absent. Furthermore, the morphology of the small callus is unmistakable. It consists of three low ridges flanking two depressions, which *in vivo* look not only smooth, but moist, wet. The two external ridges are close to, and parallel to the margins of the labellar disk. The labellum is characterized by its long, narrow isthmus and the relatively small lateral lobes, retrorse when flowers are flattened. All these characters are observed in the type of *Cohniella allenii*, the authors of which compared it to *C. cebolleta* (as "*C. ceboletta*"), a species here referred to the *Cohniella ascendens* complex. The "central lobe apically retuse, not bifid…" (Kolanowaska et al., 2016) is simply a morphological variation (see figures in Dunsterville and Garay, 1979: 670; Carnevali et al., 2010: 159, figure 1; Cetza-Ix, 2012: 142, figure 3).

The type of *C. christensoniana* also agrees closely with *C. nuda* (see diagnostic characters above and morphological variation shown in Dunsterville and Garay, 1979: 670).

Cohniella pendula Carnevali & Cetzal, Brittonia 62(2): 171 (-173; fig. 2H–O). 2010. TYPE: MEXICO. Jalisco: Municipio La Huerta, Loma Alta, 40 km. de La Huerta hacia Barra de Navidad, aprox. 19°22'0"N, 104°41'59"W, aprox. 350–450 m, collected by G. Carnevali and G. Salazar, 3 Nov. 1997, flowered in cultivation 10 Mar 2004, *G. Carnevali & I. Ramírez 6897* (Holotype: CICY; Isotypes: AMES, AMO, MO, NY). Fig. 4D.

Homotypic synonym: *Trichocentrum pendulum* (Carnevali & Cetzal) R.Jiménez & Solano, Acta Bot. Mex. 97: 54. 2011.

Distribution: Endemic to Mexico.

Cohniella sprucei (Lindl.) Königer & Pongratz, Arcula 10: 280. 2000. Fig. 4E.

Basionym: *Oncidium sprucei* Lindl., Fol. Orchid. 56. 1855. TYPE: BRAZIL. Amazonas. Rio Negro and Solimões: *R. Spruce 1526* (Holotype: G; Isotypes: AMES, K-Lindl., 2-sheets, P, 2-sheets, NY and F, photographs).

Homotypic synonym: *Trichocentrum sprucei* (Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16: 218. 2001.

Distribution: Bolivia and Brazil.

Cohniella stacyi (Garay) Christenson, Lindleyana 14: 177. 1999. Fig. 4F.

Basionym: *Oncidium stacyi* Garay, Bot. Mus. Leafl. 23: 301. 1973. TYPE: BOLIVIA. Naranjillos, road to Cochabamba, 11 km south west from Santa Cruz, *J. Stacy s.n.* (Holotype: AMES).

Homotypic synonym: *Trichocentrum stacyi* (Garay) M.W.Chase & N.H.Williams, Lindleyana 16: 138. 2001.

Distribution: Peru and Bolivia.

Cohniella ultrajectina (Pulle) Cetzal & Carnevali, Sys. Bot. 38(3): 618. 2013. Fig. 4G.

Basionym: *Oncidium ultrajectinum* Pulle, Rec. Trav. Bot. Neerl. 4: 121. 1907. TYPE: SURINAME. "Cultivated at the Utrecht Botanical Garden from a plant coming from Suriname as a gift from v. Asch v. Wijck, the Governor of the colony, to our University" (Holotype: presumably at U, not seen).

Heterotypic Synonym: *Cohniella yuroraensis* Kolan. & Szlach., Phyton (Horn) 56(1): 17. 2016. ***Syn nov.*** TYPE: GUYANA. [Upper Takutu-upper Essequibo]: ca. 5 miles from Karasabi (4–5 hrs. walk) along Yurora River, 04°00'N, 059°21'W, 300 m, 3 January 1982, S. *Knapp & J. Mallett 2811* (Holotype: MO).

Distribution: Venezuela, Guyana, Suriname, and French Guiana.

Isotypes of *Cohniella yuroraensis* at AMES and NY were cited under *C. ultrajectina* in Cetzal-Ix et al. (2013).

Cohniella yucatanensis Cetzal & Carnevali, J. Torrey Bot. Soc. 137(2–3): 206 (-210; fig. 9). 2010. TYPE: MEXICO. Yucatán: Municipio Mérida, Dzityá, alrededores del Cementerio del pueblo, 21°2'59.65"N, 89°40'25.54"W, collected by Gabriel Caceres Hernández, flowered in cultivation 20 Apr. 2009, *W. Cetzal 22* (Holotype: CICY; Isotypes: AMES, CICY- spirit collection). Fig. 4H.

Homotypic synonym: *Trichocentrum yucatanense* (Cetzal & Carnevali) R.Jiménez & Solano, Acta Bot. Mex. 97: 54. 2011.

Distribution: Endemic to Mexico.

Cohniella × francoi Cetzal & Carnevali, Phytotaxa 144(2): 47–54, f. 1A–I, 2B1–B5, 4A–F, 5B. 2013. TYPE: COSTA RICA. Guanacaste: near Santa Rosa National Park, 19 February 2009, *F. Pupulin s.n. sub G. Carnevali 7257* (Holotype, CICY; Isotypes: AMES, JBL). Fig. 4I.

Homotypic synonym: *Trichocentrum* × *francoi* (Cetzal & Carnevali) J.M.H.Shaw, Orchid Rev. 122(1305): 17. 2014.

Distribution: Costa Rica.

Cohniella × marvraganii (Lückel) Christenson, Lindleyana 14: 177. 1999.

Basionym: *Stilifolium* × *marvraganii* Lückel, Orchidee (Hamburg) 49: 90. 1998. (as "*marvreganii*"). TYPE: Bolivia. 15 km of Santa Cruz, 28 July 1979, *M. E. Regan s.n.* (Holotype: USF).

Homotypic synonym: *Trichocentrum* × *marvraganii* (Lückel) M.W.Chase & N.H.Williams, Lindleyana 16: 137. 2001.

Distribution: Endemic to Bolivia.

Lophiarella Szlach., Mytnik & Romowicz, *Polish Bot. J.* 51: 54. 2006. TYPE: *Oncidium microchilum* Lindl. [= *Lophiarella microchila* (Lindl.) Szlach., Mytnik & Romowicz].

Distribution: Southwestern Mexico to northwestern Nicaragua. Fig. 5.

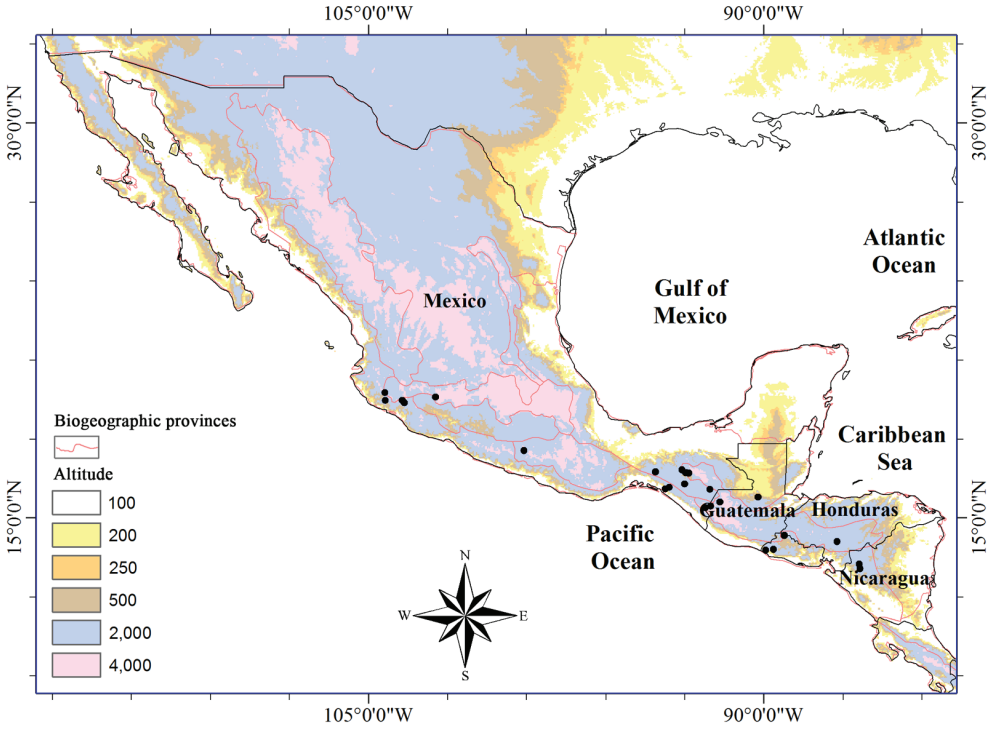

FIGURE 5. Distribution of *Lophiarella* Szlach., Mytnik & Romowicz.

KEY TO THE SPECIES OF *LOPHIARELLA*

1a. Pseudobulbs usually subquadrate, with the abscission layer usually straight, strongly compressed laterally even when turgid; ovary with pedicel 35–40 mm long, ovary 9–12 mm long; flowers large and very showy, 30–50(–70) mm diameter; petals and sepals subequal, oblong, not clawed basally, yellow with transversal red-brown bars; labellum yellow, exceeding 25 mm long, central lobe well-developed, suborbicular to subquadrate, truncate; callus composed of three teeth; column wings hemicircular; column sessile; pollinarium with a short, triangular tegula, which is about as long as the viscidium . . . . . *L. splendida*

1b. Pseudobulbs usually subspheroid, with the abscission layer always curved, slightly compressed laterally (only when dry); ovary with pedicel 15–25 mm long; ovary 3.0–5.5 mm long; flowers smaller and less showy, 20–28 mm diameter; petals and sepals different, sepals broader and with more developed claws, broadly elliptic to suborbicular, strongly clawed basally, color is green-yellow to apple green, with poorly developed transversal red-brown bars or, more commonly, blotches or spots of pale to dark reddish-brown, often the whole surface covered in the darker hue; labellum white with pink or with red-crimson speckles or blotches, when forcefully spread 6–7 mm long; central lobe strongly reduced, triangular, acute; callus more complex with several teeth; column wings triangular, acute, column elongate, clawed; pollinarium with oblong-linear tegula, much longer than the viscidium 2

2a. Plants relatively small; pseudobulbs 1.5–3.0 × 1.0–2.5 cm and leaves 15–24 × 2.5–4.0 cm, coriaceous; inflorescences borne on the fully mature pseudobulb, peduncle 5–7 mm, thinly covered with a waxy layer; ovary with pedicel 20–25 mm long; perianth segments apple green with pale, matte red-brown speckles or blotches, the apices of the petals always totally green; both sepals and petals strongly clawed, the claw accounting for ca. 1/3 total length of the segments; labellum when viewed from above triangular in general profile, white with pale rose spots and blotches and some yellow on the callus; lateral lobes relatively large, reniform-dolabriform with a large, retrorse, rounded proximal lobe and a smaller, triangular porrect, distal lobe, along with the short apical lobe giving the impression of an apically 3-dentate labellar apex; disc with five, large, +/- independent, conspicuous teeth; pollinarium with linear tegula at least twice as long as the pollinia . . . . . *L. flavovirens*

2b. Plants relatively large; pseudobulbs 3.0–4.5 × 2.5–4.0 cm and leaves (12–)22–30 × 4–7(–10) cm, thickly fleshy-coriaceous; inflorescences borne on the inmature pseudobulb, peduncle thicker, 10–15 mm diameter, densely covered with a layer of wax conveying a heavily glaucous aspect; ovary with pedicel 15–18 mm; perianth segments pale yellow green, heavily blotched with darker red-brown, often the whole segment covered in the darker hue; sepals clawed, the claw accounting for ca. 1/4 total length of the segments, petals basally cuneate, not clawed; labellum when viewed from above transversely oblong or broadly ovate in general profile; white with dark wine red or red-crimson blotches, often totally covered with the darker hue; lateral lobes proportionally smaller, reniform with a small, rounded, retrorse proximal lobe and a larger, subtriangular obtuse, porrect distal lobe; disc with a massive callus made up of three large blunt teeth, which are apically confluent on the distal portion of the disc, proximally with several much smaller verrucae on its surface, the two lateral teeth along with the small apical lobe giving the impression of an apically 3-dentate labellar apex; pollinarium with an oblong-obovate tegula about as long as the pollinia . . . . . *L. microchila*

Lophiarella flavovirens (L.O.Williams) Carnevali & Balam, Sys. Bot. 38(1): 53. 2013. Fig. 4J.

Basionym: *Oncidium flavovirens* L.O.Williams, Amer. Orchid Soc. Bull. 9: 174. 1940. TYPE: MEXICO. Colima: Barranca Delgado, near Hacienda San Antonio, Volcano Colima, 103°46'W, 23°19'N, ca. 900 m, 28 January 1935, *O. Nagel 4047* (Holotype: AMES; Isotypes: MO, S, US).

Homotypic synonyms: *Lophiaris flavovirens* (L.O.Williams) Braem, Schlechteriana 4: 17. 1993.

Trichocentrum flavovirens (L.O.Williams) M.W.Chase & N.H.Williams, Lindleyana 16: 137. 2001.

Distribution: Endemic to Mexico.

Lophiarella microchila (Bateman ex Lindl.) Szlach., Mytnik & Romowicz, Polish Bot. J. 51: 54. 2006. Fig. 4K.

Basionym: *Oncidium microchilum* Bateman ex Lindl. Edwards's Bot. Reg. 26: Misc. 82. 1840. TYPE: GUATEMALA. *G. U. Skinner s.n.* (Holotype: K-Lindl.).

Homotypic synonyms: *Lophiaris microchila* (Bateman ex Lindl.) Senghas, Schlechter Orchideen I/C (33–36): 2130. 1997.

Trichocentrum microchilum (Bateman ex Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16: 138. 2001.

Distribution: Mexico, Guatemala, El Salvador, and Honduras.

Lophiarella splendida (A. Rich. ex Duch.) Carnevali & Cetzal, Syst. Bot. 38(1): 58. 2013. Fig. 4L.

