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NEW SPECIES AND RECORDS OF ORCHIDACEAE FROM COSTA RICA. II

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Abstract. After the publication of the most recent and comprehensive treatment of the Orchidaceae in the Manual de Plantas de Costa Rica, new species continue being discovered in the country on a regular basis. Novelties in *Acianthera*, *Epidendrum*, *Lepanthes*, *Masdevallia*, *Pleurothallis,* and *Specklinia* are discussed. We present eight new records including the reconsideration of *Epidendrum concavilabium* (as different from *E. circinatum*), and the first record of the genus *Epistephium* (*E. ellipticum*) for the country. Three new taxa, *Epidendrum alieniferum, Epidendrum* × *sandiorum* (a putative natural hybrid between *E. oerstedii* and *E. ciliare*) and *Lepanthes kabebatae* are described.

Resumen. Después de la publicación del tratamiento más reciente y completo de Orchidaceae en el Manual de Plantas de Costa Rica, nuevas especies siguen descubriéndose con regularidad en el país. Se discuten novedades en *Acianthera*, *Epidendrum*, *Lepanthes*, *Masdevallia*, *Pleurothallis* y *Specklinia*. Presentamos ocho nuevos registros incluyendo la reconsideración de *Epidendrum concavilabium* (como distinto de *E. circinatum*) y el primer registro del género *Epistephium* (*E. ellipticum*) en el país. Se describen tres nuevos taxones, *Epidendrum alieniferum, Epidendrum* × *sandiorum* (un híbrido natural putativo entre *E. oerstedii* y *E. ciliare*) y *Lepanthes kabebatae*.

Key words: *Epidendrum alieniferum, Epidendrum* × *sandiorum, Lepanthes kabebatae, Epistephium,* Orchidaceae, new records, new species, Costa Rica

This article series is part of an ongoing study of the orchid flora of the country (Bogarín *et al.* 2008). As mentioned in the first installment, the development of a living collection of native orchids has been an invaluable tool for the inventory efforts that have resulted in a rapid increase in the knowledge of the Costa Rican orchid flora. This approach has proven to be much more effective than studying only herbarium material.

Since the latest treatment of the Orchidaceae in the "Manual de Plantas de Costa Rica" (referred to as the "Manual" throughout this paper; Dressler 2003), many species were reported or described from Costa Rica. A few hundred novelties (both nomenclatural and taxonomic) in some 50 genera were published since the Manual was printed. Most are actually just new names for known species and therefore do not account for a net increase in the number of species, however about half (ca. 130) are true novelties and reflect an increase in Costa Rican orchid diversity. A summary of all articles that have appeared since the publication of the Manual and include species descriptions or nomenclatural changes affecting Costa Rican orchid taxa is presented in Table 1.

Novelties were described from remote areas and from relatively well-botanized sites, and frequently citing few herbarium specimens. For example, only two plants of *Acianthera cabiriae* Pupulin, G.A.Rojas & J.D.Zuñiga were ever found at the well botanized site of CATIE, Turrialba (Pupulin *et al.* 2007). On the other hand, several plants of *Pleurothallis adventurae* Karremans & Bogarín were found growing

TABLE 1. List of orchid genera cited in the Manual de Plantas de Costa Rica for which species have been added and/or removed. The reference is given to every nomenclatural modification. Abbreviations NC= Name Change; NR= New Record; NS= New Species; Y= Increase in net species number; N= No increase in net species number.

Genus	Reference	Category
Acianthera	Pupulin, Rojas & Zúñiga 2007; Bogarín et al. 2008	NS-Y
Anathallis	Luer 2006	NR-Y
Aspidogyne	Ormerod 2007; Ormerod 2009	NS-Y
Barbosella	Bogarín et al. 2008	NR-Y
Brassia	Christenson 2003b; Pupulin & Bogarín 2005a	NC/NS-Y
Campylocentrum	Pupulin & Bogarín 2010b	NC/NS/NR-Y
Chondroscaphe	Pupulin 2005a; Pupulin et al. 2009.	NC/NS-N
Cischweinfia	Christenson 2003a; Dressler & Dalström 2004	NC/NS-N
Coccineorchis	Rutkowski et al. 2004	NS-Y
Coryanthes	Gerlach & Dressler 2003; Gerlach & Romero-González 2008	NC/NS-N
Crossoglossa	Pupulin & Karremans 2010a	NS-Y
Cyrtopodium	Romero-González & Carnevali 1999	NC-N
Dichaea	Pupulin 2005a; Pupulin 2005b; Pupulin 2005c; Dressler, Pupulin & Folsom 2006; Pupulin 2007	NC/NS-N
Dracontia	Karremans *in press*; Karremans & Smith *in press*	NC/NS-N
Dryadella	Luer 2005	NC-N
Brenesia	Bogarín et al. 2008	NR-Y
Elleanthus	Dressler & Bogarín 2007; Dressler & Bogarín 2010	NS-Y
Encyclia	Pupulin 2006	NS-Y
Epidendrum	Bogarín et al. 2008; Hágsater 2003; 2004; 2006; 2007; 2008; 2009; Karremans & Hágsater 2010; Pupulin & Karremans 2010b	NC/NS/NR-Y
Galeandra	Pupulin 2005a	NS-Y
Gongora	Jenny 2007	NS-Y
Habenaria	Batista et al. 2011	-
Kefersteinia	Pupulin & Merino 2008	NS-Y
Kraenzlinella	Luer 2011	NS-Y
Kreodanthus	Ormerod 2008	NS-Y
Lepanthes	Blanco 2003; Bogarín & Fernández 2010; Bogarín & Pupulin 2010a; 2011; Pupulin 2003a; Pupulin & Bogarín 2004; 2010a; 2011a; 2011b; 2012; Pupulin, Bogarín & Jiménez 2009; Pupulin, Medina & Bogarín 2010; Pupulin, Bogarín & Smith 2010	NS/NR-Y
Lockhartia	Bogarín et al. 2008	NR-Y
Lycaste	Bogarín 2007; Oakeley 2008	NC/NS-Y
Masdevallia	Smith & Pupulin *in prep.*	NS-Y
Maxillaria	Pupulin 2003b; Bogarín et al. 2008	NS/NR-Y
Microchilus	Ormerod 2004; 2005; 2007	NC/NS-Y
Mormolyca	Bogarín & Pupulin 2010	NS-Y
Myoxanthus	Bogarín et al. 2008; Pupulin, Bogarín & Fernández 2010b	NS/NR-Y
Octomeria	Luer 2010	NR-Y
Ornithidium	Blanco et al. 2008a	NR-Y
Ornithocephalus	Pupulin 2002a	NS-Y
Palmorchis	Bainbridge & Aguilar 2008	NR-Y
Panmorphia	Luer 2006	NR-Y
Phragmipedium	Christenson 2006a; Pupulin & Dressler 2011	NC-N

TABLE 1. *Continues*.

Genus	Reference	Category
Platystele	Bogarín & Karremans 2010	NS-Y
Platythelys	Ormerod 2007	NS-Y
Pleurothallis	Karremans & Bogarín 2011; Karremans & Muñoz 2011; Luer 2002; Pupulin & Zúñiga 2007; Pupulin, Bogarín & Fernández 2010a;	NS-Y
Polycycnis	Gerlach 2004	NC/NS-N
Polystachya	Mytnik-Ejsmont 2011	NR-Y
Prosthechea	Pupulin 2004	NS-Y
Restrepiella	Pupulin & Bogarín 2007	NS-Y
Scaphyglottis	Dressler 2004a; Bogarín et al. 2008	NS/NR-Y
Scelochilus	Pupulin & Bogarín 2005b	NC-N
Sigmatostalix	Pupulin & Rojas 2006	NS-Y
Sobralia	Bogarín et al. 2008; Dressler 2002; 2007; Dressler & Pupulin 2008; Dressler & Bogarín 2010; 2011	NC/NS/NR-Y
Specklinia	Luer 2006	NR-Y
Stanhopea	Gerlach & Beeche 2004	NC-N
Stenorrhynchos	Christenson 2005	NC/NS-Y
Stellilabium	Pupulin 2003b; Pupulin 2003c; Pupulin & Blanco 2002	NS-Y
Trichopilia	Dressler & Pupulin 2005; 2006; Dressler & Bogarín 2009	NC/NS-Y
Trichosalpinx	Fernández 2011; Fernández & Bogarín 2012	NS-Y
Trigonidium	Christenson 2002	NC-N
Vanilla	Soto Arenas & Dressler 2010	NC/NS-Y
Warmingia	Bogarín et al. 2008	NC-N

on a tree just outside of a shelter cabin close to the Panamanian border in the Cordillera de Talamanca, in a less intensely explored region. No material of either species was found in any of the main Costa Rican herbaria (CR, INB, JBL, USJ), which indicates that some species might be both conspicuous and relatively frequent but grow in relatively unexplored regions, while others might occur in more frequented sites but be scarce and/or inconspicuous.

In addition to novelties, important nomenclatural changes were proposed for many orchid taxa present in Costa Rica in the last decade. Proposals to split *Masdevallia* Ruiz & Pav., *Maxillaria* Ruiz & Pav., *Pleurothallis* R.Br. and *Prosthechea* Knowles & Westc. are the ones that account for most of the new combinations. A summary of these proposed generic segregates is presented in Table 2. On the other hand proposals to reduce several genera to the synonymy of others were also published; most notable are the inclusion of *Oerstedella* Rchb.f. in *Epidendrum* L., *Sigmatostalix* Rchb.f. in *Oncidium* Sw. and *Stellilabium* Schltr. in *Telipogon* Kunth. A summary of those proposed generic "lumpings" is presented in Table 3.

All in all, close to half of the orchid genera accepted in the Manual have either gained and/or lost species due to generic transfers, species descriptions and/or reduction to synonymy. Given the steady discovery of novelties and phylogenetic reconstructions based on DNA, any published orchid inventory for Costa Rica becomes outdated in a matter of a few years. Bogarín (2011) listed ca. 200 new names published for the Costa Rican orchid flora between 2001 and 2008. If that tendency is maintained, which is a likely scenario, in a couple of decades the number of known orchid species in the country will exceed 2000.

As part of routine botanical exploration, documentation, and identification of orchids at Lankester Botanical Garden, more novelties continue to accumulate. On that note, we reveal the following new records from Costa Rica. Most of these were discovered from the direct study of live material; in all cases additional specimens were sought in the main Costa Rican herbaria (CR, INB, JBL, USJ) and, if found, are cited in the corresponding accounts presented below.

TABLE 2. List of orchid genera cited in the Manual de Plantas de Costa Rica which have been split by recent authors. Segregate genera are given for each generic name accepted in the Manual.

Genus	Segregate Genera	Reference
Cattleya	*Guarianthe* Dressler & W.E.Higgins	Dressler & Higgins 2003
Chondrorhyncha	*Benzingia* Dodson	Romero-González & Dodson 2010
	Daiotyla Dressler	Whitten et al. 2005
	Stenotyla Dressler	Whitten et al. 2005
Elleanthus	*Adeneleuterophora* Barb. Rodr.	Dudek & Szlachetko 2010
	Epylina Schltr.	Dudek & Szlachetko 2010
	Evelyna Poepp. & Endl.	Dudek & Szlachetko 2010
Eltroplectris	*Callistanthos* Szlach.	Szlachetko & Rutkowski 2008
Epidendrum	*Coilostylis* Raf.	Whitner & Harding 2004
Erythrodes	*Aspidogyne* Garay	Ormerod 2007; Ormerod 2009
	Kreodanthus Garay	Ormerod 2008
	Microchilus C.Presl	Ormerod 2002
	Platythelys Garay	Ormerod 2007
Galeottiella	*Funkiella* Schltr.	Solano et al. 2011
Habenaria	*Bertauxia* Szlach.	Szlachetko 2004a
	Habenella Small	Szlachetko & Kras 2006
	Platantheroides Szlach.	Szlachetko 2004b
Kefersteinia	*Senghasia* Szlachetko	Szlachetko 2003; Szlachetko, Kulak & Romowicz 2006.
Lycaste	*Selbyana* Archila	Archila 2010
Malaxis	*Microstylis* (Nutt.) Eaton	Szlachetko & Margońska 2006
Masdevallia	*Acinopetala Luer*	Luer 2006
	Alaticaulia Luer	Luer 2006
	Buccella Luer	Luer 2006
	Diodonopsis Pridgeon & M.W.Chase	Pridgeon & Chase 2001
	Fissia (Luer) Luer	Luer 2006
	Reichantha Luer	Luer 2006
	Spilotantha Luer	Luer 2006
	Zahleria (Luer)	Luer 2006
Maxillaria	*Adamanthus* Szlach.	Szlachetko & Śmiszek 2006
	Camaridium Lindl.	Blanco et al. 2007
	Christensonella Szlach., Mytnik, Górniak & Śmiszek	Szlachetko, Mytnik, Górniak & Śmiszek 2006
	Heterotaxis Lindl.	Ojeda, Carnevali & Romero 2005
	Inti M.A.Blanco	Blanco et al. 2007
	Mapinguari Carnevali & R.B.Singer	Blanco et al. 2007
	Maxillariella M.A.Blanco & Carnevali	Blanco et al. 2007
	Mormolyca Fenzl	Blanco et al. 2007
	Nitidobulbon Ojeda, Carnevali & G.A.Romero	Ojeda, Carnevali & Romero 2009
	Ornithidium Salisb. ex R. Br.	Blanco et al. 2007
	Rhetinantha M.A.Blanco	Blanco et al. 2007
	Sauvetrea Szlach.	Blanco et al. 2007
Oncidium	*Brevilongium* Christenson	Christenson 2006b
	Chelyorchis Dressler & N.H.Williams	Dressler & Williams 2000; Carnevali et al. 2009
	Heteranthocidium Szlach., Mytnik & Romowicz	Szlachetko, Mytnik & Romowicz 2006
	Otoglossum (Schltr.) Garay & Dunst.	Williams et al. 2001

TABLE 2. *Continues*.

