

NEW SPECIES AND RECORDS OF ORCHIDACEAE FROM COSTA RICA

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ABSTRACT. We present and illustrate 11 new records of Orchidaceae from Costa Rica, and propose a new combination in *Acianthera* for *Pleurothallis aberrans*. *Barbosella orbicularis* and *Myoxanthus speciosus*, previously recorded from Costa Rica on the basis of doubtful vouchers, are confirmed to occur in the country and illustrated from Costa Rican vouchers. *Warmingia margaritacea* is reduced to the synonymy of *Warmingia zamorana*, a species previously known only from Ecuador. A new species, *Epidendrum zunigae* is described. This species is similar to *E. guanacastense* and *E. isomerum*, from which it differs by the narrow, lanceolate leaves, the greenish flowers, the apical half of the column purple with the clinandrium white, the sepals 11 mm long, and the creamy yellow, cordiform, acute, bicallose lip, which is somewhat convex in natural position.

RESUMEN: Presentamos e ilustramos 11 nuevos registros de Orchidaceae para Costa Rica, y proponemos una nueva combinación en *Acianthera* para *Pleurothallis aberrans*. Se confirma la presencia en el país de *Barbosella orbicularis* y *Myoxanthus speciosus*, registradas anteriormente con base en registros dudosos, y las dos especies se ilustran con material costarricense. *Warmingia margaritacea* se reduce a la sinonimia de *Warmingia zamorana*, una especie previamente conocida solamente del Ecuador. Se describe una nueva especie, *Epidendrum zunigae*. Esta especie es similar a *E. guanacastense* y *E. isomerum*, de los cuales difiere por las hojas estrechas, lanceoladas, las flores verduzcas, con la mitad apical de la columna morada y el clinandrio blanco, los sépalos 11 mm de largo y el labelo cordiforme, agudo, bicalloso y amarillo crema, el cual es algo convexo en posición natural.

KEY WORDS: *Acianthera aberrans*, Costa Rica, *Epidendrum zunigae*, floristics, new records, Orchidaceae, *Warmingia zamorana*.

Despite its well established tradition in botanical exploration, which started in 1846 with the visit of Oersted (1846), Costa Rica is still far from having a complete inventory of its orchidaceous flora. The establishment of large and documented collections of living plants at Lankester Botanical Garden, associated with an increasing access to critical documentation, have been the key to improve our understanding of orchid diversity in Costa Rica.

After the publication of the most recent and complete treatment of the family by Dressler (2003) new species have been added on a regular basis to the country's inventory. As part of the general activities of botanical exploration, documentation

and orchid identification carried out at Lankester Botanical Garden, we present the following new records for the flora of Costa Rica and a new species:

1. ***Acianthera aberrans*** (Luer) Pupulin & Bogarín, **comb. nov.**

Basionym: *Pleurothallis aberrans* Luer, Selbyana 2(4): 382. 1978. Type: Panama. Veraguas: epiphytic in tree north of the continental divide, alt. ca. 700 m., above Santa Fé, 6 September 1976, C. Luer & R.L. Dressler 1628 (holotype, SEL). *Aberrantia aberrans* (Luer) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 95: 253. 2004, *nom. inval.* *Aberrantia*