Basionym: O*ncidium splendidum* A.Rich. ex Duch. J. Soc. Imp. Centr. Hort. 8: 51. 1862. TYPE: GUATEMALA. En fleurs au mois de janvier 1862, chez MM. Thibaut et Kételeêr, rue de Charonne, 146, à Paris, qui l'ont reçu de M. [Arnaud] Herment, de Caen, *A. Herment s.n.* (Holotype: P [P00437730]).

Homotypic synonyms: *Oncidium tigrinum* var. *splendidum* (A.Rich. ex Duch.) Hook. f. Bot. Mag. 97: t. 5878. 1871. *Trichocentrum splendidum* (A.Rich. ex Duch.) M.W. Chase & N.H.Williams, Lindleyana 16: 138. 2001.

Heterotypic synonyms: *Oncidium splendidum* A.Rich. ex Duch. var. *holoxanthum* Hort. Gard. Chron. Ser. 3, 77: 136. 1925. *Lophiaris splendida* (A.Rich ex Duch.) Christenson f. *holoxantha* (Hort.) Christenson, Richardiana 6: 58. 2006. TYPE: not located.

Oncidium splendidum var. *xanthinum* auct. Gard. Chron. 83: 89. 1928. TYPE: not located.

Distribution: Guatemala, El Salvador, Honduras, and Nicaragua (A. Heller 3090 SEL).

Lophiaris Raf., Fl. Tellur. 4: 40. 1838. TYPE: *Lophiaris fragans* Raf. [=*Lophiaris lanceana* (Lindl.) Braem].

Oncidium section *Miltoniastrum* Rchb.f., Walp. Ann. Bot. Sys. 6: 748–785. 1852. TYPE: *Oncidium lanceanum* Lindl.

Oncidium section *Pluritubeculata-Sarcoptera* Lindl. Fol. Orch. *Oncidium*. Part VI–VII: 37–42. 1855. TYPE: *Oncidium haematochilum* Lindl. & Paxton.

Oncidium section *Lophiaris* (Raf.) Kuntze, Lex. Gen. Phan. 399. 1903. TYPE: *Oncidium lanceanum* Lindl.

Oncidium section *Aphanobulbia-Miltoniastrum* Kraenzl., Pflanzenr. 50(80): 96–115. 1922. TYPE: *Oncidium lanceanum* Lindl.

Oncidium section *Plurituberculata* (Lindl.) Garay & Stacy, Bradea 1(40): 393–428. 1974. TYPE: *Oncidium lanceanum* Lindl.

Trichocentrum Poepp. & Endlich. *pro parte*, *sensu* Williams et al., 2001; Chase et al., 2003, 2005, 2009.

Distribution: Southern Florida in the United States of America, the West Indies, and northern Mexico to southern Brazil and northern Argentina. Fig. 6.

KEY TO THE SPECIES OF *LOPHIARIS* SPECIES AND NATURAL HYBRIDS

1a. Flowers < 10 mm diameter; plants from south of the Amazon River 2
1b. Flowers > 15 mm diameter; plants from Florida (USA), Mexico, Central America, South America north of the Amazon River, and the Antilles 4
2a. Callus pulvinate; column wings downward; plants restricted to southeast Brazil . . . . . *L. schwanbachiae*
2b. Callus smooth; column wings downward and upward; plants from north, south, and west of south of the Amazon River 3
3a. Flowers white; column wings upward . . . . . *L. morenoi*
3b. Flowers yellow with pink or red spots; column wings downward . . . . . *L. pumila*
4a. Flowers > 47 mm diameter; callus 3-teeth; plants from north and south of the Amazon River . . . . . *L. lanceana*
4b. Flowers < 45 mm diameter; callus 5–8-teeth; plants from Florida (USA), Mexico, Central America, north and south of the Amazon River, and the Antilles 5
5a. Leaves <11 cm long; inflorescences usually shorter than the leaves, rarely longer; flowers non-resupinate; isthmus of the labellum < 0.5 mm long; column wings triangular; plant from west and southwest of north and south of the Amazon River . . . . . *L. nana*
5b. Leaves >15 cm long (except in *L. oestlundiana* of 7–30 cm long); inflorescences usually longer than the leaves, rarely shorter; flowers resupinate; isthmus of the labellum > 1 mm long; column wings dolabriform; plants from Florida (USA), Mexico, Central America, north of the Amazon River, and the Antilles. 6
6a. Flowers 30–45 mm diameter, yellow with bright red spots; lateral lobes of the labellum with claw; disc callus with conical accessories callus at each side of the labellar isthmus; plants from evergreen cloud and pine-oak forests at elevations of 800–2800 m 7
6b. Flowers 25–35(–40) diameter, pink, brown or white with pink, purple, reddish, brown or white spots or dots; lateral lobes of the labellum without claw (truncated); disc callus without conical accessories callus at each side of the labellar isthmus (smooth); plants usually from tropical rain and deciduous forests at elevations of 0–1200 m 10
7a. Sepals and petals immaculate or with a large reddish or light brown stain; width of the central lobe much larger than the length through the apices of the lateral lobes of the labellum 8
7b. Sepals and petals with bright red or dark brown spots; width of the central lobe much similar than the length through the apices of the lateral lobes of the labellum 9
8a. Flowers 30–34 mm diameter; callus with three small accessories teeth between the proximal and distal teeth; proximal teeth subcylindrical, ascendant and with four teeth; plants from Sierra Madre del Sur from Mexico . . . . . *L. chrysops*
8b. Flowers 36–41 mm diameter; callus without accessories teeth between the proximal and distal teeth; proximal teeth ovoid, semifused and with 10–15-teeth; plants from Sierra Madre de Chiapas or Cordillera Central from Mexico, Guatemala, and El Salvador . . . . . *L. bicallosa*

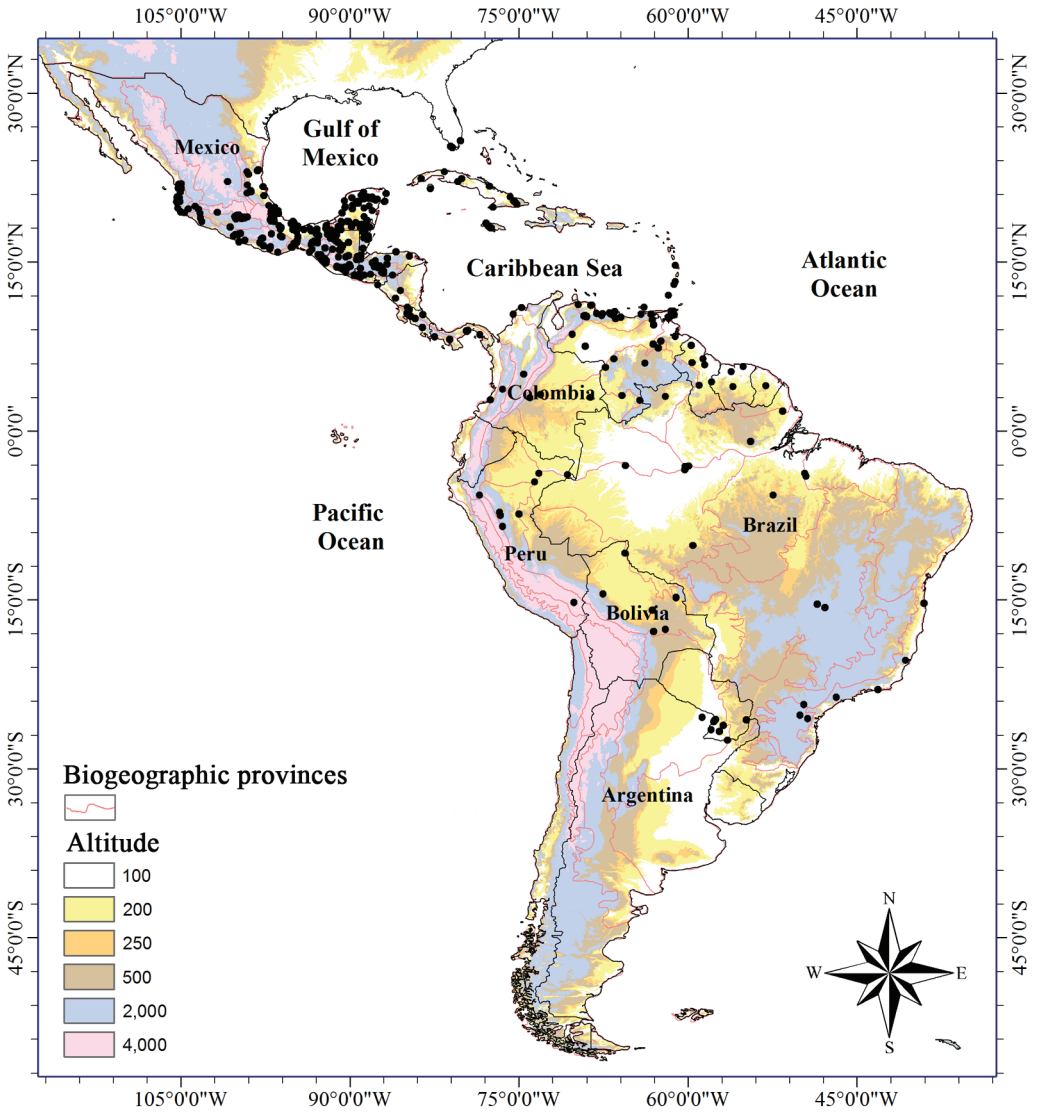

FIGURE 6. Distribution of *Lophiaris* Raf.

KEY TO THE SPECIES OF *LOPHIARIS* SPECIES AND NATURAL HYBRIDS CONT.

9a. Lateral lobes of the labellum obovate; disc of the callus with lateral thickenings; central lobe of the labellum 7–9 × 16–25 mm; isthmus of the labellum much longer than wide (5.0–6.5 × 3.5–4.0 mm); plants from Sierra Madre del Sur, Sierra Madre Occidental, and Eje Neovolcánico Transversal of Mexico . . . . . *L. pachyphylla*

9b. Lateral lobes of the labellum orbicular; disc of the callus without lateral thickenings (smooth); central lobe of the labellum 10–15.5 × 20–25 mm; isthmus of the labellum about as long as wide (3–4 × 3–4 mm); plants from Sierra Madre of Chiapas or Cordillera Central of Mexico, Guatemala, and El Salvador . . . . . *L. cavendishiana*

10a. Sepals and petals white cream or whitish green; sepals oblong-ovoid with the smooth margins; petals subquadrate to oblong ovoid; labellum white or white cream without spots ... 11

10b. Sepals and petals white with red or brown spots; sepals oblong with undulate margins (smooth in *L. lindenii* and *L. oestlundiana*); labellum white, brown with pink, purple, reddish, brown or white spots or dots or reddish or brown without spots 13

11a. Labellum with long isthmus (4–5 mm long); labellum ca. 15 mm long; plants from Honduras and Nicaragua . . . . . *L. aurisasinora*

11b. Labellum with a very short isthmus (0.5–2 mm long); labellum not exceeding 10 mm long; plants from México 12

12a. Pseudobulbs and leaves rarely more than 25 cm tall; claw of the dorsal sepal very short and wide (0.5 mm long); claw of the labellum central lobe 1–2 mm long; endemic to Veracruz . . . . . *L. straminea*

12b. Pseudobulbs and leaves more than 30 cm tall; claw of the dorsal sepal long and thin (1.5 mm long); claw of the labellum central lobe 4–5 mm long; endemic to Chiapas . . . . . *L. sierracaracolensis*

13a. Central lobe of the labellum ovate or transversally elliptical, reddish or red wine without spots on its surface 14

13b. Central lobe of the labellum transversally elliptical, brown without spots on its surface or white, yellow or pink with reddish or brown spots on its surface 17

KEY TO THE SPECIES OF *LOPHIARIS* SPECIES AND NATURAL HYBRIDS CONT.

14a. Lateral lobes of the labellum brown at base and apex; base of the disc callus and proximal teeth brown; isthmus 1–2 mm long; plants from coastal pacific in Jalisco and Nayarit States in Mexico. . . . . *L. oestlundiana*

14b. Lateral lobes of the labellum yellow at base and brown at the apex; base of the disc callus and proximal teeth yellow or yellow with reddish spots; isthmus 0.1–0.2 mm long; plants from coastal Atlantic in south of Mexico (Veracruz, Tabasco, Oaxaca, Chiapas, Quintana Roo, Campeche, and Yucatan states), Belize, Guatemala, and Honduras 15

15a. Petals and sepals white or greenish white with brown or reddish blotches in 2/3 of its surface, oblong-ovate with smooth margins; central lobe of the labellum ovate; proximal teeth of the callus of the labellum yellow without spots; isthmus 0.5–0.6 mm long . . . . . *L. lindenii*

15b. Petals and sepals white with reddish or brown continuous blotches in 2/3 of its surface or purple with continuous blotches or spots, oblong with undulate margins; central lobe of the labellum widely oblate; proximal teeth of the callus of the labellum yellow with reddish spots; isthmus 0.1–0.2 mm long 16

16a. Ovary and pedicel 20–21 mm long; sepals and petals white with reddish or brown continuous blotches in 2/3 of its surface; dorsal sepal 8–10 mm long; central lobe of the labellum 5–6 × 11–12; central keel of the callus parallel to distal teeth . . . . . *L. lindenii* × *L. lurida*

16b. Ovary and pedicel 16.5–18 mm long; sepals and petals white with reddish or purple continuous blotches or spots; dorsal sepal 5.5–6.5 mm long; central lobe of the labellum 3–3.3 × 6.7–7 mm; central keel of the callus parallel to proximal and distal teeth . . . . . *L. lindenii* × *L. oerstedii*

17a. Central lobe of the labellum 1/2, 1 or 3 times wider than long through the apices of the lateral lobes of the labellum. 18

17b. Central lobe of the labellum more or less similar or 1/4 times wider than long through the apices of the lateral lobes of the labellum 25

18a. Central lobe of the labellum brown, dull brown, brown-greenish, yellow brown, reddish brown, or orange brown without spots 19

18b. Central lobe of the labellum white or yellow, with brown or dark brown spots, or reddish brown with white margins 23

19a. Sepals and petals white on the whole surface of the blade and with pale or dark pink confluent or dispersed spots. 20