Genus	Segregate Genera	Reference
Oncidium	*Rossioglossum* (Schltr.) Garay & G.C.Kenn.	Chase et al. 2008
	Stacyella Szlach.	Szachetko 2006
	Trichocentrum Poepp. & Endl.	Williams et al. 2001
	Vitekorchis Romowicz & Szlach.	Romowicz & Szachetko 2006.
Pleurothallis	*Aberrantia* Luer	Luer 2005
	Acronia C.Presl	Luer 2005
	Acianthera Scheidw.	Pridgeon & Chase 2001; Solano et al. 2011
	Anathallis Barb.Rod.	Pridgeon & Chase 2001; Hágsater & Soto 2003
	Ancipitia (Luer) Luer	Luer 2004
	Apoda-prorepentia (Luer) Luer	Luer 2004
	Crocodeilanthe Rchb.f. & Warsz.	Luer 2004
	Didactylus Luer	Luer 2005
	Dracontia (Luer) Luer	Luer 2004
	Echinella Pridgeon & M.W.Chase	Pridgeon & Chase 2001
	Echinosepala Pridgeon & M.W.Chase	Pridgeon & Chase 2002
	Effusiella Luer	Luer 2007
	Elongatia (Luer) Luer	Luer 2004
	Empusella (Luer) Luer	Luer 2004
	Gerardoa Luer	Luer 2006
	Kraenzlinella Kuntze	Luer 2004; Hágsater & Soto 2003
	Loddigesia Luer	Luer 2006
	Lomax Luer	Luer 2006
	Muscarella Luer	Luer 2006
	Niphantha Luer	Luer 2010
	Pabstiella Brieger & Senghas	Luer 2007
	Panmorphia Luer	Luer 2006
	Phloeophila Hoehne & Schltr.	Pridgeon & Chase 2001; Luer 2006
	Rhynchopera Klotzsch	Szlachetko & Margońska 2001
	Ronaldella Luer	Luer 2006
	Sarcinula Luer	Luer 2006
	Specklinia Lindl.	Pridgeon & Chase 2001; Hágsater & Soto 2003
	Stelis Sw.	Pridgeon & Chase 2001
	Tribulago Luer	Luer 2004; Luer 2006
	Sylphia Luer	Luer 2006
	Unciferia (Luer) Luer	Luer 2004
	Unguella (Luer) Luer	Luer 2005
	Zosterophyllanthos Szlach. & Marg.	Szlachetko & Margońska 2001; Szlachetko & Kulak 2006
Prosthechea	*Anacheilium* Rchb.f. ex Hoffmanns	Whitner & Harding 2004
	Hormidium (Lindl.) Heynh.	Whitner & Harding 2004
	Panarica Withner & P. A.Harding	Whitner & Harding 2004
	Pollardia Withner & P. A.Harding	Whitner & Harding 2004
	Pseudencyclia Chiron & V.P.Castro	Chiron & Castro-Neto 2003
Schiedeella	*Funkiella* Schltr.	Solano et al. 2011
Stanhopea	*Stanhopeastrum* Rchb.f	Szlachetko 2007
Trichosalpinx	*Tubella* (Luer) Archila	Archila 2000

Table 3. List of orchid genera cited in the Manual de Plantas de Costa Rica which have been lumped into other genera by recent authors. The absorbing genus is given for each generic name accepted in the Manual.

Genus	Reduced under	Reference
Acostaea	*Specklinia*	Pridgeon & Chase 2001
Ada	*Brassia*	Chase & Whitten 2011
Amparoa	*Rhynchostele*	Hágsater & Soto 2003
Chelyorchis	*Rossioglossum*	Chase et al. 2008
Goniochilus	*Leochilus*	Chase et al. 2008
Hybochilus	*Leochilus*	Chase et al. 2008
Leucohyle	*Trichopilia*	Dressler 2004b
Mesospinidium	*Brassia*	Chase & Whitten 2011
Oerstedella	*Epidendrum*	Hágsater & Soto 2005a
Osmoglossum	*Cuitlauzina*	Dressler & Williams 2003
Pachyphyllum	*Fernandezia*	Chase & Whitten 2011
Pleurothallis	*Stelis*	Pridgeon & Chase 2001; Hágsater & Soto 2003
Psygmorchis	*Erycina*	Williams et al. 2001
Restrepiopsis	*Pleurothallopsis*	Pridgeon & Chase 2001
Salpistele	*Stelis*	Pridgeon & Chase 2001
Scelochilus	*Comparettia*	Chase et al. 2008
Sigmatostalix	*Oncidium*	Chase et al. 2008
Stellilabium	*Telipogon*	Williams et al. 2005
Ticoglossum	*Rossioglossum*	Chase et al. 2008

1. ***Acianthera oscitans*** (Ames) Pridgeon & M.W.Chase, Lindleyana 16: 245. 2001; *Pleurothallis oscitans* Ames, Bot. Mus. Leafl. 2(2): 25–27. 1934; *Didactylus oscitans* (Ames) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 95: 257. 2004. Type: Honduras, Cortés, Santa Cruz de Yojoa. Epiphyte in open mountain forest at 2000 feet altitude. Flowers dark purple. August 26, 1933. *J.B. Edwards 515* (holotype, AMES).

Distribution: Honduras, Costa Rica and Panama.

Etymology: Not indicated in the protologue. Luer (2004) suggested the name probably refers to the typically drooping inflorescence.

Habitat in Costa Rica: This species has been found growing epiphytically at around 700 m in the transition from very humid tropical lowland forest to premontane forest of the Braulio Carrillo National Park, on the Atlantic watershed of the Central Volcanic chain.

Phenology: Flowering around August under cultivation.

Costa Rican material studied: San José: Vázquez de Coronado, Jesús, Parque Nacional Braulio Carrillo, Sendero La Botella, 10°09'33.9"N 83°57'14.8"W, 702 m, bosque muy húmedo tropical transición a premontano, epífitas en bosque secundario y primario, colectado 2 junio 2010, floreció en cultivo en agosto 2011, *D. Bogarín 7621, M. Fernández & A.P. Karremans* (JBL-Spirit!; figures 1, 14A). Heredia: Horquetas, Colonia Cubujuquí, hacia las orillas del Braulio Carrillo. 10°19'N 84°00' W, ca. 300 m. A orillas de un riachuelo. 25 de febrero 2012, *A.P. Karremans 5175* (CR!).

Acianthera oscitans is most similar to *Acianthera butcheri* (L.O.Williams) Pridgeon & M.W.Chase, from which it can be distinguished by the elliptic-ovate leaves, the flower with the tip of the dorsal sepal connate to the synsepal (reminiscent of the flowers of some *Zootrophion* spp.), the synsepal with revolute margins and the lip narrowly ovate and ciliate. Luer (2005) placed *A. oscitans*, *A. butcheri* (also known from Costa Rica) and the Ecuadorian *Pleurothallis paradoxa* Luer & Dalström and *Pleurothallis thysana* Luer & J.Portilla together in the genus *Didactylus*, distinguished from *Acianthera* by the rostellum with two narrow, curved, lateral lobes.

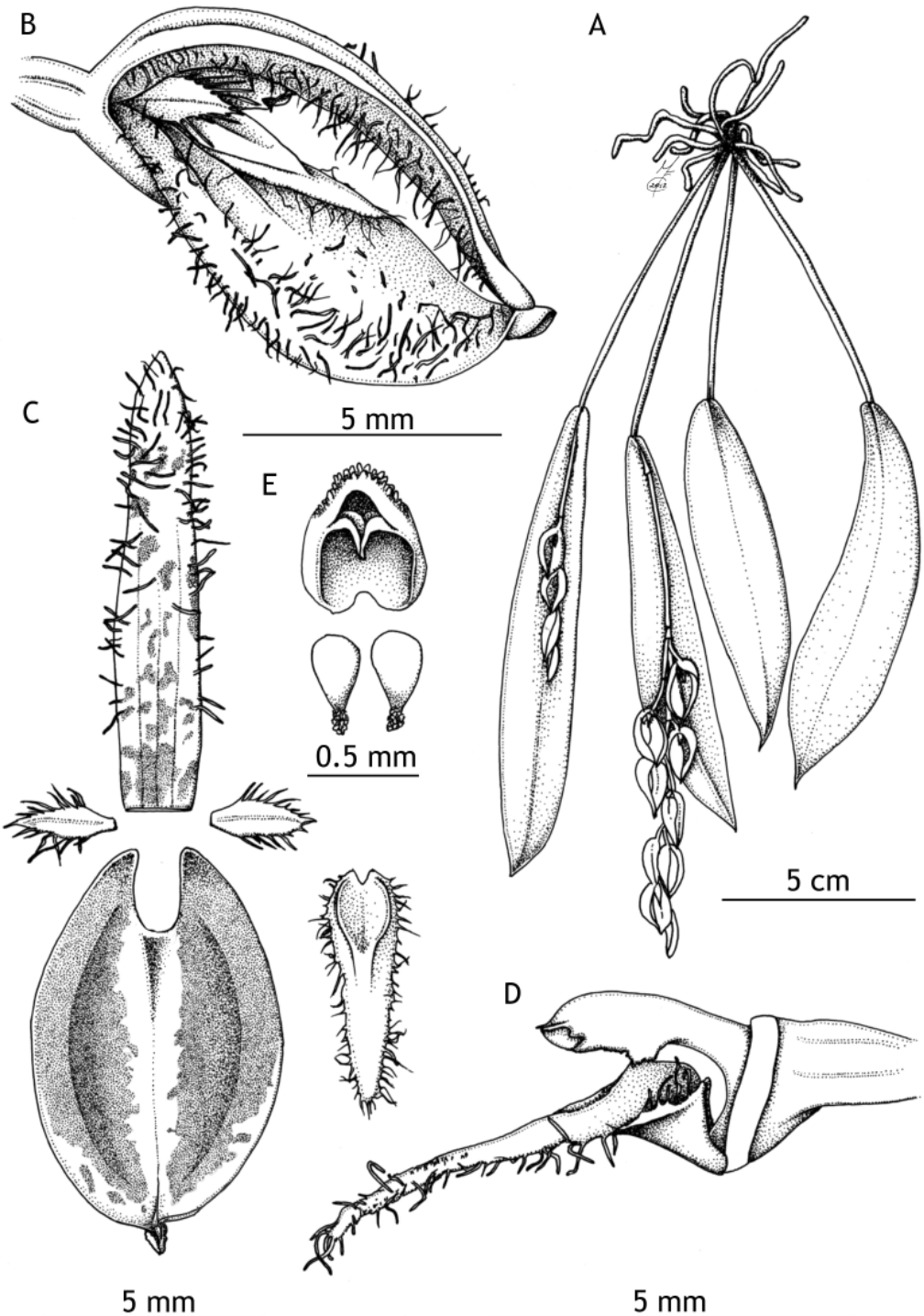

FIGURE 1. *Acianthera oscitans* (Ames) Pridgeon & M.W.Chase. A — Habit; B — Flower; C — Dissected perianth; D — Column and lip, lateral view; E — Anther and pollinaria. Drawn by M. Fernández from *D. Bogarín 7621* (JBL-Spirit).

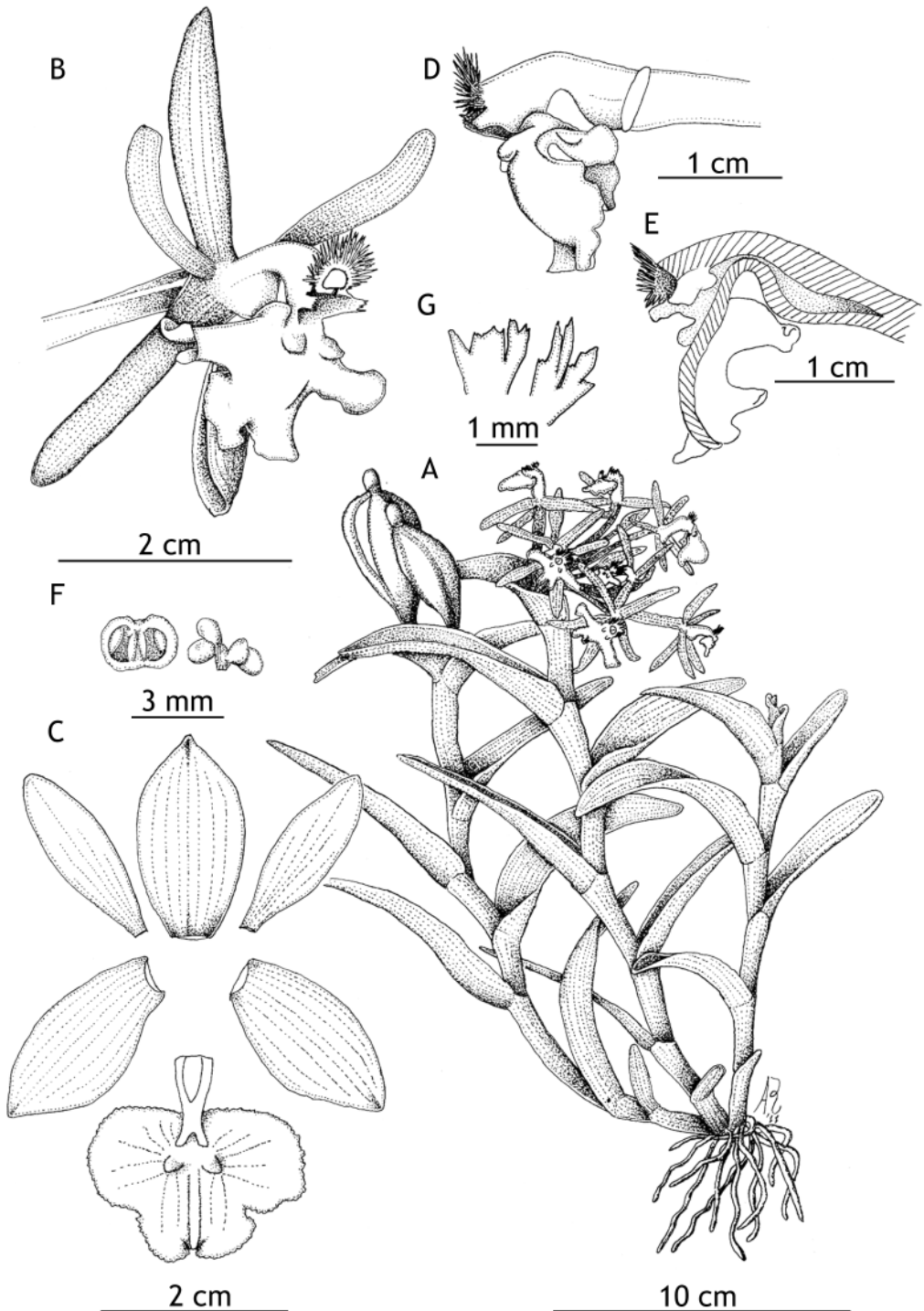

FIGURE 2. *Epidendrum alieniferum* Karremans & Bogarín. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Column and lip, longitudinal section. F — Pollinarium and anther cap. G — Clinandrium lacerations. Drawn by A.P. Karremans, based on the plant used as type (JBL-Spirit).