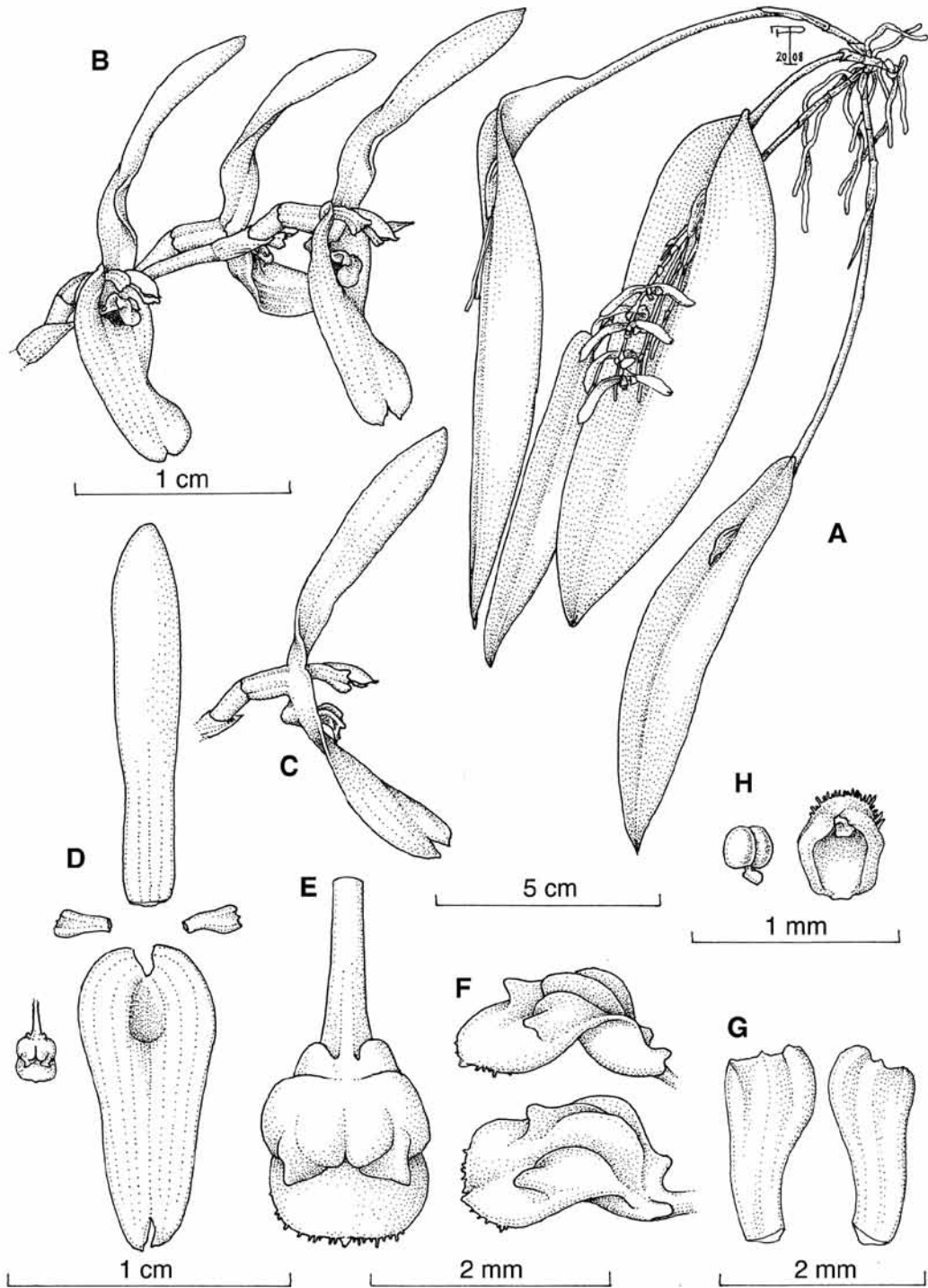


FIGURE 1. *Acianthera aberrans* (Luer) Pupulin & Bogarin. A. Habit. B. Apex of inflorescence. C. Flower, side view. D. Dissected perianth. E. Lip, frontal view. F. Lip, lateral views. G. Petals, lateral views. H. Pollinarium and anther cap. Drawing by F. Pupulin based on Pupulin *et al.* 4857 (JBL-spirit).

aberrans (Luer) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 103: 310. 2005.

DISTRIBUTION: Costa Rica, Panama and Ecuador.

ETYMOLOGY: from the Latin *aberrans*, “away from the usual”, in reference to the unusual characteristics of the species, according to its author.

HABITAT IN COSTA RICA: epiphytic in tropical rain forest in the Caribbean lowlands at 275 m of elevation.

COSTA RICAN MATERIAL STUDIED: Heredia: Sarapiquí, Horquetas, road to Rara Avis, ca. 6 km, granja La Selva, 10°20'15"N 84°00'15" W, 275 m, tropical rain forest, secondary vegetation with large remnant trees, along the edge of pastures, 26 July 2003 F. Pupulin 4857, M. Pupulin, C. Pupulin, C. Ossensbach & B. Arias (JBL-spirit!) (Fig. 1, 15-A).