19b. Sepals and petals white or dull yellowish at base and margins of the blade and the rest of the blade brown, reddish brown, pale grayish green or light yellow with dark red or light brown spots or blotches 21

20a. Proximal teeth of the callus 6-partite; distal teeth of the callus 2-partite; central keel of the callus 1 or 2 times smaller than the length of the distal teeth of the callus; plants from the Atlantic drainage in the states of San Luis Potosí, Tamaulipas, Queretaro, and Veracruz in Mexico. . . . . *L. cosymbephora*

20b. Proximal section of the callus 8—10 parted; distal teeth of the callus 3-partite; central keel of the callus similar in length up to 3/4 the length of the distal teeth of the callus; plants from the Pacific drainage in the states of Michoacán, Guerrero, Oaxaca, and Chiapas in México. . . . . *L. andreana*

21a. Central lobe of the labellum brownish-green (chocolate), or apically mustard-yellow, with a matte texture; proximal and distal teeth and central keel of the callus parallel to lateral lobes of the labellum; plants from western Mexico (Jalisco and Nayarit states). . . . . *L. nataliae*

21b. Central lobe of the labellum brown, greenish brown or dull brown; proximal teeth of the callus parallel to the lateral lobes of the labellum; plants from central and southern Mexico (Veracruz, Estado de Mexico, Oaxaca, Chiapas, Tabasco, Campeche, Quintana Roo, and Yucatán states) to Venezuela and Trinidad and Tobago 22

22a. Petals and sepals white with brown or reddish brown spots; central lobe of the labellum brown or greenish brown; ovary with pedicel 25–32 mm long; isthmus of the labellum 5–8 (–10) . . . . . *L. lurida*

22b. Petals and sepals dull yellowish with brown continuous blotches or confluent brown spots; central lobe of the labellum dull brown; ovary with pedicel 15–16 mm long; isthmus of the labellum 4.0–4.3 mm long. . . . . *L. lurida* × *L. tapiae*

23a. Central lobe of the labellum yellow cream o light brown with dark brown or dark red spots all over its surface; plants from Florida (USA), Greater and Lesser Antilles. . . . . *L. maculata*

23b. Central lobe of the labellum white or light brown with confluent light brown or yellowish spots or with brown spots dispersed all over its surface; plants from Central America (Nicaragua) and north of South America (Venezuela) 24

24a. Ovary with pedicel 11–15 mm long; central lobe of the labellum light yellow with brown spots dispersed all over its surface; lateral lobes of the labellum 2.0–2.2 mm long; plants from Central America (Nicaragua) . . . . . *L. crispiflora* × *L. lurida*

24b. Ovary with pedicel 24–25 mm long; central lobe of the labellum white with light brown or yellowish spots confluents on all of its surface; lateral lobes of the labellum 3.5–4.0 mm long; plants from north of South America (Venezuela) . . . . . *L. carthagenensis* × *L. lurida*

25a. Ovary with pedicel 34–37 mm long 26

25b. Ovary with pedicel 17–30 mm long 27

26a. Flowers yellow with dark brown spots and blotches; petals and sepals almost perpendicular to the labellum and the main axis of the flower, thus subparallel to each other; central labellum lobe yellow with brown tinges; plants restricted to the areas of the Candelaria and Palizada rivers, Campeche, Mexico. . . . . *L. tapiae*

26b. Flowers white with lilac or pink spots, rarely flowers concolor; sepals and petals at each side of the flowers at approximately 45° to the main axis of the flower; central lobe of the labellum pale pink tinged; plants restricted to NW Chiapas and SE Quintana Roo, Mexico. . . . . *L. teaboana*

27a. Lateral lobes of the labellum bright yellow; callus of the labellum bright yellow; plants restricted to the NW section of the Mexican Yucatan Peninsula . . . . . *L. andrewsiae*

27b. Lateral lobes of the labellum white, green with dark orange, red brown, pale pink, magenta or wine spots or pale straw-yellow with reddish spots; callus of the labellum white, yellow, pale straw-yellow or purple with pink, magenta or reddish-brown spots; plants from Mexico (SE Oaxaca, N Chiapas, Tabasco, and the Yucatan Peninsula southward) Central America and northern South America 28

28a. Central lobe of the labellum brown or reddish brown with white margins. . . . . *L.* × *oerstelurida*

28b. Central lobe of the labellum white, yellow or greenish with red brown, magenta or pale pink spots in 2/3 of its surface or red brown, magenta or brown spots dispersed across its surface or pink to pale pink spots on almost the entirety of its surface 29

KEY TO THE SPECIES OF *LOPHIARIS* SPECIES AND NATURAL HYBRIDS CONT.

29a. Flowers white or greenish with red brown, wine or magenta spots; central keel of the callus parallel to proximal and distal teeth; proximal teeth with the apex with more than 10 small, conical and irregular teeth; central keel compressed and with more than six small conical teeth; plants from northern Colombia and Venezuela . . . . . *L. carthagenensis*

29b. Flowers white or yellow with pink, pale pink, magenta, red or brown spots; central keel of the callus parallel to distal teeth; proximal teeth conical to ovoid with surface of the apex smooth or with 3–6 small, globose teeth; central keel compressed with one or two conical teeth; plants from northwestern Mexico to northeastern Panama 30

30a. Sepals and petals white with pink o pale pink spots; spots heterogeneously dispersed over the whole surface; central lobe of the labellum white with a pink or pale pink spots or stains in almost all its surface; proximal teeth of the callus conical with smooth surface of the apex; central keel of the callus with one teeth; plants from northeastern Mexico to southwestern Honduras and Nicaragua . . . . . *L. oerstedii*

30b. Sepals and petals white or yellow with red brown, magenta, red, brown or pale pink spots; spots confluent or with a continuous and homogeneous pattern or covering almost the whole surface or heterogeneously dispersed over the whole surface, always non-confluent; central lobe white with a red brown, magenta or pale pink spot in 2/3 or dispersed across of its surface; proximal teeth of the callus ovoid with 3–6 small globose teeth on the surface of the apex; central keel of the callus with one or two teeth; plants from eastern Honduras and central-northeastern Nicaragua to northwest of Panama. 31

31a. Flowers 16–23 mm diameter, white with red brown, magenta or pale pink spots; sepals and petals with spots confluent or with a continuous and homogeneous pattern or covering almost the whole surface; dorsal sepal 8–10 x 4–6; central lobe of the labellum white with a red brown, magenta or pale pink spot in 2/3 of its surface; proximal teeth of the callus ovoid with 6 small globose teeth on the surface of the apex; central keel of the callus with one or two teeth; isthmus of the labellum 2.5–3.5 mm width; plants from eastern Honduras and central-northeastern Nicaragua . . . . . *L. crispiflora*

31b. Flowers 25–30 mm diameter, yellow with red or brown spots; sepals and petals with spots heterogeneously dispersed over the whole surface, always non-confluent; dorsal sepal 12–14 x 8–11 mm; central lobe of the labellum yellow with red or brown spots dispersed across its surface;proximal teeth of the callus ovoid with 3 small globose teeth on the surface of the apex; central keel of the callus with one tooth; isthmus of the labellum 5 mm width; plants from northwestern Panama . . . . . *L. silverarum*

Lophiaris andreana (Cogn.) R.Jiménez & Carnevali, Harvard Pap. Bot. 6(1): 284. 2001. Fig. 7A.

Basionym: *Oncidium carthagenense* (Jacq.) Sw. var. *andreanum* Cogn., Fl. Bras. 3(6): 411. 1906. TYPE: [MEXICO]. [Guerrero]: de la prov. de Guerrero (Mexique) Recu de Ed. André, 6 May 1899, *E. André s. n.* (Holotype: BR).

Homotypic synonyms: *Oncidium andreanum* (Cogn.) Garay, Amer. Orchid Soc. Bull. 51(6): 607. 1982. *Trichocentrum andreanum* (Cogn.) R.Jiménez & Carnevali, Icon. Orchid. 5–6: t. 697. 2003.

Heterotypic synonym: *Trichocentrum perezii* Beutelspacher, Lacandonia 2(2): 11–15. 2009. ***Syn. nov.*** TYPE: MEXICO. Chiapas, Villaflores, 5 km del entronque a Grutas de Guaymas, 15 August 2008, *F. Pérez Cruz s.n.* (Holotype: HEM).

Distribution: Endemic to Mexico.

An analysis of the protologue *T. perezii* shows it is only a pale-colored form of the variable *L. andreana*. Thus, it is here referred to the synonymy of the latter.

Lophiaris andrewsiae R.Jiménez & Carnevali, Harvard Pap. Bot. 5(2): 419–422. 2001. TYPE: MEXICO. Campeche: Mun. Hopelchén, 11 km al sur de la frontera Yucatán-Campeche, ca. San Antonio Yaaxché, 20˚05'00"N, 89˚43'50"W, 20 September 1999, *G. Carnevali, F. May & J. L. Tapia 5673* (Holotype: CICY; Isotypes: AMO, AMES, FLAS, SEL). Fig. 7B.

Homotypic synonym: *Trichocentrum andrewsiae* (R.Jiménez & Carnevali) R.Jiménez & Carnevali, Icon. Orchid. 5–6: 9. 2003.

Distribution: Endemic to Mexico.

Lophiaris aurisasinora (Standl. & L.O.Williams) Braem, Schlechteriana 4: 17. 1993. Fig. 7C.

Basionym: *Oncidium aurisasinorum* Standl. & L.O.Williams, Ceiba 3(1): 39. 1952; TYPE: HONDURAS. Francisco Morazán: margines de la Quebrada de las Burras, entre Suyapa y Tegucigalpa, 1050 m, 11 December 1948, flores blancas, sobre árboles, común, floresta mezclada, *A. Molina 1823* (Holotype: US, photo EAP; Isotype: F).

Homotypic synonym: *Trichocentrum aurisasinorum* (Standl. & L.O.Williams) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001.

Distribution: Guatemala, El Salvador, Honduras and Nicaragua.

Lophiaris bellaniana Königer, Arcula 22: 468. 2012. TYPE: MEXICO. Without exact locality, flowered in culture at "Orchids & more," Ismaning, *W. Königer WK-166* (Holotype: M; Isotype: Herb. H. Königer).

Homotypic synonym: *Trichocentrum bellanianum* (Königer) J.M.H.Shaw, Orchid Rev. Suppl., 122(1305): 17. 2014.

Distribution: Mexico (without exact origin).

Lophiaris bicallosa (Lindl.) Braem, Schlechteriana 4(1–2): 17. 1993. Fig. 7D.

Basionym: *Oncidium bicallosum* Lindl., Pl. Hartw. p. 94. t. 12. 1843. TYPE: GUATEMALA. Hacienda de Diegero, *K. T. Hartweg s.n.* (Holotype: K-Lindl.).

Homotypic synonym: *Trichocentrum bicallosum* (Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001.

Distribution: Mexico, Guatemala, El Salvador, and Honduras.

Lophiaris carthagenensis (Jacq.) Braem, Schlecteriana 4(1–2): 17. 1993. Fig. 7E.

Basionym: *Epidendrum carthagenense* Jacq., Enum. Syst. Pl. Carib. 30. 1760. TYPE: COLOMBIA: Cartagena. *N. J. von Jacquin s.n.* (Holotype: BM).

Homotypic synonyms: *Oncidium carthagenense* (Jacq.)