2. ***Epidendrum alieniferum*** Karremans & Bogarín, *sp. nov*.

Type: Costa Rica. Puntarenas: Coto Brus, Sabalito, Mellizas, entre Finca Gemelas y Finca Mellizas, 8°53'32.53" N 82°46'17.83" W, 1412 m, bosque muy húmedo premontano, epífita en árboles en potreros y cafetales "*florentem invenimus ad agros Coffeae et in pascuis supra Acnistus prope opidum Mellizas*", 18 abril 2011, *A. P. Karremans 3970, D. Bogarín & D. Jiménez* (holotype, CR!; isotype, JBL-Spirit!; figures 2, 14B).

Species Epidendro lagenocolumnae Hágsater *et* Sánchez *similis, sed floribus majoribus, columnae basi inflatiore, labello crenulato, clinandrio prominenti profunde lacerato lacerationibus radialibus differt.*

Epiphytic, caespitose, erect *herb*, up to 25 cm tall. Roots basal, fleshy, filiform. *Stems* terete, somewhat flattened. *Leaves* 4-8(9), distributed along the stem, especially close to the apex; sheath tubular, rugose; blades elliptic, obtuse, variable in size, the largest up to 6-10 × 2.5-3.2 cm. *Inflorescence* apical, sub-umbellate; peduncle reduced. *Floral bracts* acute, 0.5 cm long. Flowers 4-10, greenish. *Ovary* pedicellate, terete, smooth. *Sepals* partly spreading, slightly bent backwards, elliptic, obtuse, 7-veined, margin entire, revolute; dorsal sepal 21-22 × 11-12 mm, lateral sepals oblique, 20-22 × 10-11 mm. *Petals* spreading, porrect, narrowly-elliptic, obtuse, 5-veined, margin entire, revolute, 20-22 × 6-7 mm. *Lip* trilobed, basal lobes widely ovate-elliptic, mid-lobe sub-quadrate, emarginate, bicallose, with a low central keel, margins crenulate, folded, appearing cross-like in natural position, 22 × 22-23 mm. *Column* strongly arching downwards, thickened basally, sub-terete, 13-15 mm long, with a pair of arm-like wings; clinandrium-hood erect, prominent, margins radially lacerate; rostellum near the apex of the column, slit. *Anther cap* transverse-elliptic, 4-celled, 3 mm wide. *Pollinia* 4, obovoid, laterally compressed. *Nectary* short, barely penetrating the ovary, smooth. *Fruit* ellipsoid.

Paratypes: Costa Rica. Same locality and date as the holotype, *A. P. Karremans 3971, D. Bogarín & D. Jiménez* (JBL-Spirit!). Puntarenas: Coto Brus. Z.P. Las Tablas. Cuenca Térraba-Sierpe. Estación Progreso, S. Fila Palmital, colectando en bosque primario. Epífita, flores crema. 8°55'00.3640" N - 82°46'58.3450" W. 1440 m, 24 mayo 1999, *M. Alfaro 183* (CR!, INB!).

Distribution: Known only from Costa Rica, but most probably occurring also in Panama, as the three known specimens were collected close to the Panamanian border.

Etymology: From the Latin *alienus*, alien, stranger, and *fero*, bearing. In allusion to the frontal view of the folded lip and column apex in natural position, reminiscent of little green human-like figures; bearing strange beings.

Habitat in Costa Rica: Epiphytic in primary and secondary humid premontane forest, at around 1400-1450 m elevation. It is known only from the southernmost portion of the Pacific slope of the Cordillera de Talamanca.

Phenology: Flowering recorded in April in the field and in May under cultivation.

Epidendrum alieniferum is most similar to *E. lagenocolumna* Hágsater & Sánchez (1993), but it can be distinguished by the larger flowers (sepals 20-22 vs. 13-18 mm long and 10-12 vs. 4-6 mm wide, respectively), the shape of petals (elliptic vs. linear), the lip crenulate (vs. entire), the base of the column more inflated (twice the column width vs. being less than twice the width), and the prominent clinandrium, with radial lacerations (vs. obsolete). It also grows at lower elevations than *E. lagenocolumna*, which in Costa Rica is normally found above 1800 m, and is only known from the southern part of the Pacific watershed of the Talamanca range, whereas the former is known throughout the country. The variable *E. firmum* Rchb.f. is also similar; however it is smaller in both plant and flower size, has linear petals, a column that is not thickened at the base and does not have such a prominent, erect, lacerate clinandrium (Sánchez & Hágsater 2007).

3. ***Epidendrum concavilabium*** C.Schweinf., Bot. Mus. Leafl. 4: 118. 1937. Type: Costa Rica. Colinas de San Pedro de San Ramón, Nov. 1927, *A.M. Brenes (119) 1660* (holotype, AMES; photo of type at AMES!).

Distribution: Costa Rica.

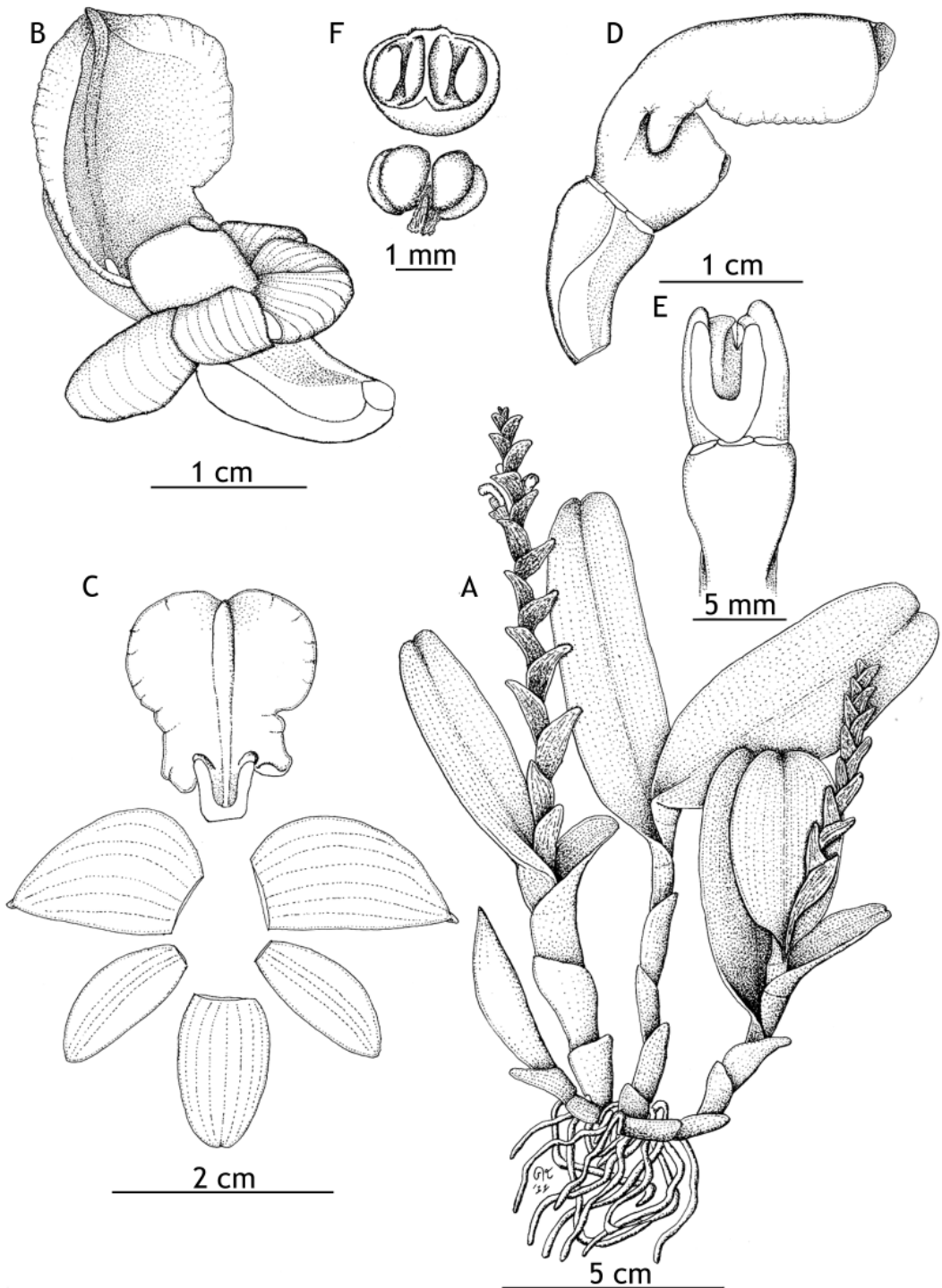

FIGURE 3. *Epidendrum concavilabium* C.Schweinf. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Column, ventral view. F — Pollinarium and anther cap. Drawn by A.P. Karremans, based on *D. Bogarín 4848* (JBL-Spirit).

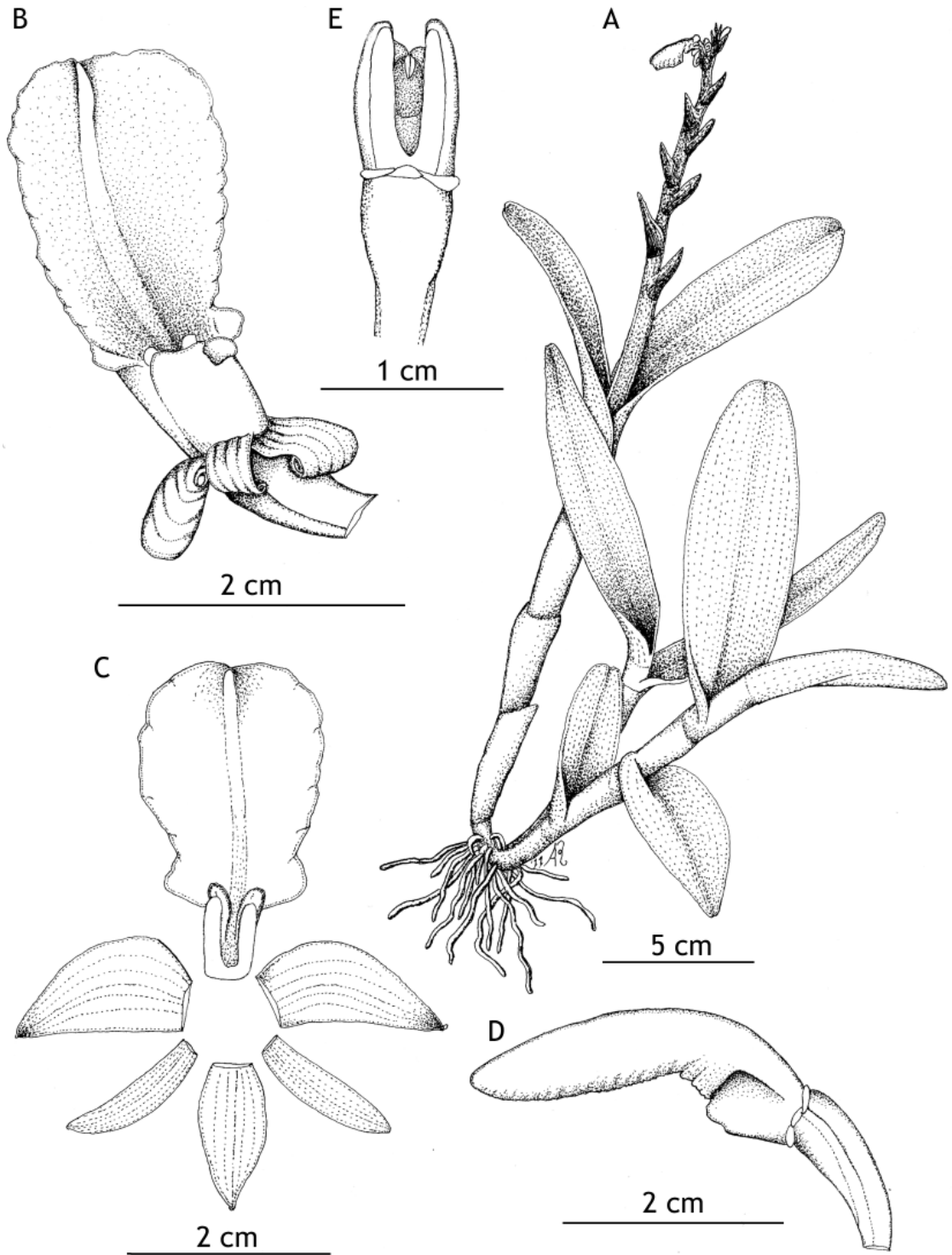

FIGURE 4. *Epidendrum circinatum* Ames. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Column, ventral view. Drawn by A.P. Karremans, based on *Karremans 84* (JBL-Spirit).