Although this species has not been yet analyzed by molecular phylogenetic techniques, morphological features suggest that it belongs to the genus *Acianthera* Scheidw. Luer (1978) stated that it vegetatively resembles to *Pleurothallis circumplexa* Lindl., *P. pacayana* Schltr., and *P. pantasmi* Rchb.f. (all now included in the genus *Acianthera*) because the inflorescence emerges from the blade of the leaf above the base. Also, he noted that the green, glabrous, gaping flowers in the short raceme resemble those of *Pleurothallis cogniauxiana* Schltr., *P. decipiens* Ames & C.Schweinf., and *P. verecunda* Schltr. (as well as many others), all of them also transferred to the genus *Acianthera* by several authors (Pridgeon & Chase 2001, Luer 2004). Its bicallose, truncate petals ending into a short apiculum, as well as the long claw of the lip, are unusual features of this species. Luer (2004, 2005) considered these floral details, together with the pair of pointed calli laying near the center of lip (rounded in our specimen) as critical features to segregate *Pleurothallis aberrans* into the monotypic genus *Aberrantia* Luer. We consider the monotypic genus *Aberrantia*, only defined by subtle floral features, congeneric with *Acianthera*. According to Luer (2003a), the voucher cited by Pupulin (2002a) is from Panama. Here, we cite a Costa Rican voucher for this species.

2. *Barbosella orbicularis* Luer, Selbyana 3 (1, 2): 10. 1976. Type: Panama. Panamá: La Eneida, region of Cerro Jefe, epiphytic, alt. 1000 m, 25 December 1967, R. L. Dressler 3285 (holotype, SEL).

DISTRIBUTION: Costa Rica, Panama, Colombia, Ecuador and Venezuela.

ETYMOLOGY: from the Latin *orbicular*, rounded, in allusion to the characteristic shape of the lenticular leaves.

HABITAT IN COSTA RICA: Epiphytic in tropical wet forest along the Caribbean watershed of the Central Volcanic range at about 500 m of elevation.

COSTA RICAN MATERIAL STUDIED: Limón: Siquirres, Siquirres, Alto Guayacán, ca 500 m, camino de Siquirres hacia Turrialba, terrenos de “Costa Rican Amphibian Research Center”, en árbol viejo de pilón (*Hyeronima* sp.) en potrero, bosque húmedo tropical, colectada por B. Kubicki, 30 septiembre 2005, D. Bogarín 1949 (JBL-spirit) (Fig. 2, 15-B).

This species had been cited for Costa Rica by Pupulin (2002a) based on a plant cultivated at Lankester Botanical Garden. Unfortunately, the plant never flowered, although it was clearly a specimen of *B. orbicularis*. It was excluded from the flora of Costa Rica by Luer (2003b), because of the absence of a proper voucher. Fertile material now available leaves no doubt of the occurrence of this species in Costa Rica.

Among Costa Rican species of *Barbosella*, *B. orbicularis* is the most distinctive. It is easily recognized by the creeping habit, the rounded smooth, overlapping leaves and the purplish flowers with a 3-lobed lip.

3. *Brenesia lappiformis* (A.H.Heller & L.O.Williams) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 95: 255. 2004. *Pleurothallis lappiformis* A.H.Heller & L.O.Williams, Fieldiana, Bot. 31: 42. 1964. *Myoxanthus lappiformis* (A.H.Heller & L.O.Williams) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 15: 38. 1986; *Echinella lappiformis* (A.H.Heller & L.O.Williams) Pridgeon & M.W.Chase, Lindleyana 16: 253. 2001, *nom. illeg.*; *Echinosepala lappiformis* (A.H.Heller &