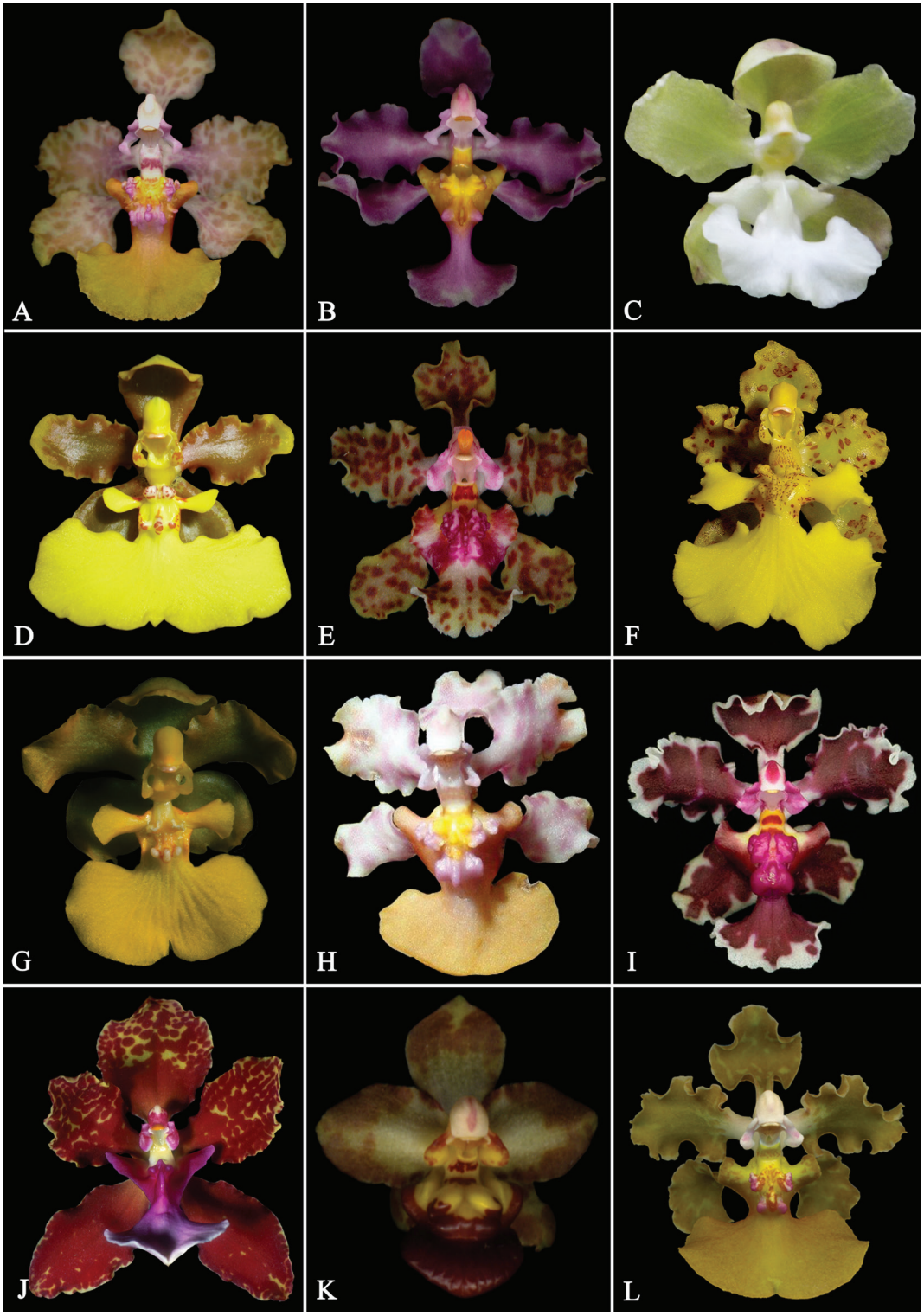

FIGURE 7. Floral morphology. **A**, *Lophiaris andreana* (Cogn.) R.Jiménez & Carnevali (*Cetzal 4* CICY); **B**, *Lophiaris andrewsiae* R.Jiménez & Carnevali (*Cetzal s.n.* CICY); **C**, *Lophiaris aurisasinora* (Standl. & L.O.Williams) Braem (*Vega s.n.* CICY); **D**, *Lophiaris bicallosa* (Lindl.) Braem (*Vega s.n.* CICY); **E**, *Lophiaris carthagenensis* (Jacq.) Braem (*Noguera-Savelli et al. 712* VEN); **F**, *Lophiaris cavendishiana* (Bateman) Braem (*Carnevali 7264* CICY); **G**, *Lophiaris chrysops* (Rchb.f.) R.Jiménez & Carnevali (*Kennedy s.n.* AMES); **H**, *Lophiaris cosymbephora* (C.Morren) R.Jiménez & Carnevali (*Carnevali 7251* CICY); **I**, *Lophiaris crispiflora* (Schltr.) Balam & Cetzal (*Bogarin & Pupulin 2228* JBL); **J**, *Lophiaris lanceana* (Lindl.) Braem (*Kennedy s.n.* AMES); **K**, *Lophiaris lindenii* (Brongn.) Braem (*Cetzal 373* CICY); **L**, *Lophiaris lurida* (Lindl.) Braem (*Noguera & Cetzal 1020* CH). Photographs: [A–B, E–F, K–L] W. Cetzal-Ix, [C–D] H. Vega, [G, J] G. Kennedy, [H] G. Carnevali, [I] Jardin Botánico Lankester (http://www.epidendra.org/).

Sw., Kongl. Vetensk. Acad. Nya Handl. 21: 240. 1800. *Trichocentrum carthagenense* (Jacq.) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001.

Heterotypic synonyms: *Oncidium panduriferum* Kunth, Nov. Gen. Sp. (quarto ed.) 1: 346–347, t. 82. 1815. TYPE: COLOMBIA. Crescit in convallibus Regni Novogranatensis, sub coelo mitori, ad radices Parami Pitatumbe, juxta pagum Pongo, inter urbes Almaguer et Pasto, alt. 1370 hex, floret Novembri, *A. von Humboldt & A. Bonpland s.n.* (Holotype: P [00320016, 00320017; drawing of type 00437513]).

Oncidium carthagenense (Jacq.) Sw. var. *sanguineum* (Lindl.) Lindl., Fol. Orchid. 40. 1855. *Oncidium sanguineum* Lindl., Sert. Orch. Plate 27. 1839. TYPE: VENEZUELA: Distrito Federal, La Guaira ex Hort. *Loddiges s.n.* (Holotype: K-Lindl.).

Oncidium carthagenense (Jacq.) Sw. var. *klotzschii* Lindl., Fol. Orchid. 40. 1855. TYPE: VENEZUELA. Distrito Federal. Caracas, *H. Wagener s.n.* (Holotype: K-Lindl.).

Oncidium carthagenense (Jacq.) Sw. var. *swartzii* Lindl., Fol. Orchid. 40. 1855. TYPE: COLOMBIA. Thick forests of Cartagena, *N. J. von Jacquin s.n.* (Holotype: presumably at BM, not seen).

Distribution: Colombia and Venezuela.

Lophiaris cavendishiana (Bateman) Braem, Schlechteriana 4(1–2): 17. 1993. Fig. 7F.

Basionym: *Oncidium cavendishianum* Bateman, Orchid. Mexico & Guatemala, t. 3. 1837. TYPE: GUATEMALA. *G. U. Skinner s.n.* (Holotype: K-Lindl., photo at AMO).

Homotypic synonym: *Trichocentrum cavendishianum* (Bateman) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001.

Distribution: Mexico, Guatemala, El Salvador, and Honduras.

Lophiaris chrysops (Rchb.f.) R.Jiménez & Carnevali, Harvard Pap. Bot. 6(1): 284. 2001. Fig. 7G.

Basionym: *Oncidium chrysops* Rchb.f., Gard. Chron. n.s. 3: 104. 1888. TYPE: MEXICO. Without locality precise, *H. Low s.n.* (Holotype: W-Reichenbach No. 7972).

Homotypic synonym: *Trichocentrum chrysops* (Rchb.f.) Soto Arenas & R.Jiménez, Icon. Orchid 5–6: ix. 2003.

Heterotypic synonyms: *Oncidium margalefii* Hágsater, Orquídea 4: 256. 1974. TYPE: MEXICO. Guerrero: Cruz de Ocote, between Yextla and Jaleaca, 2000 m, December 1973, *E. Hágsater 3690* (Holotype: MEXU No. 177143).

Lophiaris margalefii (Hágsater) Braem, Schlechteriana 4(1–2): 19. 1993.

Trichocentrum margalefii (Hágsater) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001.

Distribution: Endemic to Mexico.

Lophiaris cosymbephora (C.Morren) R.Jiménez & Carnevali, Harvard Pap. Bot. 6(1): 284. 2001. Fig. 7H.

Basionym: *Oncidium cosymbephorum* C.Morren, Ann. Soc. Roy. Agric. Gand. 5: 333–334, t. 275. 1849. TYPE: Sa patrie nous est inconnue. M. Heynderyex la cultive (protologue), ex Hort. (Holotype: not located and most likely lost).

Homotypic synonyms: *Oncidium luridum* Lindl. var. *morreni* Lindl., Fol. Orchid. Oncidium. 41. 1855. *Trichocentrum cosymbephorum* (C.Morren) R.Jiménez & Carnevali, Icon. Orchid. 5–6: 9. 2003.

Heterotypic synonyms: *Oncidium luridum* var. *atratum* Lindl., J. Hort. Soc. London 6: 54. 1851. TYPE: MEXICO. Near Tampico, *K. T. Hartweg s.n.* (Holotype: K-79377). *Oncidium luridum* var. *henchmannii* Knowles & Westc., Floricultural Cabinet, and Florist's Magazine 3: 21, t. 97. 1839. *Oncidium henchmanni* (Knowles & Westc.) Lodd., Cat. Orchid. 2: 1323. 1842. *non O. henchmanni* Lodd. ex Lindl. Fol. Orchid. *Oncidium* 40. 1855. TYPE: MEXICO. Hidalgo: Real del Monte, ex Hort. Low. and Co., 1837. Lectotype t. 97, designated by Christenson, Lindleyana 11: 21. 1996.

Distribution: Endemic to Mexico.

Lophiaris crispiflora (Schltr.) Balam & Cetzal, J. Torrey Bot. Soc. 139(1): 14. 2012. Fig. 7I.

Basionym: *Oncidium oerstedii* var. *crispiflorum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 17: 85. 1922. TYPE: PANAMA. An der Küste des Pacifischen Ozeans bei Panama City—no. 1 (Holotype: destroyed); Lectotype: Panama, Margin of Pacific Ocean, C. *W. Powell 1* (AMES-23920) designated by Christenson, Lindleyana 6: 129. 1991.

Homotypic synonym: *Trichocentrum crispiflorum* (Schltr.) Bogarin, Lankesteriana 14(3): 274. 2014.

Heterotypic synonyms: *Lophiaris mosquitensis* Dressler, *nom. nud.*

Distribution: Eastern Honduras, central-northeastern Nicaragua, and northwest Panama.

Lophiaris lanceana (Lindl.) Braem, Schlechteriana 4(1–2): 17. 1993. Fig. 7J.

Basionym: *Oncidium lanceanum* Lindl. Trans. Hort. Soc. London 2:100. t. 7. 1836. *Lophiaris fragrans* Raf., Fl. Tellur. 4:41. 1838, *nom. superfl.* TYPE: SURINAM. Uncertain locality, *J. H. Lance & F. W. Hostmann 342* (Holotype: K-Lindl., not seen).

Homotypic synonym: *Trichocentrum lanceanum* (Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001.

Heterotypic synonyms: *Oncidium lanceanum* Lindl. var. β *superbum* Lindl. ex Seemann, Harting. Parad. Vindob. 1: t. 12. 1844. TYPE: The illustration accompanying the protologue.

Oncidium lanceanum Lindl. var. *louvrexianum* Rchb.f., Gard. Chron. 18: 218. 1882. TYPE: Not located.

Oncidium lanceanum forma *aureum* Christenson, Phytologia 71(6): 442. 1992. TYPE: Not located.

Distribution: Colombia, Venezuela, Trinidad and Tobago, Guyana, Suriname, and Brazil.

Lophiaris lindenii (Brongn.) Braem, Schlechteriana 4(1–2): 19. 1993. [as "*lindeni"*]. Fig. 7K.

Basionym: *Oncidium lindenii* Brongn., L'Horticulteur Universel 3: 372–373. 1842. [non *Oncidium lindenii* Lodd. ex Lindl. Sertum Orchidaceum sub t. 48. 1841. *nom. nud.*; as "Lindenii"]. TYPE: MEXICO. [Campeche:] Habite aux environs de Campeche (protologue), *L. Linden s.n.* (Holotype: BR; drawing at AMES [102500]).

Homotypic synonym: *Trichocentrum lindenii* (Brongn.) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001.

Heterotypic synonym: *Oncidium retemeyerianum* Rchb.f., Bot. Zeitung (Berlin) 14(30): 513–514. 1856. [as "*Retemeyerianum"*]. TYPE: Unknown origin, cultivated in Vienna from plants supplied by Herr Retemeyer (Holotype: probably W-Reichenbach-23960, not seen; drawing in AMES-24269).

Distribution: Mexico, Belize, Guatemala, and Honduras.

Lophiaris lurida (Lindl.) Braem, Schlechteriana 4(1–2): 19. 1993. Fig. 7L.

Basionym: *Oncidium luridum* Lindl., Bot. Reg. 9: pl. 727. 1823. TYPE: "An unrecorded species… Native of South America," ex Hort Griffin, at South Lambeth. (Holotype: The illustration accompanying the protologue).

Homotypic synonym: *Trichocentrum luridum* (Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001.

Distribution: Mexico, Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Colombia, Venezuela, and Trinidad and Tobago,

Lophiaris maculata (Aubl.) Ackerman, Lindleyana 15(2): 92. 2000. Fig. 8A.

Basionym: *Epidendrum maculatum* Aubl., Hist. Pl. Guiane 2: 825. 1775. TYPE: presumably collected in St. Vincent (St. Vincent and the Grenadines), Pl. Amer. 173, t. 178, fig. 2. 1758; Lectotype, designated by Ackerman, 2014: 537: *Helleborine maculofa, follis aloes carinatis* in Burman, Pl. Amer. t. 178; Epitype, designated here: St. John, Carlota, *R. Howard 11283* [AMES]).

Homotypic synonym: *Trichocentrum maculatum* (Aubl.) M.W.Chase & N.H.Williams, Lindleyana 16(3): 218. 2001.

Heterotypic synonyms: *Epidendrum undulatum* Sw., Prodr. 122. 1788. TYPE: JAMAICA. *O. Swartz s.n.* (Lectotype, designated by Ackerman, 2014: 537: S; Isolectotypes: UPS [not seen], G [not seen]).

Oncidium luridum Lindl. var. *guttatum* Lindl., Edwards´s Bot. Reg. 25: t. 16. 1839. TYPE: JAMAICA. Hort. (Holotype: K-Lindl., not seen).

Oncidium undulatum (Sw.) Salisb., Trans. Hort. Soc. London 1: 295. 1812.

Trichocentrum undulatum (Sw.) Ackerman & M.W.Chase, Lindleyana 16(4): 225. 2001.

Oncidium luridum Lindl. var. *intermedium* Lindl., Fol. Orchid. Oncidium 41. 1855. TYPE: CUBA. Santiago in Cuba, on the Sierra Maestre, at the height of 5000 ft., *L. Linden s.n.* (Holotype: K-Lindl., not seen).

Oncidium intermedium Knowl. & Westc., Fl. Cab. 2: 53, t. 60. 1838 [non *O. intermedium* Bert. ex Spreng., Syst. Veg. 16(3): 728. 1826].

Oncidium guttatum var. *intermedium* (Lindl.) Rchb. f., Ann. Bot. Syst. 6: 782. 1863.

Distribution: Florida (USA) and the Greater (Cuba and Jamaica) and Lesser (Martinique, San Vicent, and The Grenadines) Antilles.

Lophiaris morenoi (Dodson & Luer) Braem, Schlechteriana 4(1–2): 19. 1993. Fig. 8B.

Basionym: *Oncidium morenoi* Dodson & Luer, Selbyana 1: 44. 1976. TYPE: BOLIVIA. 10 km east of Santa Cruz, flowering in cult. [Sic.], *F. Fuchs s.n.* (Holotype: SEL-1366).

Homotypic synonym: *Trichocentrum morenoi* (Dodson & Luer) M.W.Chase & N.H.Williams, Lindleyana 16: 138. 2001.

Distribution: Bolivia, Peru, and Brazil.

Lophiaris nana (Lindl.) Braem, Schlechteriana 4(1–2):19. 1993. Fig. 8C.

Basionym: *Oncidium nanum* Lindl. Edwards´s Bot. Reg. 28(30): 37. 1842. TYPE: GUYANA. Uncertain locality, *C. Loddiges 1327* (Holotype: K-Lindl.).

Homotypic synonym: *Trichocentrum nanum* (Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16(2): 138. 2001.