Etymology: Referring to the concave shape of the lip.

Habitat in Costa Rica: Epiphytic in tropical wet forest along the Central Valley at about 700-800 m elevation.

Additional Costa Rican material studied: Cartago: Límite entre Turrialba y Jiménez, La Suiza, Pejivalle, camino a Esperanza, en lomas cerca de la Quebrada Puente, 9°48'46.0"N 83°39'10.0" W, 738 m, bosque muy húmedo premontano, epífitas en bosque secundario a la orilla de cañaverales, 1 mayo 2008, *D. Bogarín 4847, A.P. Karremans, Y. Kisel & R. Phillips* (JBL-Spirit!). Same locality and date, *D. Bogarín 4848, A.P. Karremans, Y. Kisel & R. Phillips* (JBL-Spirit!; figures 3 & 14D). Taus, pastures beside Río Pejibaye between Río Taus and Quebrada Azul, elev. 760 m. Epiphyte in large clumps. Flowers green. 28 May 1972, *R.W. Lent 2553*, (CR!, F, NY). Heredia: Sacramento, marzo 1983. Floreció en cultivo en el Jardín Lankester en julio de 1990, *Mora s.n.*, (USJ!); San José de la Montaña, 15 marzo 1981, *Mora s.n.*, (USJ!). Without collecting data, Jardín Botánico Lankester, received 18 March 1982, pressed cult. 7 April 1983, *Hágsater 6731* (AMO), *idem*. pressed cult. 4 September 1984 (AMO; INB!), *idem*. pressed cult. 18 September 1986 (AMO), *idem*. pressed cult. 23 November 1992 (AMO), *idem*. pressed cult. 18 September 1996 (AMO).

Epidendrum concavilabium was traditionally considered a synonym of *E. circinatum* Ames (Hágsater et al. 2003; Jiménez & Hágsater 2008). Although their habits are similar, plants of *E. concavilabium* are much more robust, more compact and thicker, have wider leaves (length:width ratio 2-3:1 vs. 4-5:1) that are darker (even in herbarium material). Both have a concave, pandurate lip, but that of *E. concavilabium* is much more deeply concave and shorter (19-23 mm vs. 30-32 mm). The two species have completely retrorse sepals and petals, which are similar in length (lateral sepals 16-19 mm, petals 14-15 mm); however, those of *E. concavilabium* are wider (lateral sepals 10-11 mm vs. 7-8 mm and petals 6-7 mm vs. 3.5-4 mm), and generally more obtuse (vs. acute). Additionally, the column of *E. concavilabium* is shorter, almost as wide as long, whereas that of *E. circinatum* is clearly longer than wide. Aside from morphological characters, *E. circinatum* is typically found in the warm Caribbean lowlands with coastal influence, whereas *E. concavilabium* grows at higher elevations in the mountainous areas around the Central Valley.

Note: Since *E. concavilabium* was relegated to the synonymy of *E. circinatum* by Hágsater *et al.* (2003) and Jiménez & Hágsater (2008), we also list the studied specimens of *E. circinatum*: Nicaragua. Bluefields: En los manglares frente a la costa, 0 m de altura. 18 febrero 2004, *A.P. Karremans 84* (JBL-Spirit!; figures 4 & 16-D). Costa Rica. Limón: Cantón de Talamanca, Bratsi. Amubri, Alto Lari, siguiendo la fila entre Río Dapari y Río Lari, bajando hasta el cauce del mismo, 9°25'30" N 83°03'35" W 450 m. Epífito. Cáliz verde, corola verde-blanco, columna verde. 3 marzo 1992, *G. Herrera 5159* (CR, AMO, MO, INB!). Alajuela: Arenal Volcano, 400 year old lava flow. Open high canopy, dense understory, broken lava blocks covered w/duff. April 22, 1990. *V.A. Funk 10809, F.O. Smith, G.S. McKee and others* (CR!). Without specific locality data, *JBL-s.n.* (digital photograph, 14C).

We have not been able to see material from *Hágsater 6810* (AMO) and *Lankester 844* (AMES), cited by Jiménez & Hágsater (2008) under the Costa Rican specimens of *E. circinatum*, but based on their locality they probably are *E. concavilabium*.

4. ***Epidendrum cystosum*** Ames, Bot. Mus. Leafl. 2(9):105. 1934. Type: Honduras. Yoro: Bajo Grande, 3000 ft, 14 March 1934, *J. B. Edwards 675* (holotype: AMES; photo of type at AMES!; illustration of type!).

Distribution: Mexico, Belize, Honduras, Nicaragua, Costa Rica and Colombia.

Etymology: From the Greek κυστις, bladder, cyst, in reference to the prominent ventral vesicle behind the perianth.

Habitat in Costa Rica: the only known specimen was found growing as an epiphyte on a solitary tree in open pastures, in tropical wet forest, just above sea level around Drake Bay in the Península de Osa.

Costa Rican material studied: Puntarenas: Osa, Sierpe. Bahía Drake, frente a Finca Maresía, en árboles de potrero, bosque muy húmedo tropical, 8°40'49.9" N 83°40'17.5" W, 85 m, 19 marzo 2011, *A.P. Karremans 3744 & M. Contreras* (JBL-Spirit!, CR!; figures 5, 14E).

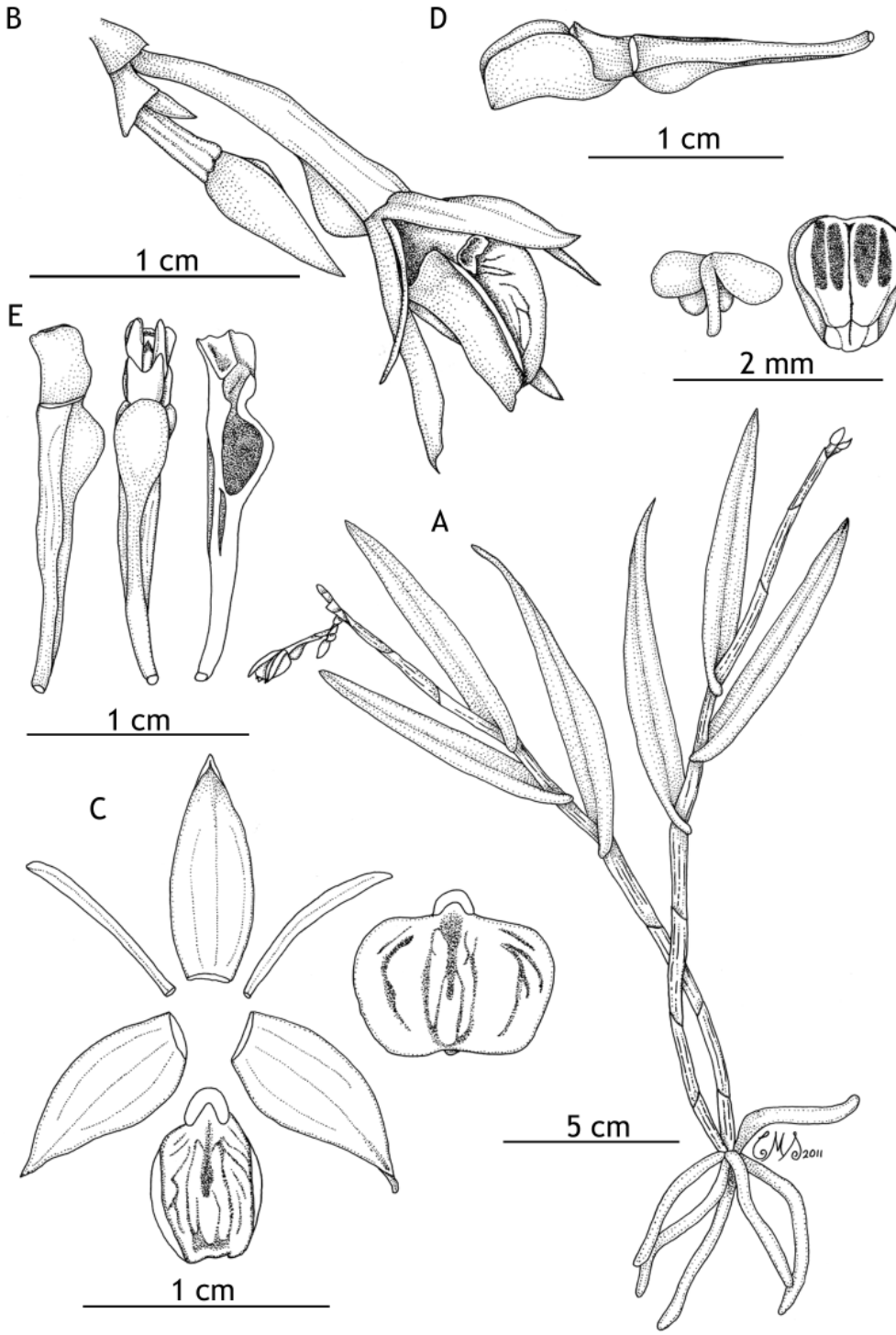

FIGURE 5. *Epidendrum cystosum* Ames. A — Habit. B — Flower. C — Dissected perianth, with lip in natural configuration below and spread to the right. D — Column and lip, lateral view. E — Column, lateral view, front view, and longitudinal section (from left to right). F — Pollinarium and anther cap. Drawn by C. M. Smith based *on Karremans 3744* (JBL-Spirit).

This unique species is distinguished by the thin stems, grassy leaves, inflorescence generally shorter than the apical leaf, with partly spreading petals and sepals, the apices of the sepals recurved, the elliptical to suborbicular lip with evident laminar keels, and the prominent clinandrium-hood with the margin erose. *Epidendrum cystosum* is most similar to *E. macroclinium* Hágsater, but the latter has succulent, ovate-lanceolate leaves, inflorescences much longer that the apical leaf, reflexed petals, an obreniform lip with a single low keel, and a prominent clinandrium-hood with a fimbriate-dentate margin. It may also be related to *E. physodes* Rchb.f., which can be distinguished by the wider, lanceolate, short-acuminate leaves, the inflorescence longer than the apical leaf, the lip transversely elliptic, with a single low keel, and an obsolete clinandrium-hood with a thick and crenate margin (Santiago & Hágsater 2010).

5. ***Epidendrum* × *sandiorum*** Hágsater, Karremans & L.Sánchez, *nothosp. nov.*

Type: Costa Rica. Puntarenas: Coto Brus, Sabalito, Zona Protectora Las Tablas, 10 km al noreste de Lucha, Sitio Coto Brus, camino a la Finca de Miguel Sandí, 8°56'07.4" N 82°45'13.9" W, 1862 m, bosque muy húmedo montano bajo, epífitas a orillas del camino, colectado 5 junio 2010, floreció en cultivo en agosto 2011, *A. P. Karremans 2781 & D. Bogarín* (holotype, JBL-spirit!; figure 13).

Planta inter Epidendrum ciliare L. *et E. oerstedii* Rchb.f. *quasi intermedia et verisimiliter ex hybridatione harum specierum orta, cum Epidendro ciliare sed lobulo apicali labelli ad medium dilatato, lanceolato, clavato, manifeste acuminato, margine vix eroso, cum Epidendro oerstedii sed lobulis lateralibus labelli margine profunde fimbriato ad laciniatum, lobo apicali labelli longiore et aliis characteribus inter parentes mediis.*

Epiphytic, sympodial, caespitose *herb*, up to 20 cm tall. *Roots* basal, fleshy, 3 mm in diameter. *Stems* thickened into a sub-spherical to ovoid homoblastic pseudobulb, 4.0-6.0 × 1.5-3.0 cm. *Leaves* 1 at the apex of the pseudobulb, coriaceous; blade ovate-elliptic, bilobed, 7.5-12.0 × 3.5-6.0 cm. *Spathaceous bract* lacking. *Inflorescence* apical, racemose, born from the undeveloped new growth, with at least 3 flowers; peduncle laterally compressed, 2.5 cm long; covered by triangular, obtuse bracts. *Floral bract* about half the length of the ovary, triangular, acuminate, 3.5 cm. *Ovary* terete, not inflated, smooth, exceeding the length of the sepals, 6.5 cm. *Flowers* simultaneous, resupinate, sepals and petals yellowish green, lip white, column white turning green close to the base, calli white; flowers turn completely yellow with age. *Sepals* spreading, narrowly elliptic-lanceolate, acuminate, 5-7 veined, margin entire, revolute, 5.5 × 0.9 cm. *Petals* incurved, embracing the column and lip, linear-lanceolate, acuminate, 5-veined, margin entire, 5.2 × 0.8 cm. *Lip* basally united to the column, 3-lobed, base truncate; bicallose, the calli laminar, prominent, narrowly elliptic, 5 mm; disc with numerous evident veins; lateral lobes obliquely oblong, inner margin entire, outer margin prominently fimbriate to laciniate, 20 × 6 mm; mid-lobe separate from the lateral lobes by deep sinuses, lanceolate-clavate, widened beyond the middle and that portion trullate, acuminate, margin shallowly erose, 45 × 7 mm. *Column* straight, dilated towards the apex, 1.6 cm long; *clinandrium-hood* prominent, margin dentate-fimbriate, rostellum apical, cleft, forming a slit-like aperture *anther* ovoid, 4-celled. *Pollinia* 4, obovoid, the inner margin straight, laterally compressed.