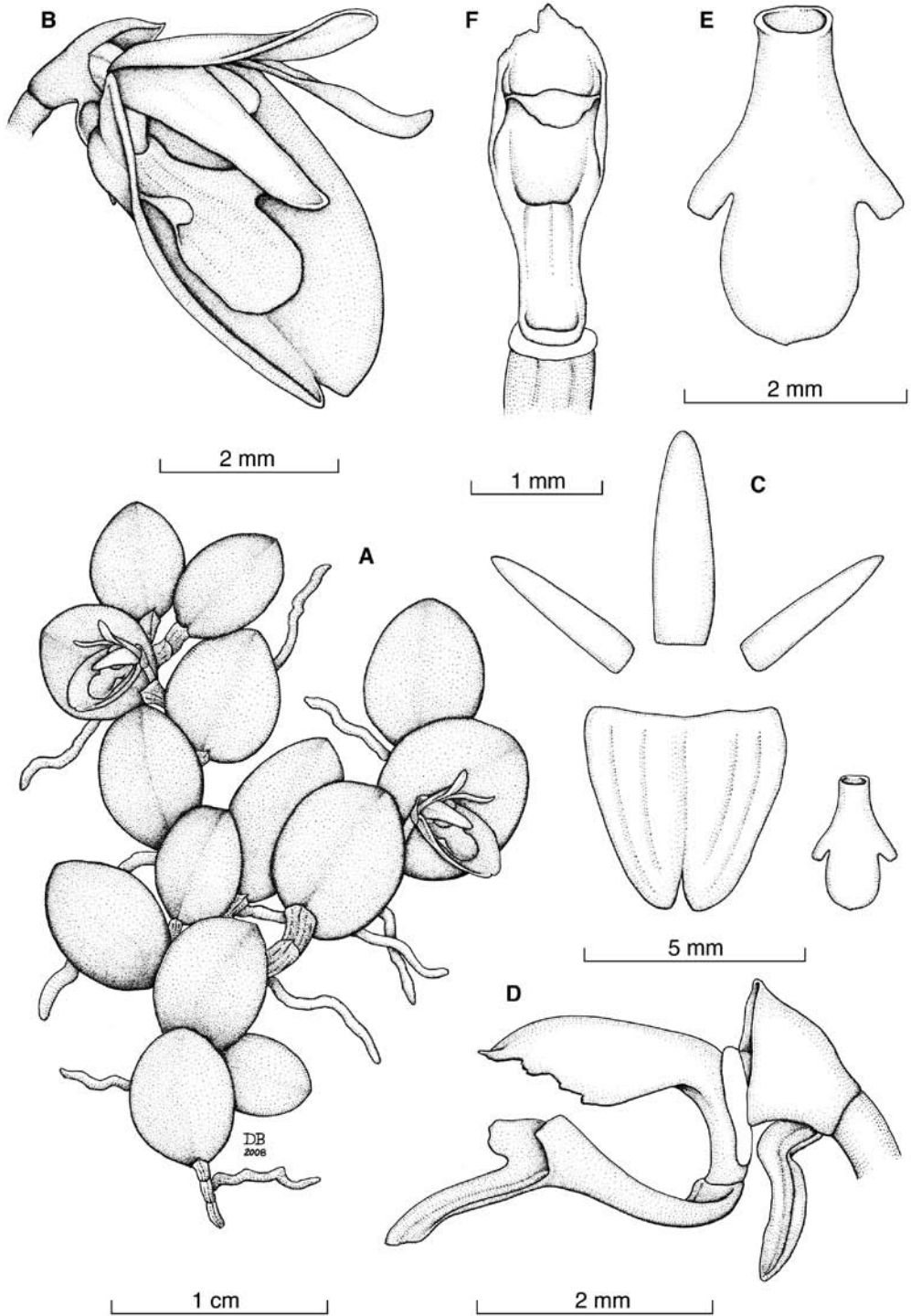


FIGURE 2. *Barbosella orbicularis* Luer. A. Habit. B. Flower. C. Dissected perianth. D. Column and lip, lateral view. E. Lip. F. Column, frontal view. Drawing by D. Bogarín based on Bogarín 1949 (JBL-spirit).