Heterotypic synonyms: *Oncidium thyrsiflorum* Barb. Rodr., Gen. Sp. Orchid. 2: 194, t. 340. 1881. TYPE: BRAZIL. [Pará:] Dans les environs de la ville de Santarem, province du Pará, June, *J. Barbosa Rodrigues* (Holotype: destroyed; Lectotype, here designated, RB, not seen [reproduced in Sprunger et al., 1996: 390]).

Oncidium patulum Schltr., Orchis 8: 18. 1914. TYPE: Probably Brazil, without locality, date, or collector (Holotype: B, destroyed).

Distribution: Colombia, Venezuela, Guyana, Peru, Bolivia, and Brazil.

Lophiaris natalieae Balam & Carnevali, Lankesteriana 9(3): 522 (521–525; fig. 1). 2010. TYPE: MEXICO. Jalisco: Cabo Corrientes, 1.3 km. después del puente Los Horcones, ca. 11 km después de Boca de Tomatlán, rumbo a El Tuito, 20°26'47"N, 105°17'05"W, 460–470 m; floreciendo en cultivo en Dzityá, Yucatán, 25 Marzo 2008, de una planta colectada en Julio de 2007, *G. Carnevali & I. Ramírez 7271* (Holotype: CICY; Isotype: AMES). Fig. 8D.

Homotypic synonym: *Trichocentrum nataliae* (Balam & Carnevali) R.Jiménez & Solano, Acta Bot. Mex. 97: 54. 2011.

Distribution: Endemic to Mexico.

Lophiaris oerstedii (Rchb.f.) R.Jiménez, Carnevali & Dressler, Harvard Pap. Bot. 5(2): 423. 2001. Fig. 8E.

Basionym: *Oncidium oerstedii* Rchb.f., Bonplandia (Hanover) 2: 91. 1854. TYPE: NICARAGUA. Without locality, "undoubtedly the most beautiful discovery of… Oersted [Unzweifelhaft die schönste Entdeckung des

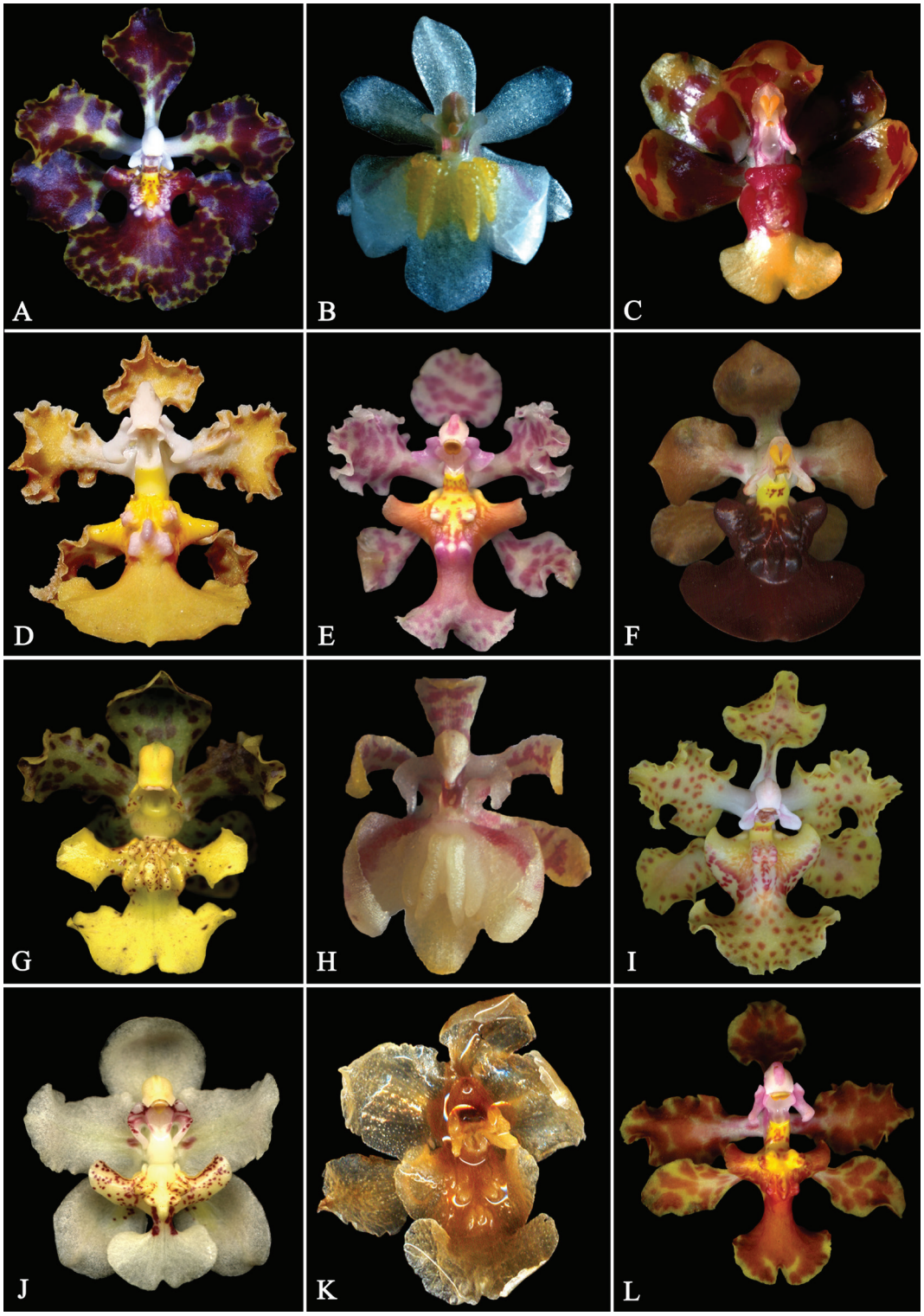

FIGURE 8. Floral morphology. **A**, *Lophiaris maculata* (Aubl.) Ackerman (*Kennedy s.n.* AMES); **B**, *Lophiaris morenoi* (Dodson & Luer) Braem (*Kennedy s.n.* AMES); **C**, *Lophiaris nana* (Lindl.) Braem (*Kennedy s.n.* AMES); **D**, *Lophiaris natalieae* Balam & Carnevali (*Carnevali & Ramírez 6931* CICY); **E**, *Lophiaris oerstedii* (Rchb.f.) R.Jiménez, Carnevali & Dressler (*Balam s.n.* CICY); **F**, *Lophiaris oestlundiana* (L.O.Williams) Braem (*Cetzal 404* CICY); **G**, *Lophiaris pachyphylla* (Hook.) R.Jiménez & Carnevali (*Ramírez s.n.* CICY); **H**, *Lophiaris pumila* (Lindl.) Braem (*Kennedy s.n.* AMES); **I**, *Lophiaris silverarum* Carnevali & Cetzal *(Silveira & Rodriguez s.n.* CICY); **J**, *Lophiaris straminea* (Bateman ex Lindl.) Braem (*Carnevali 7161* CICY); **K**, *Lophiaris sierracaracolensis* Cetzal & Balam (*Pérez Farrera 565* HEM); **L**, *Lophiaris tapiae* Balam & Carnevali (*Balam 114* CICY). Photographs: [A–C, H] G. Kennedy, [D] G. Carnevali, [E–G, I–L] W. Cetzal-Ix.

Hrn. Dr. A. Oersted]," *A. Oersted s.n.* (Holotype: W-Reichenbach, not seen, photograph and drawing of holotype at AMES-24182, 39629; photograph at AMO).

Homotypic synonym: *Oncidium carthagenense* var. *oerstedii* (Rchb.f.) Lindl., Fol. Orchid. 40. 1855.

Trichocentrum oerstedii (Rchb.f.) R.Jiménez & Carnevali, Icon. Orchid. 5–6: ix. 2003.

Heterotypic synonyms: *Oncidium salvadorense* Schltr., Repert. Spec. Nov. Regni Veg. 12(322–324): 215. 1913. TYPE: EL SALVADOR. San Salvador, in Wäldern bei Izalco, blühend im Feb 1907, *H. Pittier 5753* (Holotype: B, destroyed; Isotype: US-593112).

Oncidium kymatoides Kraenzl., Pflanzenr. 50 (Heft. 80): 112. 1922. TYPE: GUATEMALA. Without locality, *H. von Tuerckheim s.n.* (Holotype: presumably at BM, not seen).

Oncidium obsoletum A. Rich & Galeotti ex Lindl., Fol. Orchid. 6: 41 (1855). *nom. nud.*

Distribution: Mexico, Belize, Guatemala, El Salvador, Honduras, and Nicaragua.

Lophiaris oestlundiana (L.O.Williams) Braem, Schlechteriana 4(1–2): 19. 1993. Fig. 8F.

Basionym: *Oncidium oestlundianum* L.O.Williams, Amer. Orch. Soc. Bull. 9(12): 336, f. f. 5–9. 1941. [as *Oncidium* "Oestlundianum"]. TYPE: MEXICO. Nayarit, on a tree in open field, region of Yago, 21˚50'N, 105˚04'W, 300 m, 12 August 1936, *O. Nagel & J. Gonzáles 5134* (Holotype: AMES [43784]; Isotype: US [1809825]).

Homotypic synonym: *Trichocentrum oestlundianum* (L.O.Williams) M.W.Chase & N.H.Williams, Lindleyana 16(2): 138. 2001.

Distribution: Endemic to Mexico.

Lophiaris pachyphylla (Hook.) R.Jiménez & Carnevali, Harvard Pap. Bot. 6(1): 284. 2001. Fig. 8G.

Basionym: *Oncidium pachyphyllum* Hook., Bot. Mag. 67: t. 3807. 1840. TYPE: MEXICO. Without locality precise, ex Hort. *J. Parkinson s.n.* (Holotype: K-Lindl., photo, AMO).

Homotypic synonym: *Trichocentrum pachyphylla* (Hook.) R.Jiménez & Carnevali, Icon. Orchid 5–6: ix. 2003.

Heterotypic synonym: *Oncidium pachyphyllum* Hook. var. *chrysoglossum* Rchb.f., Xenia Orch. 1: 237, t. 99, fig. IV, 9–12. 1858. TYPE: Unknown origin (probably Mexico), *Herrn Senator Jenisch 52* (Holotype: W-R No. 7981; slide AMO).

Distribution: Endemic to Mexico.

Lophiaris pumila (Lindl.) Braem, Schlechteriana 4(1–2): 21. 1993. Fig. 8H.

Basionym: *Oncidium pumilum* Lindl., Bot. Reg. 11: t. 920. 1825. TYPE: BRAZIL. Between Río Janeiro and Boto Fogo, upon the trunk of a *Bombax Ceiba* [Sic.], flowering in cult., *W. Herbert s.n.* (Holotype: K-Lindl, not seen).

Homotypic synonym: *Trichocentrum pumilum* (Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001. *Lophiarella pumila* (Lindl.) Szlach., Mytnik & Romowicz, Polish Bot. J. 51: 54. 2006.

Heterotypic synonyms: *Oncidium pumilum* var. *angustifolium* Cogn., Fl. Bras. 3(6): 374. 1905. TYPE: BRAZIL. In prov. S. Paulo ad Campinas, *F. Noack s.n.* (Holotype: BR, not seen).

Oncidium pumilum var. *robustum* Cogn., Fl. Bras. 3(6): 374. 1905. TYPE: BRAZIL. In prov. Río de Janeiro, *L. Riedel n. 3, 4* (Syntype: BR); in prov. S. Paulo prope Campinas, campes novaes in comm. *N. Geogr. & G. Paulo 2865* (Syntype: BR).

Oncidium pumilum var. *laxum* Kraenzl., Ark. Bot. 16(8): 27. 1921. TYPE: BRAZIL. Sao Paulo: Campinas, *A. Heiner s.n.* (Holotype: S; Isotype: BR)

Distribution: Brazil, Paraguay, and Argentina.

Lophiaris schwambachiae (V.P.Castro & Toscano) Senghas, Schlechter Orchideen I/C (33–36): 2128. 1997.

Basionym: *Oncidium schwambachiae* V.P. Castro & Toscano, Bradea 3(39): 353–357. 1983. [as *schwambachii*]. TYPE: BRAZIL. Espírito Santo: Domingos Martins, ca. 500–600 m, in moist forest, 22 December 1981, *R. A. Kautsky s.n.* (Holotype: HB [71550]).

Homotypic synonym: *Trichocentrum schwambachiae* (V.P.Castro & Toscano) Meneguzzo, Harvard Pap. Bot. 9: 74. 2014.

Distribution: Endemic to Brazil.

Lophiaris sierracaracolensis Cetzal & Balam, Novon 18(1): 12–15, f. 1C. 2008. TYPE: MEXICO. Chiapas: Mun.Villaflores, Sierra El Caracol, 10 km al O delejido La Sombra de la Selva, ca. 14˚19'00"N, 93˚37'00"W. ca. 860 m, selva baja caducifolia, 17 July 1995, *M. A. Pérez Farrera 565* (Holotype: HEM; isotypes, CICY, MO [holotype fragm.]). Fig. 8I.

Homotypic synonym: *Trichocentrum sierracaracolense* (Cetzal & Balam) R.Jiménez & Solano, Acta Bot. Mex. 97: 54. 2011.

Distribution: Endemic to Mexico.

Lophiaris silverarum Carnevali & Cetzal, Phytotaxa 162(3): 165–172. 2014. TYPE: PANAMA. Veraguas: Distrito de La Mesa, Palo Verde, Río Subí, Costa Pacífica 8˚13'N, 81˚10'W, 180 m, December 2005, vegetación primaria a orillas del río, *G. Silvera & B. Rodríguez s.n.* (Holotype: PMA; Isotypes: AMES, CICY). Fig. 8J.

Homotypic synonym: *Trichocentrum silverarum* (Carnevali & Cetzal) J.M.H.Shaw, Orchid Rev. 122(1306): 37. 2014

Distribution: Endemic to Panama.

Lophiaris straminea (Bateman ex Lindl.) Braem, Schlechteriana 4(1–2): 21. 1993. Fig. 8K.