Distribution: Known only from Costa Rica; however, as it was found a few km from the border it could also occur in Panama.

Etymology: The name honors Miguel Sandí and his family; the plant that served as the type was collected on the road leading to their property.

Habitat in Costa Rica: This natural hybrid is only known from the very humid lower montane forests of the Pacific watershed of the Cordillera de Talamanca at an elevation of around 1900 m.

Phenology: Flowering at least in August and September in cultivation.

Several species of *Epidendrum* (e.g., *E. ciliare* L. *E. falcatum* Lindl., *E. nocturnum* L., *E. oerstedii* Rchb.f., and *E. parkinsonianum* Hook.) have star-like, white or greenish flowers with a deeply 3-lobed, white lip. They were traditionally considered close

relatives, but DNA studies (Hágsater & Soto 2005b) showed that species with this floral morphology are found in five different groups within *Epidendrum*, and that probably their pollination by nocturnal sphyngid moths has led to the development of similar floral features. The fact that they may all be pollinated by the same type of moth has led to occasional natural hybrids, such as *E. parkinsonianum* × *E. falcatum* (Hágsater 1990) and *Epidendrum* × *dorotheae* P.H. Allen (Hágsater & Sánchez 2008a). The latter case is interesting because the putative parent species belong to different groups, *E. nocturnum* being in the Nocturnum group and *E. ciliare* in the Coilostylis Group.

Both putative parents of *Epidendrum* × *sandiorum*, *E. oerstedii* and *E. ciliare*, are members of the Coilostylis Group that is characterized by the sympodial, caespitose plants, the stems forming a fusiform pseudobulb, with an apical, racemose, distichous inflorescence, the peduncle covered by large bracts (but not spathaceous), and flowers with the above-mentioned morphology. The hybrid is recognized by the sub-spherical to ovoid pseudobulbs with a single apical leaf and the inflorescence produced from the immature stem. The outer margins of the lateral lobes of the lip are fimbriate to laciniate, the mid-lobe trullate beyond the middle, 45 mm long, apically long-acuminate, and the margin erose. *Epidendrum oerstedii* ranges from Honduras to central Panama, produces the inflorescence from the immature, short pseudobulb. The margin of the lip is entire, and the mid-lobe shorter (25-33 mm long), widened beyond the middle. *Epidendrum ciliare* is widely distributed from western Mexico (Nayarit) south to Peru and Brazil and the Antilles, also produces the inflorescence from the immature, more elongate pseudobulb, but the outer margins of the lip are deeply fimbriate, and the mid-lobe is linear, not widened in the middle (Sánchez & Hágsater 2008b; 2010). The putative parents have not been recorded yet at the same location were the hybrid was found.

6. ***Epistephium ellipticum*** R.O.Williams & Summerh., Bull. Misc. Inform. Kew 1928(4): 145. 1928. Type: Trinidad: Valencia Road, Mora forest end, Sept. 1926, *Freeman, William & Cheesman s.n.* (holotype, TRIN no. 11324; isotype, K).

Distribution: Belize, Costa Rica, Venezuela, Trinidad, Guyana and Peru. Likely occurs (but not yet collected) in Colombia, Ecuador, Panama, and other Central American countries.

Etymology: From the Latin *ellipticus,* elliptic, in reference to the elliptic leaf shape of the type specimen.

Habitat in Costa Rica: Known from a single collection in the coastal lowlands of the Caribbean close to the Panamanian border. The specimen label does not describe the habitat, but species of *Epistephium* grow terrestrially, typically in open, grassy areas (Cameron 2003).

Costa Rican material studied: Limón. Talamanca, Sixaola, Gandoca, El Llano entre Filas Manzanillo y Rio Mile Creek. 09°37'00" N, 82°41'00" W, 50-100 m. 27 Mar. 1995. Terrestre. Margen de la hoja liliáceos. Flor lila morado. *G. Herrera 7605 & E. Sandoval McCarthy* (CR!, MO; figure 6).

Heretofore, *E. ellipticum* had been recorded for Belize, Venezuela, Trinidad, Guyana and Peru; it had not been recorded from anywhere in Central America outside of Belize. The Costa Rican record here reported was collected a few kilometers from the Panamanian border, and the species likely occurs in Panama as well. The duplicate specimen at MO had already been identified as *E. ellipticum* by Robert L. Dressler in 2007.

Epistephium ellipticum is a short-statured herb and the flowers of the genus are short-lived (Garay 1961), so the plants are likely overlooked and undercollected. In addition, because of their reticulate leaf venation, herbarium collections are likely to be erroneously assigned to other plant families (e.g., Convallariaceae, Smilacaceae, or even Piperaceae) when not in flower or when the perianth has been damaged or lost. It is possible that *E. ellipticum* is more widespread along the Caribbean lowlands of Central America than what the few available collections suggest. *Epistephium ellipticum* is also known from Peru from a single collection made in the Amazonian lowlands of the department of Loreto (*Beltrán & Foster 567*, F). No collections of the Amazonian lowlands of Colombia and Ecuador are known to us. The size variation of the three plants included in the herbarium sheet at CR (all of them with inflorescences) is worth mentioning; two plants are only 8 cm tall, whereas the third plant is 23 cm tall.

FIGURE 6. Herbarium specimen of *Epistephium ellipticum* R.O.Williams & Summerh. (*Herrera 7605 & Sandoval McCarthy,* CR).

7. ***Lepanthes kabebatae*** Bogarín, Karremans & Mel. Fernández, *sp. nov.*

Type: Costa Rica. Cartago: Turrialba, La Suiza, Llanos del Quetzal, ca. 1 km sobre el camino detrás de la Escuela de Kabebata (Alto Quetzal), 9°46'43.6"N 83°24'41.6"W, 1449 m, epífita en bosque primario y secundario, bosque muy húmedo premontano, "supra arbores in nemoribus Llanos del Quetzal ad Turrialba in Cartago", 17 junio 2011, *D. Bogarín 8873, M. Fernández & A.P. Karremans* (holotype, CR; isotype, JBL-Spirit; figures 7, 14F).

A Lepanthes eleganti Luer *petalis latioribus luteis basaliter scarlatis, lobo superno petalorum oblong-ovato, lobo infero petalorum angusto-ovato, labello scarlato minute ciliato et appendice longiore statim dignoscenda.*

Epiphytic, caespitose, erect *herb*, up to 20 cm tall. *Roots* slender, flexuous, to 1 mm in diameter. *Ramicaul* erect to suberect, up to 12.5 cm, enclosed by 8-11 minutely ciliate, blackish, lepanthiform sheaths, lightly ciliate especially on new growth, the ostia dilated, ciliate, ovate, acute, adpressed. *Leaves* subcoriaceous, adaxially green, abaxially purple, elliptic to narrowly ovate, acute to acuminate, with an apiculus, 4.3-7.2 × 1.5-3.6 cm, the cuneate base narrowing into a petiole up to 5 mm long. Inflorescence racemose, distichous, successively flowered, born beneath the leaf, shorter than the leaves, up to 4.5 cm, peduncle 2 cm long, rachis 2.5 cm. *Floral bracts* 1 mm long, ciliate, ovate, acuminate, conduplicate, membranaceous, muriculate. *Pedicel* 5 mm long, persistent. *Ovary* up to 3 mm long, glabrous. *Flowers* with the sepals light yellow, basally light red, petals yellow, basally scarlet, the lip scarlet. *Dorsal sepal* ovate, acute, connate to the lateral sepal for about 1 mm, 4.7 × 5.1 mm. *Lateral sepals* ovate to elliptic, acute, connate for about 2 mm, 4.3-4.9 mm × 1.9-2.3 mm. *Petals* minutely pubescent with the margins minutely ciliate transversely bilobed, 1.8-2 × 5.6-8 mm, the upper lobe oblong-ovate, obtuse, the apex folded, the lower lobe, narrowly ovate, acute, slightly smaller than the upper lobe. *Lip* bilobate, adnate to the column, 1.8-2 mm × 4.2-5 mm, the blades oblong, minutely pubescent, with rounded ends, falcate, the connectives terete, up to 1 mm long, the body oblong, connate to the base of the column, the appendix oblong, pubescent. *Column* cylindrical, up to 2 mm long, the anther apical, the stigma ventral; anther cap cucullate. *Pollinia* two, ovoid.

Distribution: Known only from the type locality in Costa Rica.

Etymology: After the Cabécar *kabe*, quetzal, and *bata*, slope, referring to the locality of the Alto Quetzal (Kabebata), where the type specimen was collected. The Cabécar is one of the six native languages of the Chibcha language family spoken in Costa Rica.

Habitat in Costa Rica: Epiphytic in secondary and primary vegetation in premontane wet forest on the Caribbean slopes of the Cordillera de Talamanca, northwestern Fila de Matama at around 1500 m elevation.

Phenology: Plants have been recorded in flower at least in June, but continued flowering up to November in cultivation.

Paratypes: Costa Rica. Same locality and date as the holotype, *D. Bogarín 8875, M. Fernández & A.P. Karremans* (JBL-spirit!; figure 14G). Same locality and date, *A.P. Karremans 4278, D. Bogarín & M. Fernández* (JBL-spirit!; CR!). Same locality and date, *A.P. Karremans 4279, D. Bogarín & M. Fernández* (USJ!).

Lepanthes kabebatae is one of the largest species of the genus in Costa Rica, with plant up to 20 cm tall. The flowers of *L. kabebatae* are similar to those of *L. elegans*, but the former can be recognized by the wider petals 5.6-8 mm (vs. up to 5 mm) with the upper lobe oblong-ovate (vs. widely ovate) and the lower lobe narrowly ovate (vs. obliquely triangular), the microscopically ciliate lip (vs. long ciliate lip towards the apex) and the large appendix (vs. reduced to a tuft of cilia). The color of the flowers is also different; in *L. kabebatae* the petals are yellow, basally stained with scarlet (vs. yellow with a red stain in the middle of the upper lobe and along the external margins) and the lip is scarlet (vs. yellow).

The size and habit of *L. kabebatae* are similar to those of *L. atrata* Endrés ex Luer, *L. barbosae* Luer, *L. daniel-jimenezii* Bogarín & Pupulin, *L. ferrelliae* Luer and *L. guardiana* Endrés ex Luer. However, the new species lacks the thick, protuberant body of the lip present in all those species.

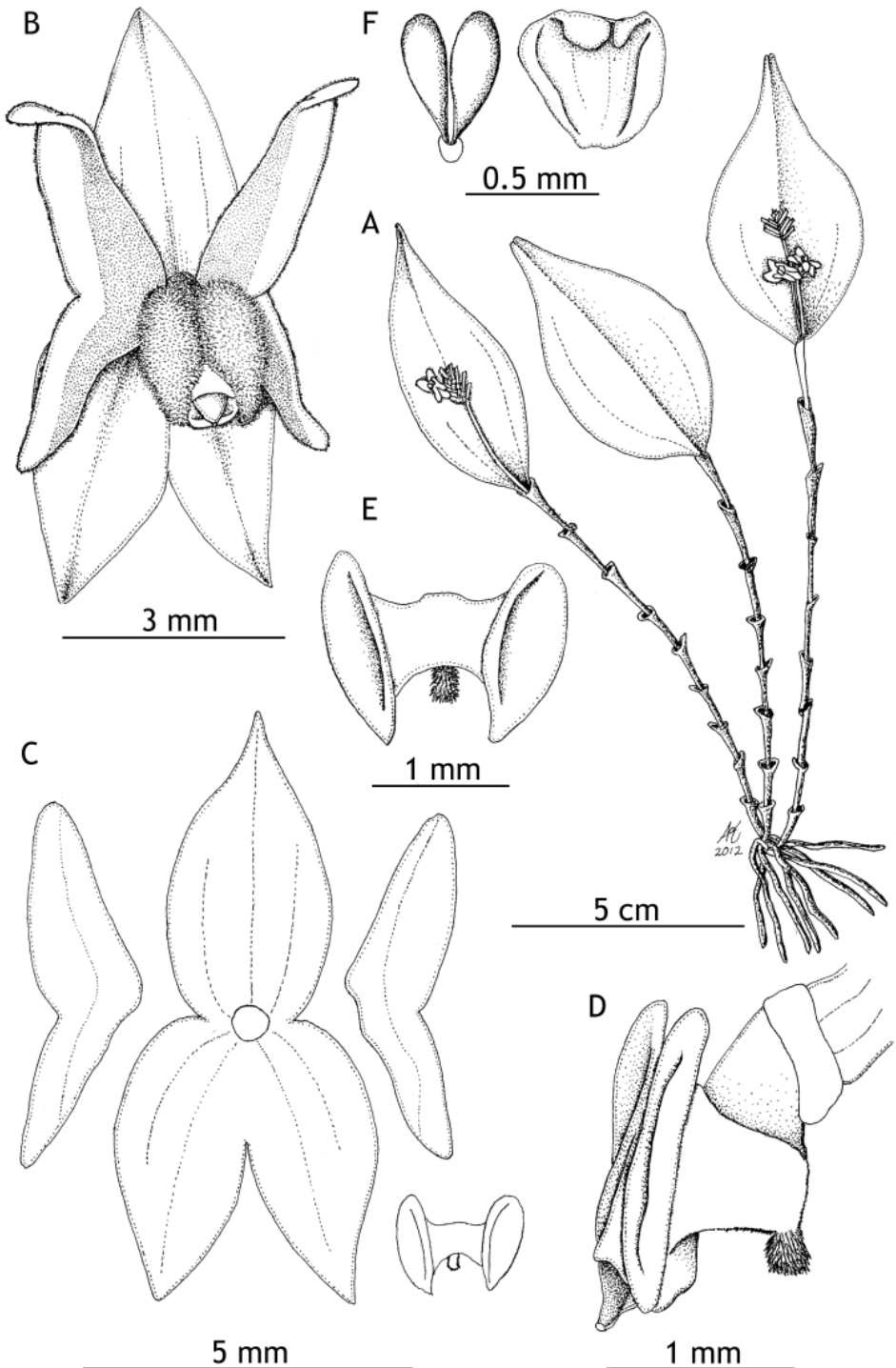

FIGURE 7. *Lepanthes kabebatae* Bogarín, Karremans & Mel. Fernández. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Lip, spread. F. Pollinarium and anther cap. Drawing by D. Bogarín and A.P. Karremans, based on the plant used as type (JBL-Spirit).