Basionym: *Oncidium stramineum* Bateman ex Lindl., Edwards's Bot. Reg. 24: Misc. 39. 1838. TYPE: MEXICO. Veracruz: Zacuapam, *K.T. Hartweg s.n.* (Holotype: K).

Homotypic synonym: *Trichocentrum stramineum* (Bateman ex Lindl.) M.W.Chase & N.H.Williams, Lindleyana 16(2): 138. 2001.

Heterotypic synonym: *Oncidium saltator* Lem., Fl. Serres Jard. Eur. 3: sub t. 237B. 1847. TYPE: Not located.

Distribution: Endemic to Mexico.

Lophiaris tapiae Balam & Carnevali, Acta Bot. Mex. 97: 21 (17–29; Figs. 1–3). 2011. TYPE: MÉXICO. Campeche: Municipio Candelaria, en la periferia del poblado de Candelaria, específicamente a 25 m NE del puente, creciendo sobre árboles a orillas del río Candelaria, remanentes de selva mediana subperennifolia, 18˚11'15.20"N, 91˚2'55.57"W, 35 m, floreciendo en cultivo en Mérida, Yucatán, México el 9 de noviembre de 2009 de una planta colectada el 21 de julio de 2009, *R. Balam, W. Cetzal & G. Cáceres 114* (Holotype, CICY; Isotypes: AMES, MEXU). Fig. 8L.

Homotypic synonym: *Trichocentrum tapiae* (Balam & Carnevali) J.M.H.Shaw, Orchid Rev. 122(1305): 18. 2014.

Distribution: Endemic to Mexico.

Lophiaris × teaboana R. Jiménez, Carnevali & Tapia-Muñoz, Harvard Pap. Bot. 5(2): 423–425, f. 6. 2001. TYPE: MEXICO. Yucatán, Mpio. Teabo, población de Teabo, remanentes de selva mediana subcaducifolia, colectado por G. Campos Ríos (no. 2511) y accesionado por el Jardín Botánico Regional del CICY como 89-020-a, floreciendo en cultivo en Mérida, Yucatán, México, 29 October 1999, *G. Carnevali 5905* (Holotype: CICY, Isotype: AMO). Fig. 9A.

Homotypic synonym: *Trichocentrum × teaboanum* (R.Jiménez, Carnevali & Tapia-Muñoz) R.Jiménez & Carnevali (non *teaboana*), Icon. Orchid. 5–6: 9. 2003.

Distribution: Mexico.

Lophiaris × haematochila (Lindl. & Paxton) Braem, Schlechteriana 4(1–2): 19. 1993.

Basionym: *Oncidium × haematochilum* Lindl. & Paxton, Paxt. Fl. Gard. 1: 21, t. 6. 1850.

Homotypic synonym: *Trichocentrum haematochilum* (Lindl. & Paxton) M.W.Chase & N.H.Williams, Lindleyana 16(2): 137. 2001.

Distribution: Colombia, Venezuela, and Trinidad and Tobago.

Lophiaris × oerstelurida Cetzal & Balam, J. Torrey Bot. Soc. 139(1): 20. 2012. TYPE: MEXICO. Chiapas: Colonia Reforma, Acacoyagua, colectado el 7 de Noviembre del 2008 y florecida en cultivo en marzo del 2009, *C. R. Beutelspacher s.n.* (Holotype: HEM). Fig. 9B.

Homotypic synonym: *Trichocentrum × oersteluridum* (Cetzal & Balam) J.M.H.Shaw, Orchid Rev. 122(1305): 17. 2014.

Distribution: Mexico, Guatemala, and Honduras.

Trichocentrum Poepp. & Endl. Nov. Gen. Sp. Pl. 2: 11, pl. 115. 1836. TYPE: *Trichocentrum pulchrum* Poepp. & Endl.

Acoidium Lindl., Edwards's Bot. Reg. t. 1951. 1837. TYPE: *Acoidium fuscum* Lindl., *Trichocentrum fuscum* Lindl.

Distribution: Southwestern Mexico to southern Brazil. Fig. 10.

KEY TO THE GROUPS OF *TRICHOCENTRUM*

1a. Spur gibbous, 2–4 lobed, or clavate 2
1b. Spur slender, conic or tubular 3
2a. Spur short, less than 5 mm long, 2–4 lobed; labellum elliptic-ovate . . . . . *T. candium* group
2b. Spur longer than 10 mm long, clavate; labellum pandurate . . . . . *T. hoegei* group (monotypic taxon)
3a. Labellum with two lateral, erect, falcate lobes near the base . . . . . *T. pfavii* group
3b. Labellum without lateral, erect, falcate lobes near the base 4
4a. Spur longer or equaling the labellum, flexuous to uncinated 5
4b. Spur shorter than labellum, linear 6
5a. Ovary triquetrous; disc thickly bicarinate . . . . . *T. pulchrum* group
5b. Ovary not triquetrous; disc with two to four slender carines . . . . . *T. fuscum* group
6a. Labellum concave, strongly narrowed above; flowers campanulate, produced on successive inflorescence . . . . . *T. brachyceras* group
6b. Labellum flat to slightly convex, with dilated lamina; flowers spreading on 1–2-flowered, simultaneous inflorescences . . . . . *T. trigrinum* group (monotypic taxon)

KEY TO THE SPECIES OF THE *TRICHOCENTRUM CANDIDUM* GROUP

1a. Column wings decurrent, obtuse with introrse apexes; anther cap glabrous; lip marked with broad purple blotches . . . . . *T. pupulinianum*
1b. Column wing ascending or porrect, acute, with somewhat revolute apexes; anther cap papillose or hirsute; lip entirely white or with scattered purple spots 2
2a. Leaves widely ovate; lip with scattered purple spots . . . . . *T. caloceras*
2b. Leaves oblong–elliptic; lip entirely white 3
3a. Labellum narrow in the middle; flowers small (sepals and petals to 5–6 mm long); inflorescence erect to patent . . . . . *T. brenesi*
3b. Labellum elliptic ovate or rhombic; flowers medium to large (sepals and petals longer than 15 mm); inflorescence pendule 4
4a. Labellum shorter than sepals, acute to obtuse . . . . . *T. capistratum*
4b. Labellum longer than sepals, retuse at apex 5
5a. Labellum obovate; column wings entire . . . . . *T. candidum*
5b. Labellum broadly rhombic; column wings erose at the apex . . . . . *T. cymbiglossum*

KEY TO THE SPECIES OF THE *TRICHOCENTRUM PFAVII* GROUP

1a. Spur more than 5 mm long; column wings with longitudinal brown stripes . . . . . *T. dianthum*
1b. Spur less than 5 mm long; column wings white with brown spots at margins 2
2a. Labellum flabellate, with very crisped apex; lateral lobes of the labellum digitate . . . . . *T. pfavii*
2b. Labellum obovate, fleshy, with plane apex; lateral lobes of the labellum short and rounded . . . . . *T. estrellense*

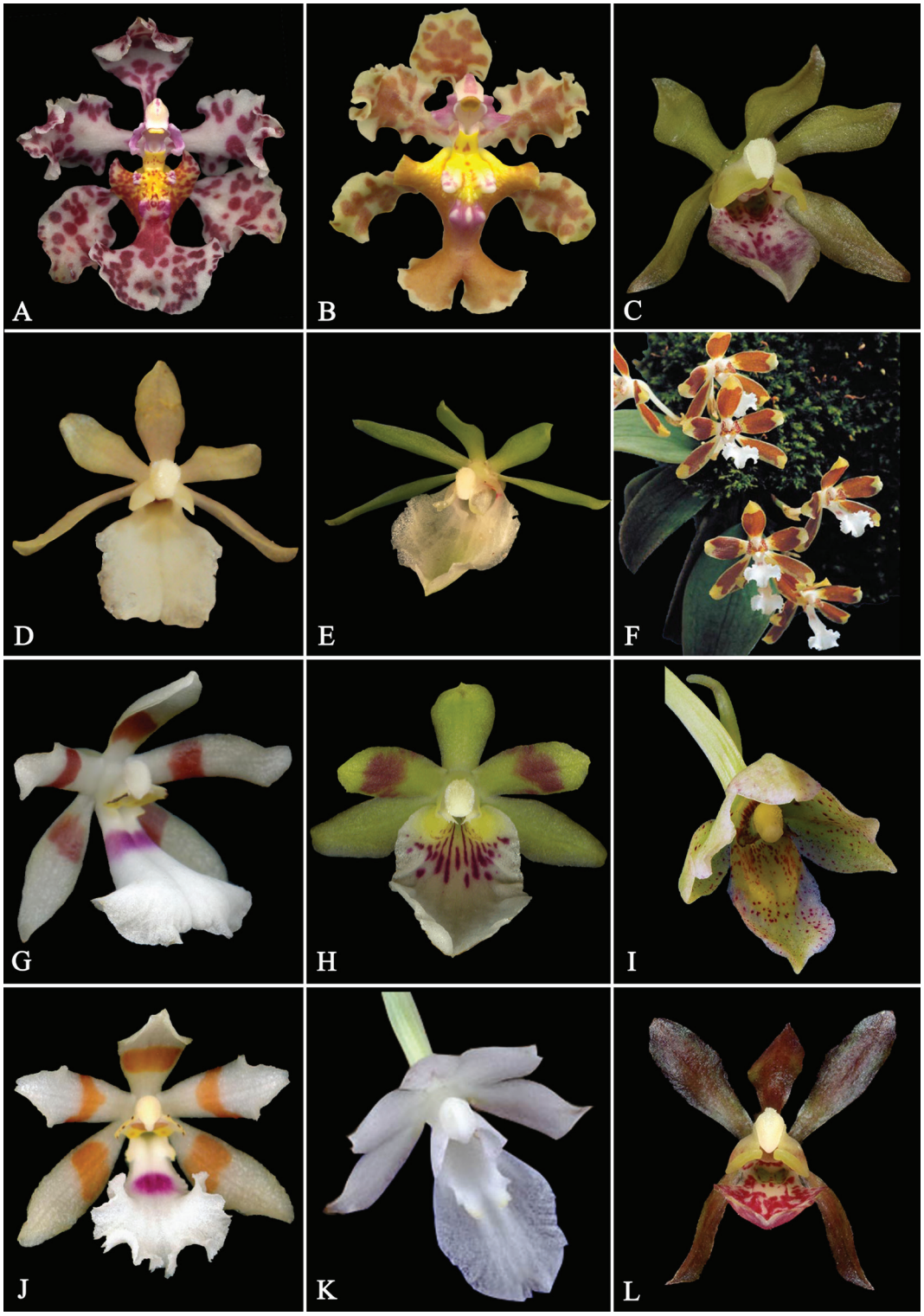

FIGURE 9. Floral morphology. **A**, *Lophiaris teaboana* R.Jiménez, Carnevali & Tapia-Muñoz (*Carnevali 7504* CICY); **B**, *Lophiaris* × *oerstelurida* Cetzal & Balam (*Cetzal s.n.* CICY); **C**, *Trichocentrum caloceras* Endres & Rchb.f.; **D**, *Trichocentrum candidum* Lindl.; **E**, *Trichocentrum cymbiglossum* Pupulin (*Bogarin 7379* JBL); **F**, *Trichocentrum dianthum* Pupulin & Mora-Retana (*Pupulin 21* JBL); **G**, *Trichocentrum estrellense* Pupulin & J.B.García (*Pupulin 7102* JBL); **H**, *Trichocentrum hoegei* Rchb.f. (*Cetzal s.n.* CICY); **I**, *Trichocentrum loyolicum* Pupulin, Karremans & G.Merino (*Karremans 2133* JBL); **J**, *Trichocentrum pfavii* Rchb.f. subsp. *pfavii* (*Pupulin 3447* JBL); **K**, *Trichocentrum popowianum* Konigër (*Pupulin s.n.* JBL); **L**, *Trichocentrum pupulinianum* Bogarín & Karremans (*Karremans et al. 3963* JBL). Photographs: [A–B, H] W. Cetzal-Ix, [C–G, I–L] Jardín Botánico Lankester (http://www.epidendra.org/).

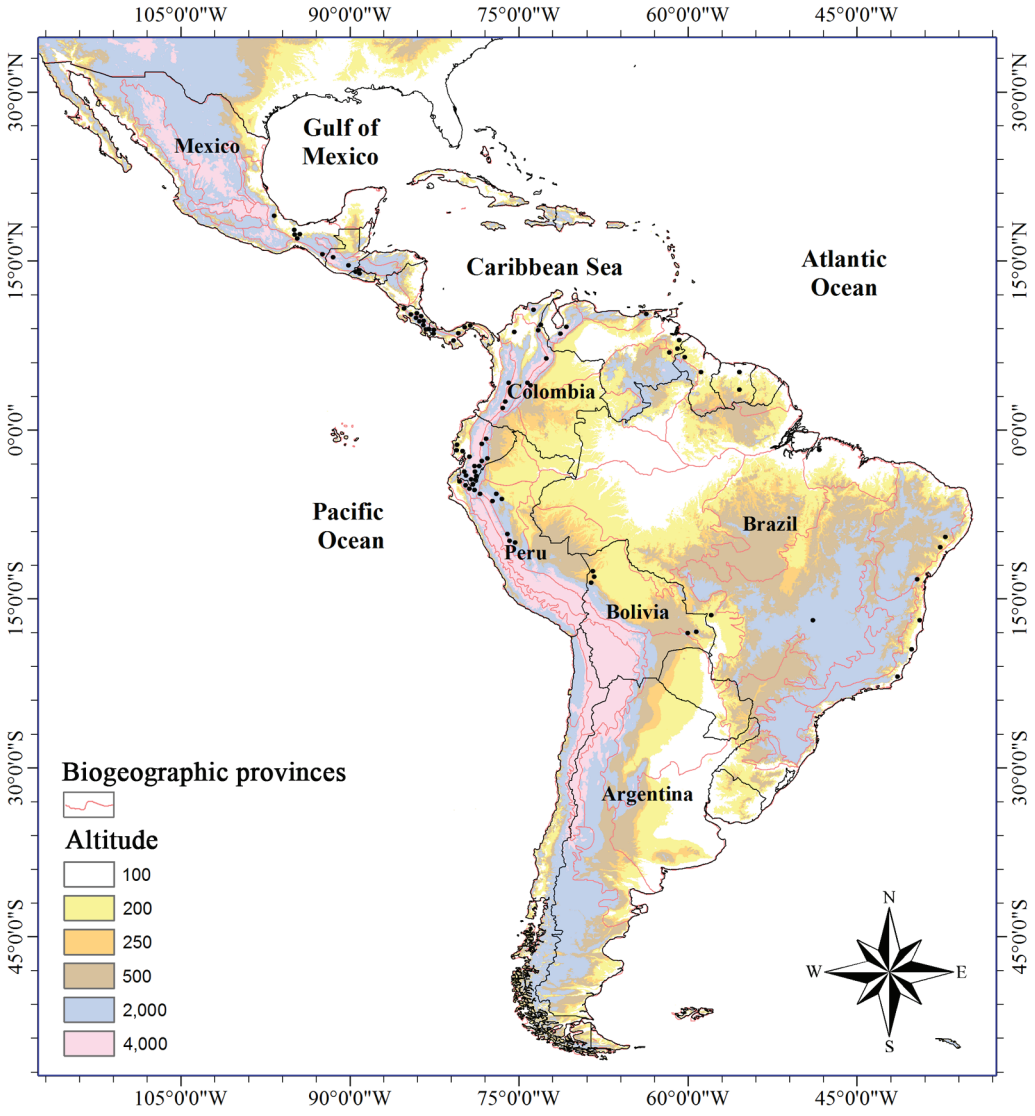

FIGURE 10. Distribution of *Trichocentrum* Poeppig & Endlicher.

KEY TO THE SPECIES OF THE *TRICHOCENTRUM PULCHRUM* GROUP

1a. Spur more than twice as long as the labellum . . . . . *T. longicalcaratum*
1b. Spur less than twice as long as the labellum 2
2a. Disk of the labellum without keels . . . . . *T. neudeckeri*
2a. Disk of the labellum with keels 3
3a. Disk of the labellum with 4 keels; labellum obcordate . . . . . *T. obcordilabium*
3b. Disk of the labellum with 3 keels; labellum obovate 4
4a. Keels of the labellum glabrous or minutely puberulent; sepals and petals greenish white without purple spots or blotches . . . . . *T. viridulum*
4b. Keels of the labellum papillose; sepals and petals greenish white with purple spots or blotches 5
5a. Spur 1.5 times longer than the blade of the labellum; keels of the labellum divergent at apex; column wings 3 mm long . . . . . *T. pulchrum*
5b. Spur as long as the blade of the labellum; keels of the labellum incurved, convergent at apex; column wings 1 mm long . . . . . *T. loyolicum*

KEY TO THE SPECIES OF THE *TRICHOCENTRUM FUSCUM* GROUP

1a. Inflorescence simultaneously 2–5 flowered . . . . . *T. panduratum*
1b. Inflorescence successive 2
2a. Column wings lanceolate to strictly triangular 3
2b. Column wings broad, obtuse to truncate at apex 5
3a. Disc of the labellum with four keels . . . . . *T. albo-coccineum*
3b. Disc of the labellum with two keels 4

KEY TO THE SPECIES OF THE *TRICHOCENTRUM FUSCUM* GROUP CONT.

4a. Spur as long as the labellum . . . . . *T. tenuiflorum*
4b. Spur 1.5 times longer than the labellum . . . . . *T. popowianum*
5a. Disc of the labellum with two keels . . . . . *T. recurvum*
5b. Disc of the labellum with four keels 6
6a. Spur about twice long than the labellum . . . . . *T. wagneri*
6b. Spur as long as the labellum or shorter 7
7a. Labellum obovate-oblong . . . . . *T. purpureum*
7b. Labellum subpandurate . . . . . *T. fuscum*

KEY TO THE SPECIES OF THE *TRICHOCENTRUM BRACHYCERAS* GROUP

1a. Labellum longer than sepals, apiculate, with two distinct keels near the base . . . . . *T. brachyceras*
1b. Labellum markedly shorter than sepals, minutely retuse, without keels . . . . . *T. brevicalcaratum*

Trichocentrum albo-coccineum Linden, Belgique Hort. 15: 103. 1865. TYPE: BRAZIL. Amazonas: epiphytic in forest along Rio Negro, *G. Wallis s.n.* (Holotype: W).

Heterotypic synonyms: *Trichocentrum albopurpureum* Linden & Rchb.f., Gen. Sp. Orchid. 219. 1866. TYPE: based on the same type as *T. albo-coccineum*, *Linden* (Holotype: W).

Trichocentrum albopurpureum var. *striatum* Linden & Barb.Rodr. Lindenia 2: 77, t. 85. 1866.

Trichocentrum alboviolaceum Schltr., Die Orchideen 446. 1927.

Trichocentrum amazonicum Barb.Rodr., Gen. Sp. Orchid. 1: 140. 1877. TYPE: BRAZIL. Villa Bella da Imperatriz, along Macurany lake, *Barbosa Rodrigues s.n.* (Holotype: not located).

Trichocentrum atropurpureum Linden & Rchb.f., Gard. Chron. 219. 1866.

Trichocentrum ionopthalmum Rchb.f., Gard. Chron. n.s., 6: 100. 1876. TYPE: BRAZIL. *Cult Hamburg Bot. Gard. s.n.* (Holotype: W).

Trichocentrum leeanum Rchb.f., Flora 69: 550. 1886. TYPE: PERU. Ex cord. occid. Am. aequat. ex hirt Lee, *Ex hort. Lee s.n.* (Holotype: W).

Trichocentrum orthoplectron Rchb.f., Gard. Chron. n.s. 19: 562. 1883. TYPE: Origin unknown, *ex hort. Linden s.n.* (Holotype: W).

Trichocentrum porphyrio Rchb.f., Ill. Hort. 31: 9, t. 508. 1884. TYPE: Origin unknown, *ex hort. Linden s.n.* (Holotype: W).

Distribution: Peru, Bolivia, and Brazil.

Trichocentrum brachyceras Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 184. 1920. TYPE: COLOMBIA. Cauca: *M. Madero s.n.* (Holotype: B, destroyed; drawing, Repert. Spec. Nov. Regni Veg. Beih. 57: t 65, Fig. 252. 1929).

Distribution: Endemic to Colombia.

Trichocentrum brenesii Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 248. 1923. TYPE: COSTA RICA. Alajuela: San Pedro de San Ramón, September 1921, *A. Brenes 116* (Holotype: B [destroyed]; Lectotype, designated by Barringer, 1986: AMES).

Distribution: Endemic to Costa Rica.

Trichocentrum brevicalcaratum C.Schweinf., Amer. Orchid Soc. Bull. 13: 388. 1945. TYPE: PERU. Junín: Chancahmayo Valley, 1800 m, July 1924–1927, *C. Schunke s.n.* (Holotype: F).

Distribution: Endemic to Peru.

Trichocentrum caloceras Endres & Rchb.f., Gard. Chron. 1257. 1871. TYPE: COSTA RICA. "Mr. Endres, the excellent Costa Rica traveller, has found since 1867, in Costa Rica, another *Trichocentrum*" (holotype presumed to be located at W, not located; lectotype designated by Bogarin and Karremans (2013): Costa Rica, without collecting data, *A.R. Endres s.n.,* illustration kept at W, 0020954!). The neotype designation by Pupulin (1995): Costa Rica. Puntarenas: Coto Brus, *F. Pupulin and D. Castelfranco 1* (USJ) is rejected by Bogarin and Karremans (2013), as the specimen selected is in conflict with the protologue and the natural distribution of this species. Fig. 9C.

Heterotypic synonyms: *Trichocentrum costaricense* Mora-Ret. & Pupulin, Selbyana 15(2): 94–96, f. 5. 1994. TYPE: COSTA RICA. Alajuela: epiphytic in forest near Ciudad Quesada (about 700 m), 1988, flowered in cultivation 1989, *C.K. Horich s.n.* (USJ). Lectotype, designated by Bogarin and Karremans (2013): Costa Rica. Alajuela: San Carlos, 600 m, March 1989, *C.K. Horich s.n.* (USJSpirit, 57624). Rejected lectotype of Morales & Villalobos (2004) by Bogarin and Karremans (2013): Costa Rica. San José: Pérez Zeledón, San Isidro del General, "florece en mayo," *C.K. Horich s.n.* (USJ-Spirit, 57468!).

Distribution: Endemic to Costa Rica.

Trichocentrum candidum Lindl., Edwards's Bot. Reg. 29: Misc. 9. 1843. TYPE: GUATEMALA. Without specific locality, *G. U. Skinner s.n.* (Holotype: K). Fig. 9D.

Heterotypic synonyms: *Trichocentrum albiflorum* Rolfe, Bull. Misc. Inform. Kew 336. 1893. TYPE: MEXICO. Veracruz: without locality, *H. Fink s.n.* (Holotype: K).

Distribution: Mexico, Guatemala, and El Salvador.

Trichocentrum capistratum Linden & Rchb.f., Gard. Chron. 1257. 1871. TYPE: COSTA RICA. Without specific locality. Floreció en el jardín de Linden, Bélgica, 23 September 1868, *G. Wallis s.n.* (Holotype: W; photo USJ).

Heterotypic synonyms: *Trichocentrum panamense* Rolfe,

Bull. Misc. Inform. Kew 1913(9): 341–342. 1913. TYPE: PANAMA. on bush-covered hills east of the Panama Canal, 255 m, *L.J. Lipscomb s.n.* (Holotype: K).

Trichocentrum pusillum Lehm. ex Pupulin, in Herb. Kew., Ms. *nom. inval.*

Distribution: Costa Rica, Panama, Colombia, and Venezuela.

Trichocentrum cymbiglossum Pupulin, Lindleyana 9(1): 51. 1994. TYPE: COSTA RICA. Alajuela: San Carlos, Laguna Bosque Alegre, *F. Pupulin 5* (Holotype: USJ; illustration of type). Fig. 9E.

Distribution: Endemic to Costa Rica.

Trichocentrum dianthum Pupulin & Mora-Retana, Selbyana 15: 90. 1994. TYPE: COSTA RICA. San José: Pérez Zeledón, Las Nubes de Quizarrá, 1000 m, epiphytic on short trees along a little river, 1988, flowered in cultivation in March 1989, *J. Cambronero s.n.* (Holotype: USJ; illustration of type). Fig. 9F.

Distribution: Endemic to Costa Rica.

Trichocentrum estrellense Pupulin & J.B.García, Lindleyana 10(3): 196. 1995. TYPE: COSTA RICA. Cartago: El Guarco, in valleys under Palo Verde, epiphytic in shadow on tall trees along a minor affluent of Río Reventazón, 1250 m, 30 Apr. 1992, *F. Pupulin 209* (Holotype: USJ; illustration of type). Fig. 9G.

Distribution: Endemic to Costa Rica.

Trichocentrum fuscum Lindl., Edwards's Bot. Reg. 23: t. 1951. 1837. TYPE: incorrectly said to be from Mexico, cultivated in the collection of Mr. Knight, *Warming s.n.* (Holotype: not located; drawing, K).

Heterotypic synonyms: *Acoidium fuscum* Lindl., Edwards's Bot. Reg. 23: sub t. 1951. 1837. *nom. nud.*

Trichocentrum cornucopiae Linden & Rchb.f., Gard. Chron. 266. 1866. TYPE: BRAZIL: Amazonas: Rio Negro, *G. Wallis s.n.* (Holotype: W).

Trichocentrum hartii Rolfe, Bull. Misc. Inform. Kew 1894: 395. 1894. TYPE: VENEZUELA. Monagas: cult. Kew Bot. Gard., *D. M. D. Hart s.n.* (Holotype: K).

Trichocentrum mattogrossense Hoehne, Comm. Lin. Telegr., Bot. 5(1): 55. 1910. TYPE: BRAZIL. San Luis de Caceres, along the Rio Paraguay, *F. Hoehne s.n.* (SP).

Trichocentrum pinelii Lindl., Gard. Chron. 772. 1854. TYPE: BRAZIL. Rio de Janeiro, without specific locality, *C. Pinel s.n.* (Holotype: K; photo, USJ).

Distribution: Venezuela, Suriname, Brazil, Ecuador, Peru, and Bolivia.

Trichocentrum hoegei Rchb.f., Gard. Chron., n.s. 16: 717. 1881. TYPE: MEXICO. Veracruz: near Cordoba, *C. T. Hoege s.n.* (Holotype: W; Illustration in Xenia Orch. 3: 69, t. 234, Fig. 6. 1890). Fig. 9H.

Distribution: Endemic to Mexico.

Trichocentrum longicalcaratum Rolfe. Orchid Review 4: 260. 1896. TYPE: COLOMBIA. Without specific locality, *F.C. Lehmann s.n.* (Holotype: K).

Heterotypic synonyms: *Trichocentrum brandtiae* Kraenzl., Bull. Herb. Boissier 5: 109. 1897. TYPE: COLOMBIA. Without specific locality, *Barbey s.n.* (Holotype: not located).

Trichocentrum verruciferum Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 184. 1920. TYPE: COLOMBIA. Cauca: *M. Madero s.n.* (Holotype: B destroyed; drawings, Repert. Spec. Nov. Regni Veg. Beih. 57: t. 253. 1929).

Distribution: Endemic to Colombia.

Trichocentrum loyolicum Pupulin, Karremans & G.Merino, Harvard Pap. Bot. 13(2): 220. 2008. TYPE: ECUADOR. Loja: Valladolid, Loyola, 1000–1200 m, collected by G. Merino in 2002, flowered in cultivation, *A. Karremans 2133* (Holotype: QCNE; illustration of type; photo of the flower from the plant that served as the holotype). Fig. 9I.

Distribution: Endemic to Ecuador.

Trichocentrum neudeckeri Königer, Arcula 6: 175. 1996. TYPE: BOLIVIA. Santa Cruz: Florida, 1500 m, gesammelt 1977 von T. Neudecker s.n., in Kultur in Blüte 1996 in München bei *W. Königer WK-71* (Holotype: M; Isotypes: K, LPB, Herb. H. Königer; illustration of type).

Heterotypic synonyms: *Trichocentrum teaguei* Christenson, Orch. Digest 61: 32. 1997. BOLIVIA. TYPE: Road between La Paz and Coroico, ca. 2000m, wet forest on steep slopes. Cultivated by M. Turkel s.n. *sub A. Hirtz et al. s.n.* (Holotype: K).