9. ***Lepanthes psyche*** Luer, Phytologia 55: 192. 1984. Type: Panama. Chiriquí, epiphytic in small trees near Volcán, "La Cordillera", alt. 1300 m, 9 Dec. 1983, *C. Luer, J. Luer, A. Maduro & H. Butcher 9317* (holotype, SEL). *Lepanthes setos* Luer, Phytologia 55(3): 193-194. 1984. Type: Panama. Prov. of Chiriquí: epiphytic in scrubby trees near Volcán, alt. 1350 m, 7 Dec. 1983, *C. Luer, J. Luer & H. Butcher 9279* (holotype, SEL).

Distribution: Costa Rica and Panama.

Etymology: From the Greek *psyche*, a butterfly, in reference to the large petals.

Habitat in Costa Rica: Epiphytic in secondary premontane wet and transition to wet forests in the southern Pacific watershed of the Cordillera de Talamanca at around 1500 m elevation.

Costa Rican material studied: Puntarenas: Coto Brus, Sabalito, Cotoncito, Sitio Cotón, 8°56'34.07" N 82°47'15.55" W, 1545 m, en árboles a orillas de una quebrada, Daniel Jiménez invenit, floreció en cultivo en el Jardín Botánico Lankester, 7 abril 2011, *D. Jiménez sub D. Bogarín 8538* (JBL-Spirit!; figures 8, 14H). San José: Dota, San Lorenzo de Dota, camino que comunica esa localidad con el proyecto Pirrís, parte más alta del trayecto, árboles de Ciprés en cerca de potreros, 9°36'45.72"N 84°04'51.88"W, recolectada por D. Jiménez, *M. Fernández 334* (JBL-spirit!).

This species is closely related to *Lepanthes fimbriata* Ames. Vegetatively they are similar, both having thick, heavy, concave, coppery leaves with pendent stems. The appendix is conspicuous and fimbriate in both species. However, *L. psyche* is distinguished from *L. fimbriata* by the glabrous petals and lip (vs. fimbriate) and the petals with the upper lobe suborbicular to widely obovate (vs. ovate). *Lepanthes setos* Luer from Panama is considered a synonym of *L. fimbriata* (Luer 2003).

10. ***Lepanthes regularis*** Luer, Lindleyana 2: 210. 1987. Type: Panama. Prov. of Chiriquí: Cerro Punta, Las Nubes, collected by A. Maduro 6-B, *C. Luer 11631* (holotype, MO).

Distribution: Costa Rica and Panama.

Etymology: From the Latin *regularis*, regular, standard, referring to the average morphology of this species.

Habitat in Costa Rica: Epiphytic in disturbed forest in pastures in lower montane rain forests in the southern Pacific watershed of the Cordillera de Talamanca, at around 1800 m elevation.

Costa Rican material studied: Puntarenas: Coto Brus, Sabalito, Zona Protectora Las Tablas, 13 km al noreste de Lucha, Sitio Coto Brus, entre Río Surá y Quebrada Sutú, Finca de Miguel Sandí, 8°56'46.1" N 82°44'30.9" W, 1778 m, bosque pluvial montano bajo, epífitas en potreros arbolados, 6 junio 2010, *D. Bogarín 7767 & A.P. Karremans* (JBL-Spirit!; figures 9, 14I). Puntarenas: Coto Brus, Sabalito, Zona Protectora Las Tablas, 13 km NE of Lucha, Sitio Coto Brus, finca Sandí "El Capricho", 8°56'46.1" N 82°44'30.9" W, 1778 m, epiphytic, mostly on *Quercus* sp. in pastures and along the river Sutú, wet premontane forest, 6 October 2010, *F. Pupulin 7928, D. Bogarín, R.L. Dressler & M. Fernández* (JBL-spirit!; CR!).

According to Luer (1987) the morphological features of this species are standard for the genus and no one character is particularly distinctive, it is actually the combination of standard characters that make *L. regularis* unique. A population of this species was found near the border between Costa Rica and Panama in the region of Las Tablas (15 km from the type locality of Las Nubes in Panama). The features are consistent with those given in the protologue (Luer 1987), especially in the ovate, acute lateral sepals, the red oblong petals, the minutely pubescent appendix and the general measurements of the flower parts and plant.

11. ***Masdevallia nicaraguae*** Luer, Selbyana 5(2): 148–149. 1979. Type: Nicaragua. Granada: epiphytic in cloud forest on Mombacho Volcano, J.T. Atwood s.n., cultivated by J. & L. Orchids, Easton, CT, flowered in cult. 7 Nov 1977, *C. Luer 2118* (holotype, SEL).

Distribution: Nicaragua and Costa Rica.

Etymology: Named after Nicaragua, the country of origin of the type specimen.

Habitat in Costa Rica: The only known specimen of

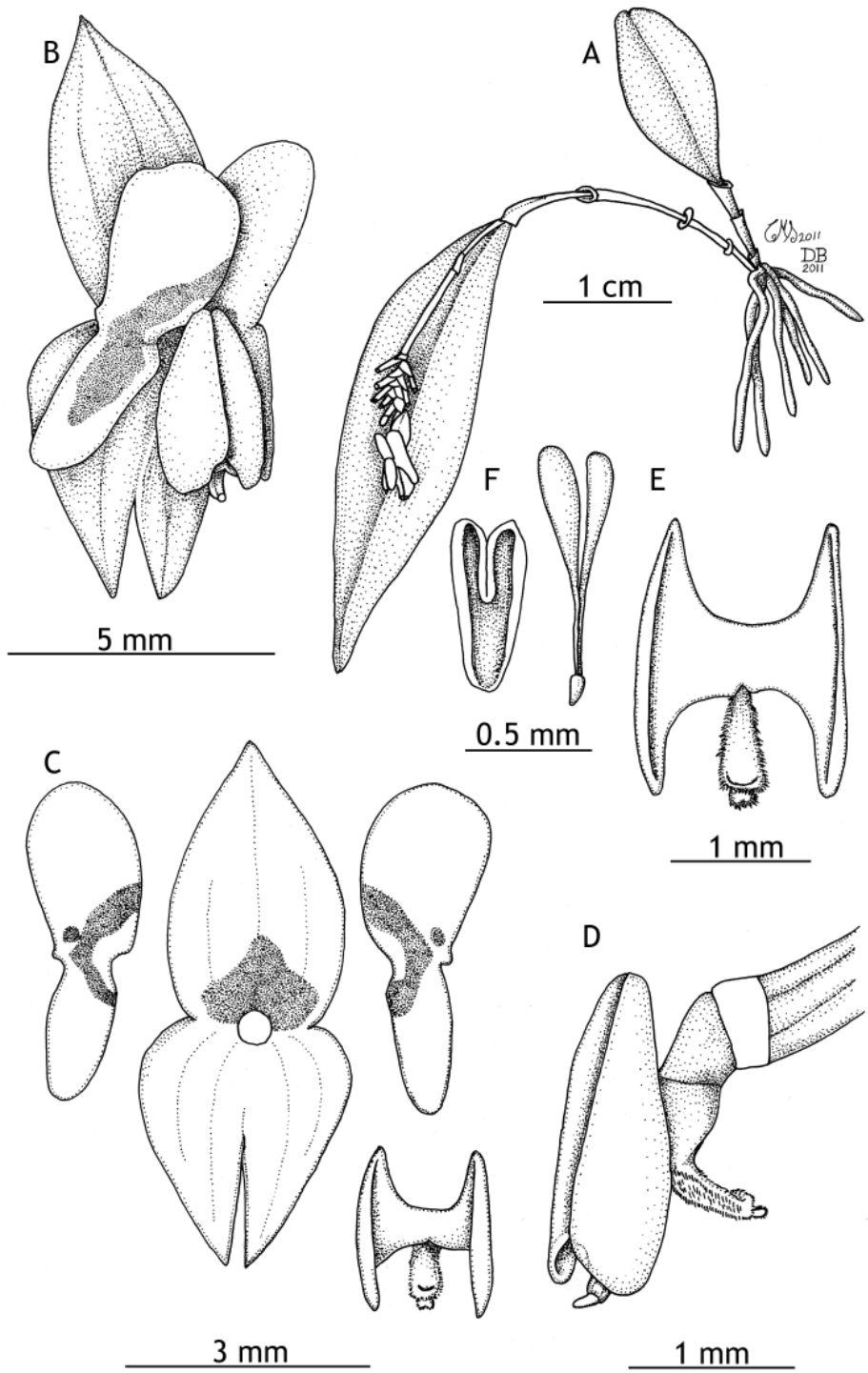

FIGURE 8. *Lepanthes psyche* Luer. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Lip, spread. F — Pollinarium and anther cap. Drawing by D. Bogarín and C. M. Smith based on *Bogarín 8538* (JBL-spirit).

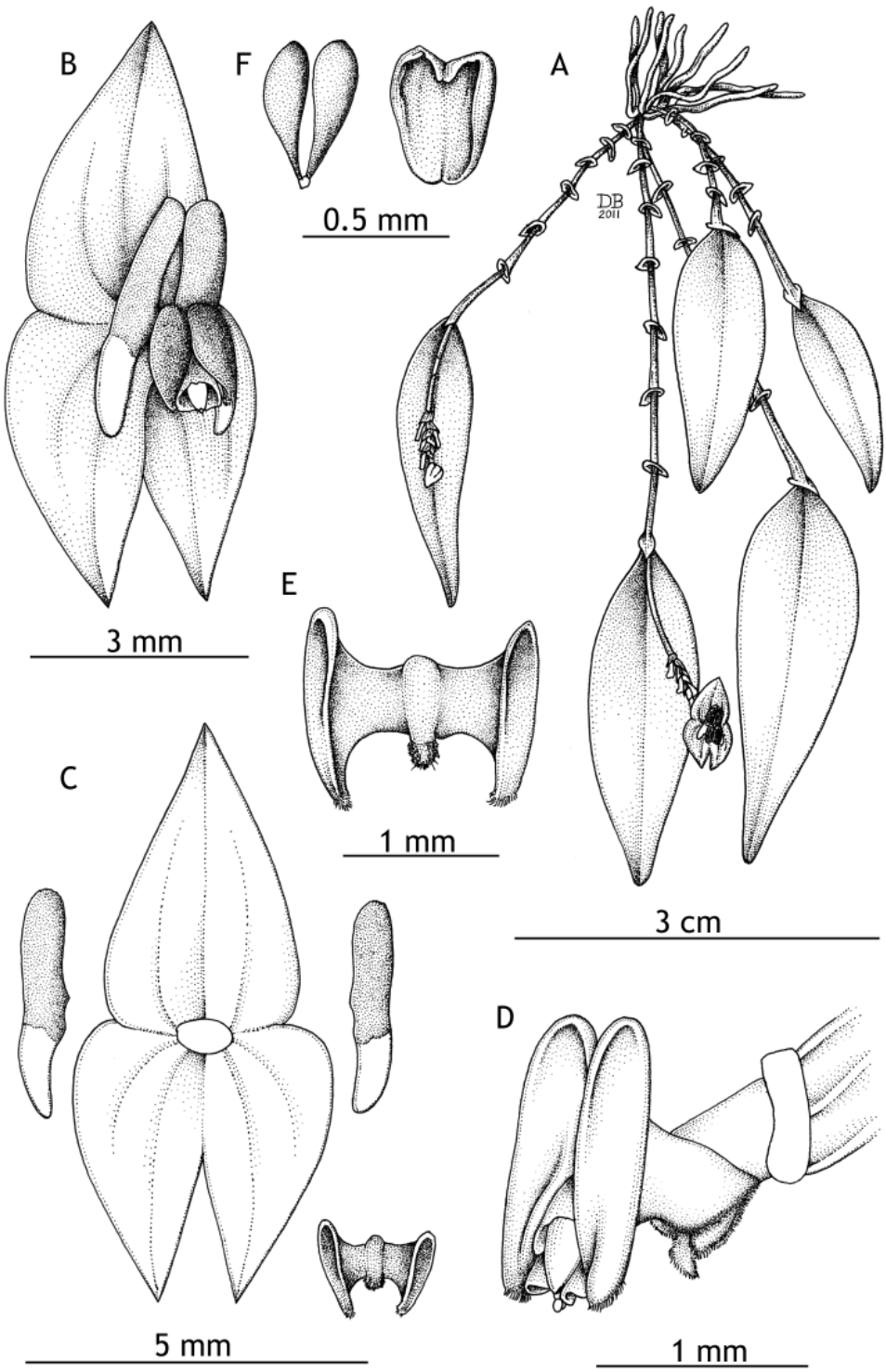

FIGURE 9. *Lepanthes regularis* Luer. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Lip, spread. F — Pollinarium and anther cap. Drawing by D. Bogarín based on *Bogarín 7767* (JBL-spirit).