Distribution: Endemic to Bolivia.

Trichocentrum obcordilabium Pupulin, Novon 8(3): 283, f. 1. 1998. TYPE: ECUADOR. Morona-Santiago: San Juan Bosco, 1600 m, 16 February 1993; coll. by J. Portilla, fl. in cultivation 6 July 1996, *F. Pupulin 285* (Holotype: SEL; Isotypes: MO, QCNE, USJ; illustration of type).

Distribution: Endemic to Ecuador.

Trichocentrum panduratum C.Schweinf., Amer. Orchid Soc. Bull. 14: 104, t. 1946. TYPE: PERU. San Martin: Juan Jui, Alto Rio Huallaga, *G. Klug 4260* (Holotype: AMES; Isotypes: K, MO).

Distribution: Endemic to Peru.

Trichocentrum pfavii Rchb.f. subsp. **pfavii** Gard. Chron., n.s., 16: 70. 1881. TYPE: PANAMA. Chiriquí, without specific locality, 19 November 1980, *R. Pfau 80* (Holotype: W). Fig. 9J.

Heterotypic synonyms: *Trichocentrum pfavii* var. *zonale* Rchb.f., Gard. Chron., n.s. 19: 44. 1883. TYPE: COSTA RICA. San José: Boca de Dota, along the cracks on the trunks of young trees, *Endres s.n.* (Holotype: W).

Trichocentrum saundersianum Endrés & Rchb.f. ex Pupulin, *nom. inval.*

Trichocentrum saundersii Endrés & Rchb.f. ex Pupulin, *nom. inval.*

Trichocentrum zonale Rchb.f., *nom. inval.*

Trichocentrum pfavii var. *album* Henderson ex Pupulin, *nom. illeg.*

Distribution: Costa Rica and Panama.

Trichocentrum pfavii subsp. **dotae** Pupulin, Selbyana 22(1): 23–25, f. 5A–F. 2001. TYPE: COSTA RICA. San José: Dota, Santa Maria, road to San Joaquín, collected by A. Flores, Apr 1999, flowered in cultivation at Gaia Botanical Garden, 11 December 1999, *F. Pupulin 1871* (Holotype: USJ; Paratype: USJ; illustration of type).

Distribution: Endemic to Costa Rica.

Trichocentrum popowianum Konigër, Arcula 6: 178. 1996. TYPE: ECUADOR. Morona-Santiago: El Pangui, 1000 m, importiert 1995 von Herrn N. Popow zusammen mit *Trichocentrum pulchrum*, in Kulture in Blüte in München bei *W. Königer WK-72* (Holotype: M; Isotypes: K, QCA, Herb. H. Königer; illustration of type). Fig. 9K.

Distribution: Endemic to Ecuador.

Trichocentrum pulchrum Poepp. & Endl., Nov. Gen. Sp. Pl. 2: 11, pl. 115. 1836. TYPE: PERU. Huánuco: near Pampayacu, *Poeppig s.n.* (Holotype: W).

Heterotypic synonyms: *Orchis punctata* Ruiz & Pav. ex Pupulin, *nom. inval.*

Trichocentrum maculatum Lindl., Orchid. Linden. 24, No. 127. 1846. TYPE: COLOMBIA. Río Hacha, Sierra de Santa Marta, along the Río San Antonio, 1300 m, 1844, *L. Linden 1666* (Holotype: K; Isotype: BR, P, W; USJ (photo)).

Trichocentrum speciosum Schlim ex Pupulin, *nom. inval.*

Distribution: Colombia, Venezuela, Ecuador, and Peru.

Trichocentrum pupulinianum Bogarín & Karremans, Lindleyana in Orchids (West Palm Beach) 82(2): 106–108. 2013. TYPE: COSTA RICA. Coto Brus, Sabalito, San Miguel, carretera entre Union y Mellizas, 2.5 km después de Unión, orillas de la Quebrada Sereno, 8°51'17.0"N, 82°52'35.2" W, 994 m, bosque muy humedo premontano transicion a pluvial "supra truncos ad ripas silvarum prope San Miguel juxta flumen ad Quebrada Sereno," 18 April 2011, *A.P. Karremans et al. 3963* (Holotype: JBL-spirit; illustration of the plant that served as the holotype). Fig. 9L.

Distribution: Southern Costa Rica and western Panama.

Trichocentrum purpureum Lindl. ex Rchb.f., Gard. Chron. 772. 1854. TYPE: GUYANA. *Ex hort. Veitch* (Holotype: K).

Distribution: Endemic to Guyana.

Trichocentrum recurvum Lindl., Edwards's Bot. Reg. 29: misc. 29. 1843. TYPE: GUYANA. Without locality, *Ex hort. Loddiges* (Holotype: K).

Heterotypic synonyms: *Trichocentrum cornu-vaccae* Rchb.f. ex Pupulin, in Lindleyana 10(3): 203. 1995.

Trichocentrum plectrophora Rchb.f. in Herb. Jard. Bot. Etat Bruxelles (BR), Ms., non (Lodd. Ex Lindl.) Rchb.f. [= *Plectrophora iridifolia*].

Distribution: Ecuador (?), Guyana, and Suriname.

Trichocentrum tenuiflorum Lindl., Paxt. Fl. Gard. 1: 12. 1850. TYPE: BRAZIL. Bahia: without locality, *Morel s.n.* (Holotype: K).

Distribution: Brazil.

Trichocentrum tigrinum Linden & Rchb.f., Gard. Chron., n.s. 862. 1869. TYPE: ECUADOR. Guayas: Guayaquil, 1875, *G. Wallis s.n.* (Holotype: W).

Heterotypic synonyms: *Trichocentrum tigrinum* var. *splendens* Linden & Barb.Rodr., Lindenia 1: 53, t. 24. 1885.

Distribution: Ecuador and Peru.

Trichocentrum viridulum Pupulin, Novon 8(3): 285, f. 2. 1998. TYPE: COLOMBIA. Santander: Charalá, Virolín, 1900 m, collected in Mar 1990, flowered in cult. at Colomborquideas, 24 August 1996, *F. Pupulin 388* (Holotype: SEL; Isotypes: MO, USJ; illustration of type).

Distribution: Endemic to Colombia.

Trichocentrum wagneri Pupulin, Lindleyana 10(3): 203, f. 14. 1995. TYPE: BRAZIL. Without locality, introduced by A. Seidel, flowered in cultivation by A. Wagner in Santa Margherita, Italy, 25 September 1990, *F. Pupulin 289* (Holotype: SEL).

Distribution: Brazil.

Literature Cited

Ackerman, J. D. 2014. *Trichicentrum*. Pages 536–539 in J. D. Ackerman, Taxon Coordinator, Orchid Flora of the Greater Antilles. Mem. New York Bot. Gard. 109: 1–625.

Braem, G. J. 1993. Studies in the Oncidiinae: discussion of some taxonomic problems with description of *Gudrunia* Braem, gen. nov., and reinstatement of the genus *Lophiaris* Rafinesque. Schlechteriana 4: 8–29.

Balam, R. 2007. *Sistemática y filogenia del género* Lophiaris *Raf. (Orchidaceae)*. M.S. thesis, Centro de Investigación Científica de Yucatán, A. C., Mérida.

———. 2011. Sistemática de *Lophiaris* Raf. (Orchidaceae). Ph.D. dissertation, Centro de Investigación Científica de Yucatán, A. C., Mérida.

———, G. Carnevali, W. Cetzal-Ix, and R. Duno. 2011. *Lophiaris tapiae*, a new species in the *Lophiaris oerstedii* complex (Orchidaceae) from the Yucatan Peninsula, Mexico. Acta Bot. Mex. 97: 17–29.

——— and W. Cetzal-Ix. 2012. Una revisión del complejo *Lophiaris cavendishiana* (Orchidaceae: Oncidiinae). *Caldasia* 34: 87–107.

———, W. Cetzal-Ix and G. Carnevali. 2010. A new species of *Lophiaris* Raf. (Orchidaceae) from the Pacific Coastal of Mexico. Lankesteriana 9: 521–525.

Bogarín, D. and A. P. Karremans. 2013. *Trichocentrum pupulinianum* (Orchidaceae). A new species from Costa Rica and Panama honors Lankester Botanical Garden's head of research. Orchids (West Palm Beach) 82: 106–110.

Carnevali, G., W. Cetzal-Ix, R. Balam-Narváez and G. A. Romero-González. 2010. A synopsis of *Cohniella* (Orchidaceae, Oncidiinae). Brittonia 62: 153–177.

———, W. Cetzal-Ix, R. Balam, C. Leopardi and G. A. Romero-González. 2013. A combined evidence phylogenetic re-circumscription and a taxonomic revision of *Lophiarella* (Orchidaceae: Oncidiinae). Sys. Bot. 38: 46–63.

Cetzal-Ix, W. 2012. *Oncidium lacerum*, an older and ignored name for *Cohniella stipitata* (Orchidaceae, Cymbideae, Oncidiinae). Ann. Bot. Fenn. 49: 137–143.

———, and R. Balam. 2012. The identity and distribution of *Lophiaris carthagenensis* (Orchidaceae, Oncidiinae): Two centuries of confusion. J. Torrey Bot. Soc. 139: 9–25.

———, R. Balam-Narváez, and G. Carnevali. 2008. A new species in Lophiaris (Orchidaceae, Oncidiinae) in the *Lophiaris straminea* Complex. Novon 18: 12–15.

——— and G. Carnevali. 2010. A revision of *Cohniella* Pfitzer (Orchidaceae) in Mexico. J. Torrey Bot. Soc. 137: 180–213.

———, G. Carnevali, and E. Noguera-Savelli. 2014. A new species in the *Cohniella ascendens* complex from Amazonian Venezuela (Orchidaceae, Oncidiinae). Lankesteriana 13: 207–214.

———, G. Carnevali, E. Noguera-Savelli, and D. Jáuregui. 2013a. Morphological and anatomical characterization of a new natural hybrid between *Cohniella ascendens* and *C. brachyphylla* (Orchidaceae, Oncidiinae). Phytotaxa 144: 45–55.

———, G. Carnevali, E. Noguera-Savelli, and G. A. Romero-González. 2013b. Really, what is *Cohniella cebolleta*? A recircumscription plus new and resurrected species and combinations. Sys. Bot. 38: 606–623.

———, G. Carnevali, and V. Paiva-Castro. 2012. *Cohniella* (Orchidaceae: Oncidiinae) south of the Amazon River. Sys. Bot. 37: 1–20.

Chase, M. W. 2009. Subtribe Oncidiinae. Pages 211–220 in A. M. Pridgeon, P. J. Cribb, M.W. Chase, and T. N. Rassmussen, eds. *Genera Orchidacearum. Epidendroideae. Volume 5. Part II*. Oxford University Press, United Kingdom, England.

Christenson, E. A. 1999. The return of *Cohniella* (Orchidaceae: Oncidiinae). Lindleyana 14: 176–177.

Dunsterville, G. C. K. and L. A. Garay. 1979. Orchids of Venezuela, an Illustrated Field Guide. Botanical Museum, Harvard University Press, Cambridge, Massachusetts.

ESRI. 1999. ArcView gis 3.2. Environmental Systems Research Institute, Inc. New York.

Hijmans, R. J., L. Guarino, C. Bussink, P. Mathur, M. Cruz, I. Barrentes, and E. Rojas. 2004. DIVA-GIS. Vsn. 5.0. A geographic information system for the analysis of species distribution data. Freely available at <http://www.diva-gis.org>

Kolanowaska M. and Szlachetko D. 2016. Notes on the taxonomic position of the genus *Cohniella* (Orchidaceae-Epidendroideae-Oncidiinae) with description of four new species. Phyton (Horn) 56: 15–26.

Löwenberg-Neto, P. 2014. Neotropical region: a shapefile of Morrone's (2014) biogeographical regionalization. Zootaxa 3802: 300–300.

Neubig, K. M., W. M. Whitten, N. H. Williams, M. A. Blanco, L. Endara, J. G. Burleigh, K. Silvera, J. C. Cushman, and M. W. Chase. 2012. Generic recircumscriptions of Oncidiinae (Orchidaceae: Cymbidieae) based on maximum likelihood analysis of combined DNA datasets. Bot. J. Linn. Soc. 168: 117–228.

Pupulin, F. 1995. A revision of the genus *Trichocentrum* (Orchidaceae: Oncidiinae). Lindleyana 10: 183–210.

———. 1998. New Species of *Trichocentrum* (Orchidaceae) from the Andes with a Realignment of the *Trichocentrum pulchrum* Group. Novon 8: 283–287.

——— and G. Carnevali. 2005. *Cohniella* Pfitz. Pages 141–147 in F. Pupulin, ed. *Vanishing Beauty: Native Costa Rican Orchids Vol. I*. Costa Rica University Press, San José, Costa Rica.

———, A. Karremans, and G. Merino. 2008. *Trichocentrum loyolicum*, a new species in the genus *Trichocentrum* s.str. (Orchidaceae: Oncidiinae). Harvard Pap. Bot. 13: 219–222.

Sosa, V. M., M. W. Chase, G. Salazar, G. M. Whitten, and N. H. Williams. 2001. Phylogenetic position of *Dignathe* (Orchidaceae: Oncidiinae): evidence from nuclear ITS ribosomal DNA sequences. Lindleyana 16: 94–101.

Sprunger, S., P. J. W. Cribb, and A. Toscano de Brito. 2009. João Barbosa Rodrigues—Iconographie des Orchidées du Brésil I. Friedrich Reinhardt, Basle.

Szlachetko, D. L., J. Mytnik-Ejsmont, and A. Romowicz. 2006. Genera et Species Orchidalium. 14. Oncidieae. Polish Bot. J. 51: 53–55.

Williams, N. H., M. W. Chase, T. Fulcher, and W. M. Whitten. 2001. Molecular systematic of the Oncidiinae based on evidence from four DNA sequence regions: expanded circumscriptions of *Cyrtochilum, Erycina, Otoglossum, Trichocentrum,* and a new genus (Orchidaceae). Lindleyana 16: 113–139.