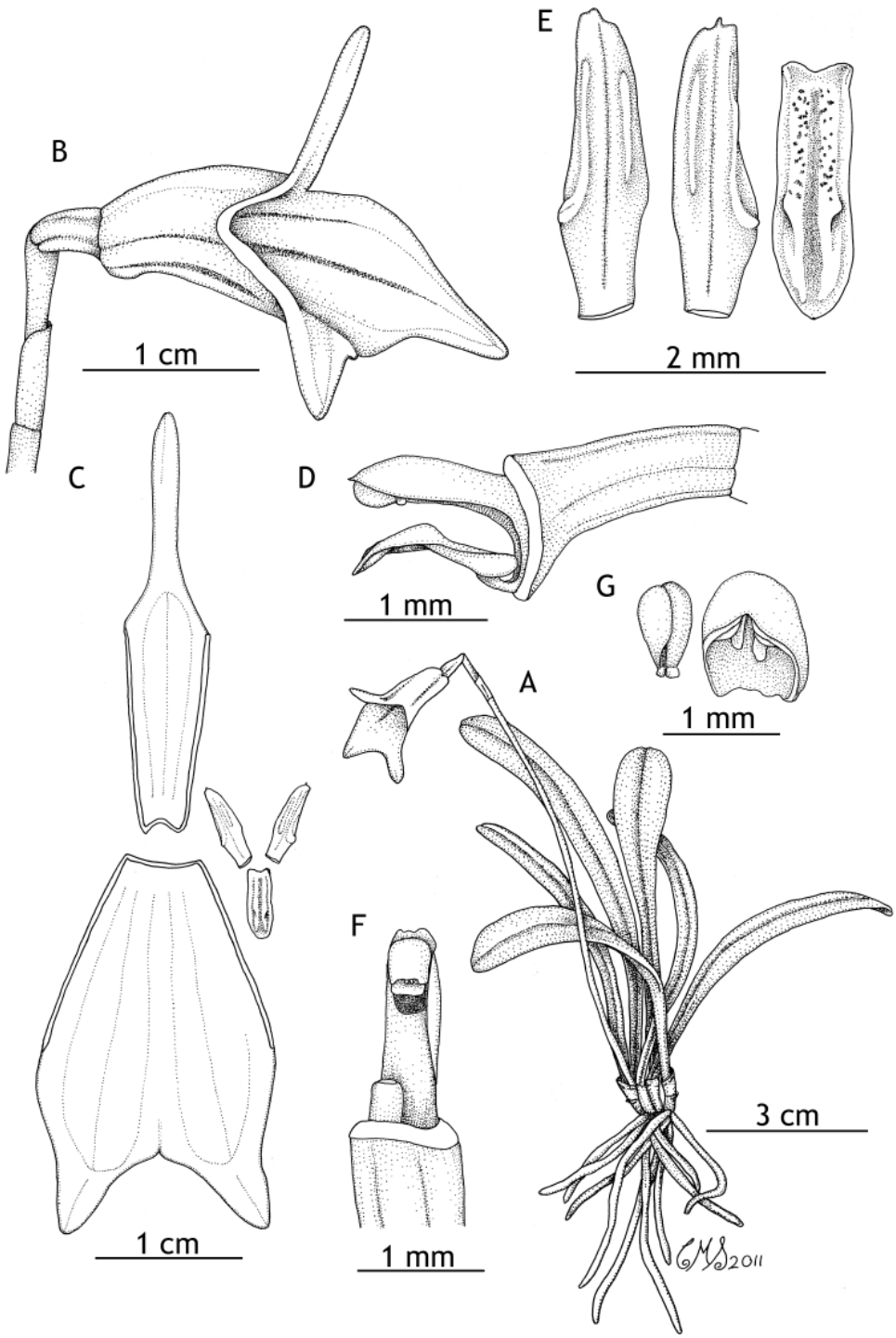

FIGURE 10. *Masdevallia nicaraguae* Luer. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Petals and lip. F — Column and bases of ovary and lip. G — Pollinarium and anther cap. Drawn by C. M. Smith based on *Acosta s.n.* (JBL-spirit).

M. nicaraguae was found growing in premontane wet forest, around Río Costa Rica in Guápiles at 600 m elevation. It is likely that this species would turn up in the northern Caribbean lowlands of Costa Rica, which are continuous with the Nicaraguan lowlands where plants of this species are known to grow..

Costa Rican material studied: [Costa Rica: Limón: Pococí, Guápiles] Río Costa Rica, 600 m, *L. Acosta s.n.* (JBL-Spirit D2166!, D2264!, D1988!; figures 10, 14J).

This species is similar to *Masdevallia floribunda* Lindl., from which it is distinguished by the thick sepaline tails, particularly those of the shorter, triangular, lateral sepals, white, faintly suffused with rose within toward the bases (vs. dull brownish yellow, spotted). *Masdevallia nicaraguae* is also similar to *M. tubuliflora* Ames, but is distinguished by its larger, pure white sepals, the erect tail of the dorsal sepal, the broadly dilated lateral sepals and the entire apex of the column (Luer 2001).

12. ***Pleurothallis instar*** Luer, Selbyana 3: 320–321, f. 260. 1977. Type: Panama. Chiriquí: epiphytic in cloud forest on Cerro Hornito, alt. ca. 1700 m, 15 Dec 1976, *C. Luer 1389, A. Luer, R.L. Dressler, N.H. Williams & F.L. Stevenson* (holotype, SEL; illustration of type!).

Distribution: Panama and Costa Rica.

Etymology: From the Latin *instar*, image, likeness, in reference to the similarity of the plant to *Pleurothallis eumecocaulon* Schltr.

Habitat in Costa Rica: Both plants of *Pleurothallis instar* were found growing epiphytically in the premontane rain forests of the Fila Cruces, in the Pacific watershed.

Costa Rican material studied: Puntarenas: Coto Brus, Limoncito, Fila Cruces, camino al Cerro Paraguas, ca. 10 km al oeste del Jardín Botánico R. & C. Wilson sobre el camino a Río Claro de Golfito, 8°46’22.4” N 82°59’33.1” W, 1367 m, bosque pluvial premontano, epífitas en bosque secundario a orillas del camino, 5 junio 2010, *A.P. Karremans 2776 & D. Bogarín* (JBL-Spirit!; figure 11, 14K). Same locality, 20 abril 2011, *D. Bogarín 8742, D. Jiménez & A.P. Karremans* (JBL-Spirit!).

As indicated in the protologue, *Pleurothallis instar* resembles mostly closely *P. eumecocaulon* Schltr., but it can be recognized by the ovate leaves and wider sepals and petals. Also, *P. eumecocaulon* bears a papillose disc located below the middle of the lip, whereas the disc in *P. instar* is concave and located in the basal half. Luer (2004) moved *P. eumecocaulon* to *Ancipitia* Luer but seems to have forgotten *P. instar*.

13. ***Specklinia duplooyi*** (Luer & Sayers) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 95: 260. 2004. *Pleurothallis duplooyi* Luer & Sayers, Revista Soc. Boliv. Bot. 3(1/2): 48-50. 2001. *Panmorphia duplooyi* (Luer & Sayers) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 105: 153. 2006. Type: Belize. Toledo District, Little Quartz Ridge Camp, alt. 740 m, 1 August 2000, *B. Sayers 997* (holotype, DBN; isotype, MO).

Distribution: Belize and Costa Rica.

Etymology: Named in honor of the late Ken DuPlooy, former director of the Belize Botanical Garden, who had a keen interest in the flora of Belize.

Habitat in Costa Rica: Epiphytic on twigs of abandoned trees of *Macadamia integrifolia* (Proteaceae) in premontane rain forest, on the Caribbean watershed of the Cordillera de Talamanca at around 700 m elevation.

Costa Rican material studied: Cartago: Jiménez, Pejibaye, Taus, Río Pejibaye, 1 km después de la escuela de Taus, 9°46’51.7”N 83°43’00.4”W, 707 m, bosque pluvial premontano, epífita en bosque secundario a orillas del río, 30 abril 2009, *D. Bogarín 6955, M. Fernández, R. Gómez, Y. Kisel, F. Pupulin, P. Renshaw & R. Trejos* (JBL-Spirit). Same locality, 16 octubre 2009, *D. Bogarín 7382 & A.P. Karremans* (JBL-Spirit!). Same locality and date, *D. Bogarín 7384 & A.P. Karremans* (JBL-Spirit!; figures 12, 14L). Same locality, 29 de enero 2012, *A.P. Karremans 4887, R.J.C.M. & I.V. Ferreira Lok* (JBL-Spirit!).

The species was previously known only from Belize. It is closely related to the widely distributed *Specklinia barbulata* (Lindl.) Luer, from which it is distinguished by the larger inflorescences surpassing the leaves (vs. as long as or shorter than the leaves),

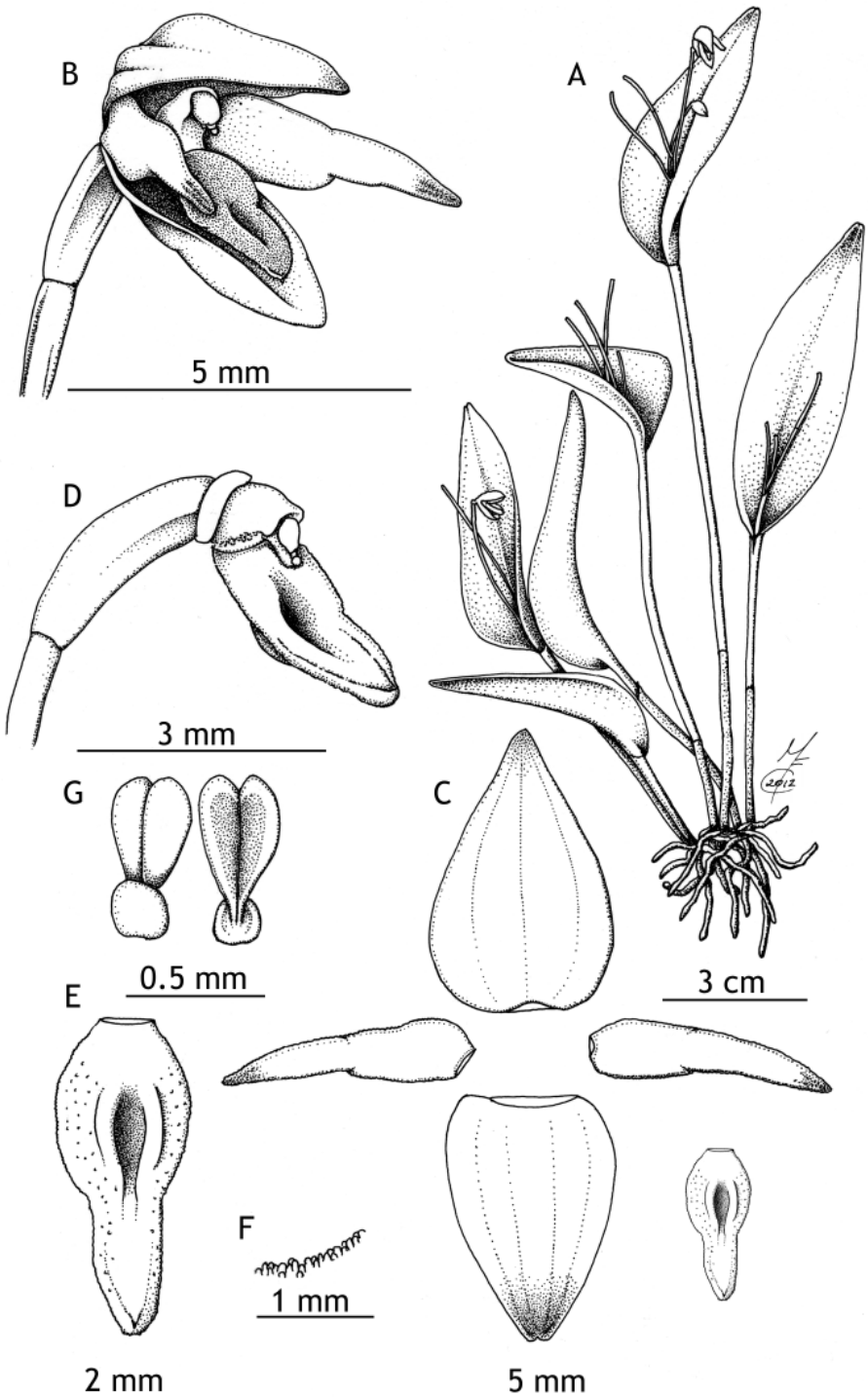

FIGURE 11. *Pleurothallis instar* Luer. A — Habit; B — Flower; C — Dissected perianth; D — Column and lip, oblique view; E — Lip, ventral view; F — Detail of lip apical margin, G — Pollinaria. Drawn by M. Fernández based on *Karremans 2776* (JBL-spirit).

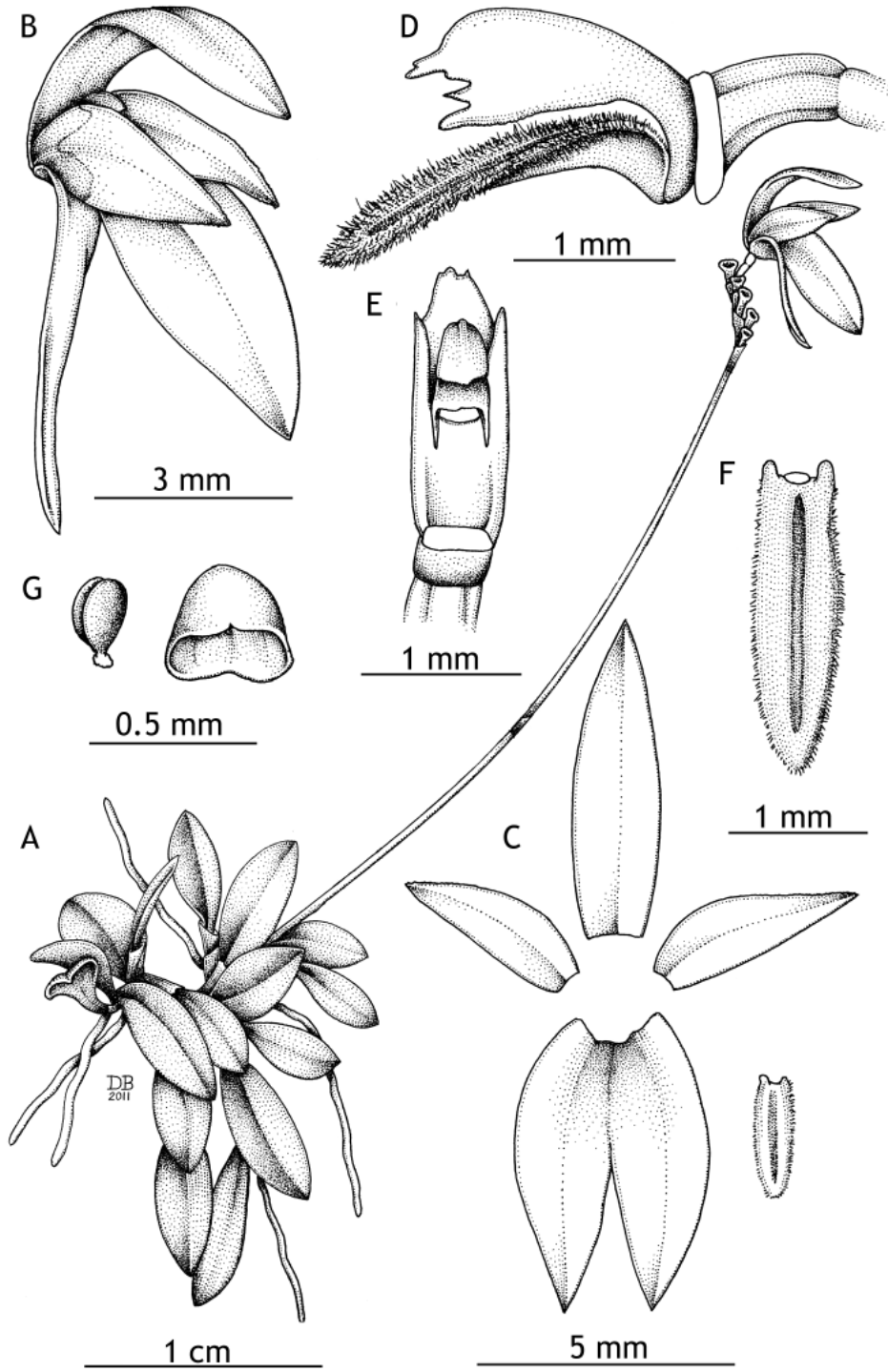

FIGURE 12. *Specklinia duplooyi* (Luer & Sayers) Luer. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Column, front view. F — Lip, spread. G — Pollinarium and anther cap. Drawing by D. Bogarín based on *Bogarín 7382* (JBL-spirit).

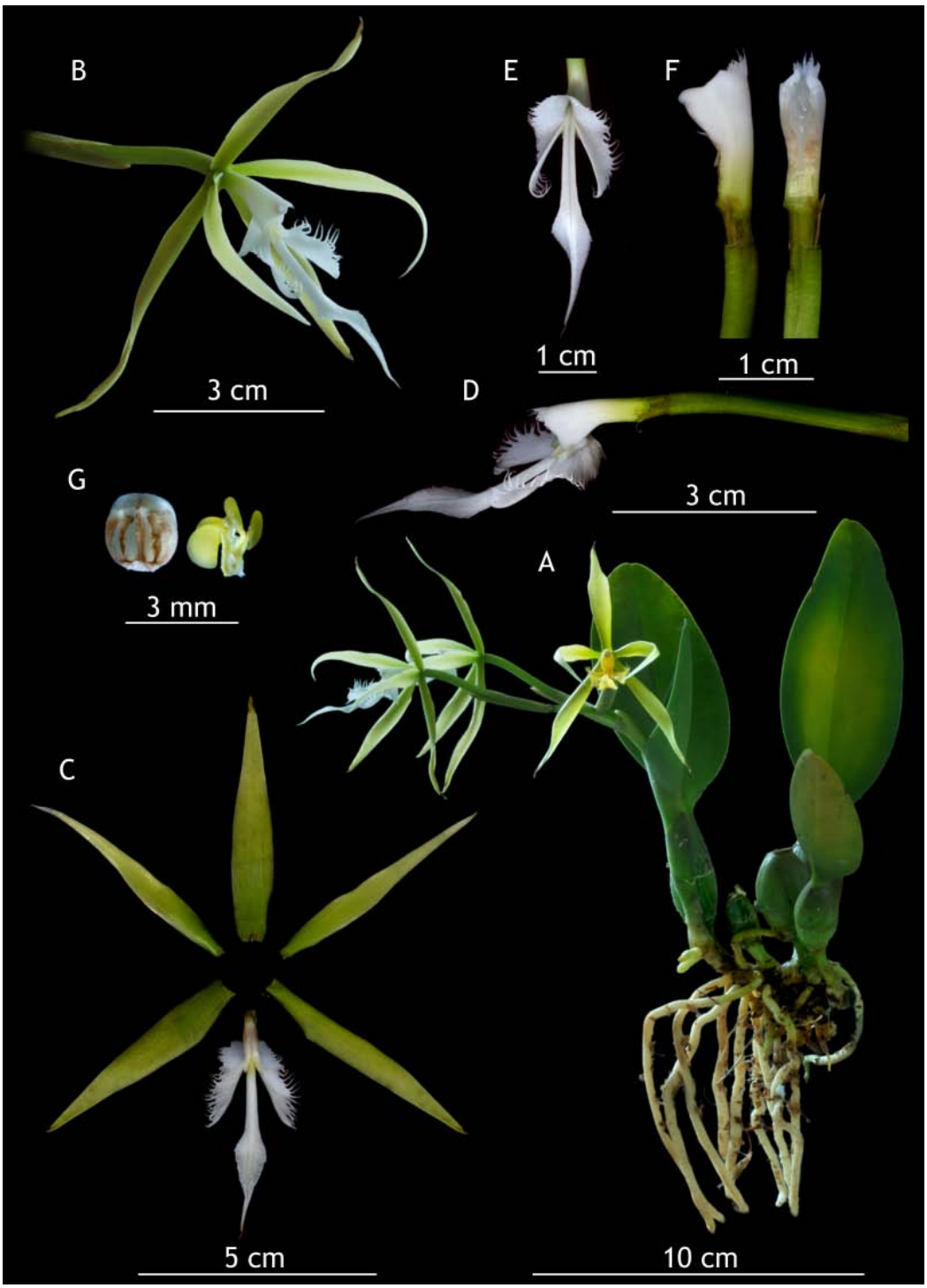

FIGURE 13. *Epidendrum* × *sandiorum* Hágsater, Karremans & L.Sánchez. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Lip, spread. F — Column, lateral and ventral views. G — Anther cap and pollinarium. Photographs by A.P. Karremans and F. Pupulin based on *A.P. Karremans 2781*.

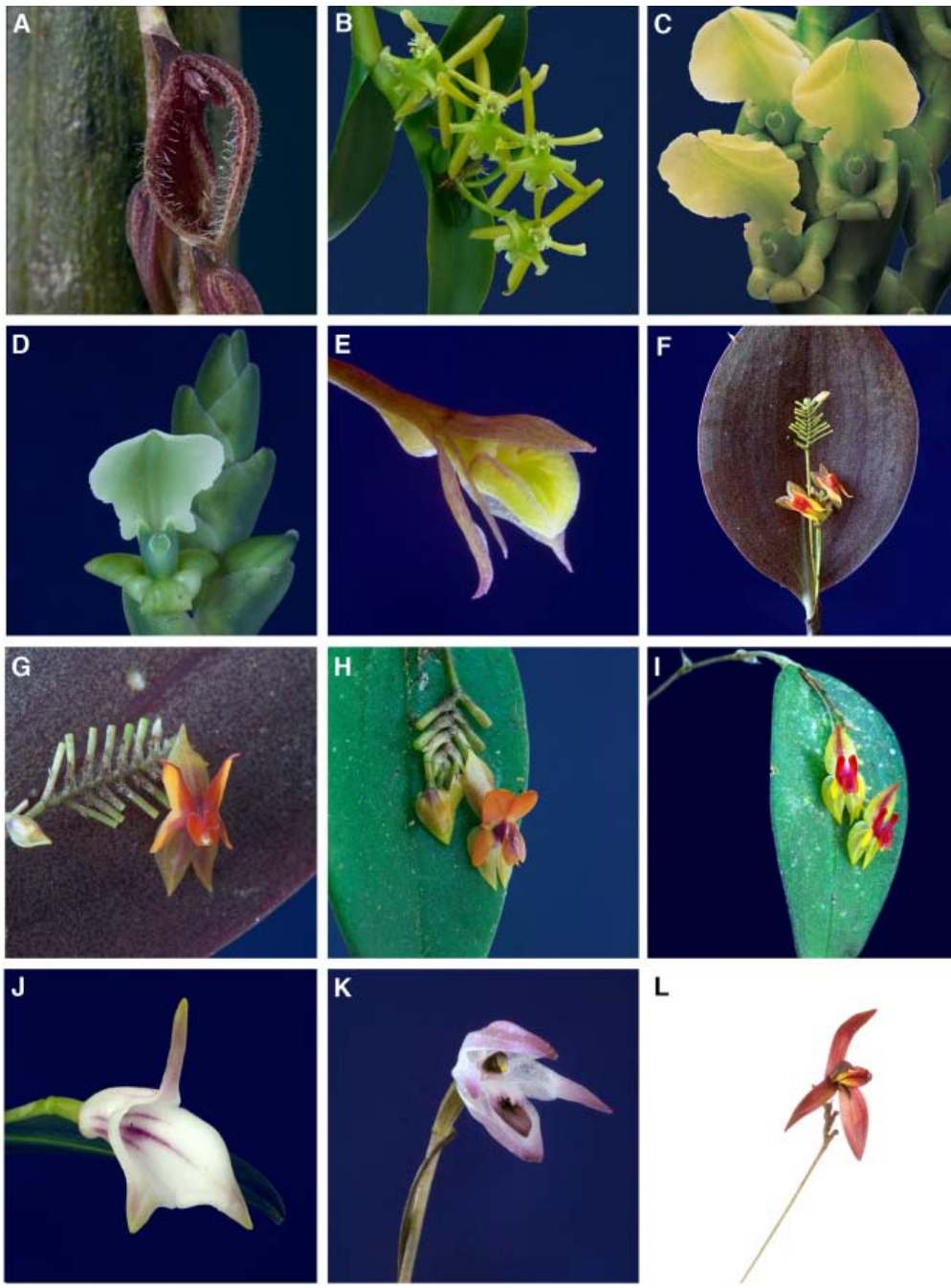

FIGURE 14. A — *Acianthera oscitans* (*Bogarín 7621*). B — *Epidendrum alieniferum* (*Karremans 3970*). C — *Epidendrum circinatum* (*JBL s.n.*). D — *Epidendrum concavilabium* (*Bogarín 4848*). E — *Epidendrum cystosum* (*Karremans 3744*). F — *Lepanthes kabebatae* (*Bogarín 8873*). G — *Lepanthes kabebatae* (*Bogarín 8875*). H — *Lepanthes psyche* (*Bogarín 8538*). I — *Lepanthes regularis* (*Bogarín 7767*). J — *Masdevallia nicaraguae* (*Acosta s.n.*). K — *Pleurothallis instar* (*Karremans 2776*). L — *Specklinia duployii* (*Bogarín 7382*). Photographs by D. Bogarín (F., G., H., I., J. & L.), A.P. Karremans (B, D, E, K), and F. Pupulin (A, C).

the prostrate leaves (vs. erect) and the larger flowers with free lateral sepals (vs. smaller, with a synsepal). Also, the petals are sharply acute and microscopically ciliate (vs. acute, ciliate). The lip is narrowly elliptical, long-ciliate, and longitudinally channeled (Luer 2006). The Costa Rican plants were found growing on twigs of abandoned Macadamia trees in exposed condition, an unusual habitat for plants of *Specklinia*. The morphology of the Costa Rican specimens is consistent with the protologue (Luer 2006).

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