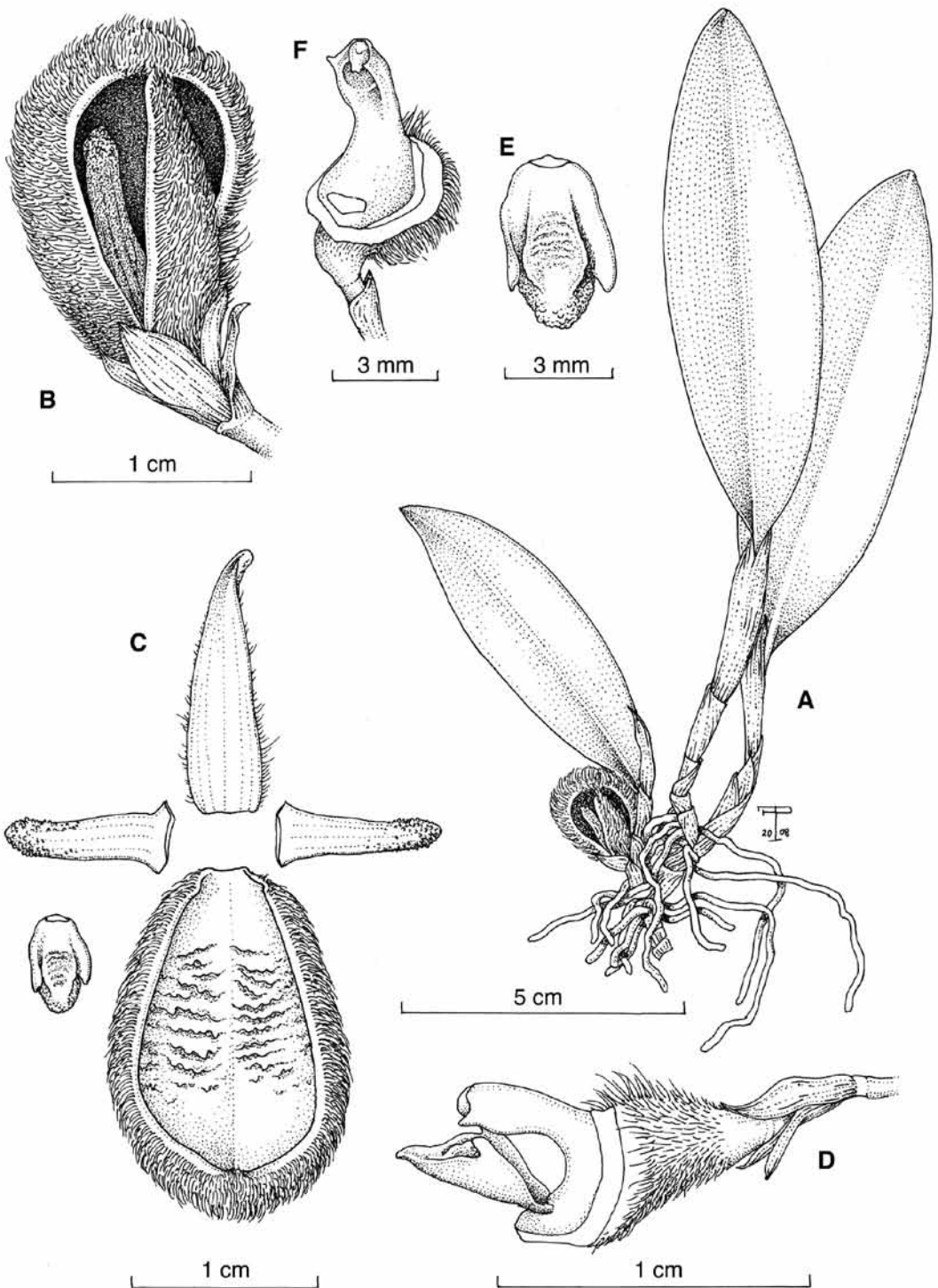


FIGURE 3. *Brenesia lappiformis* (A.H.Heller & L.O.Williams) Luer. A. Habit. B. Flower. C. Dissected perianth. D. Column and lip, lateral view. E. Lip. F. Column, frontal view. Drawing by F. Pupulin based on Bogarín 890 (JBL-spirit)

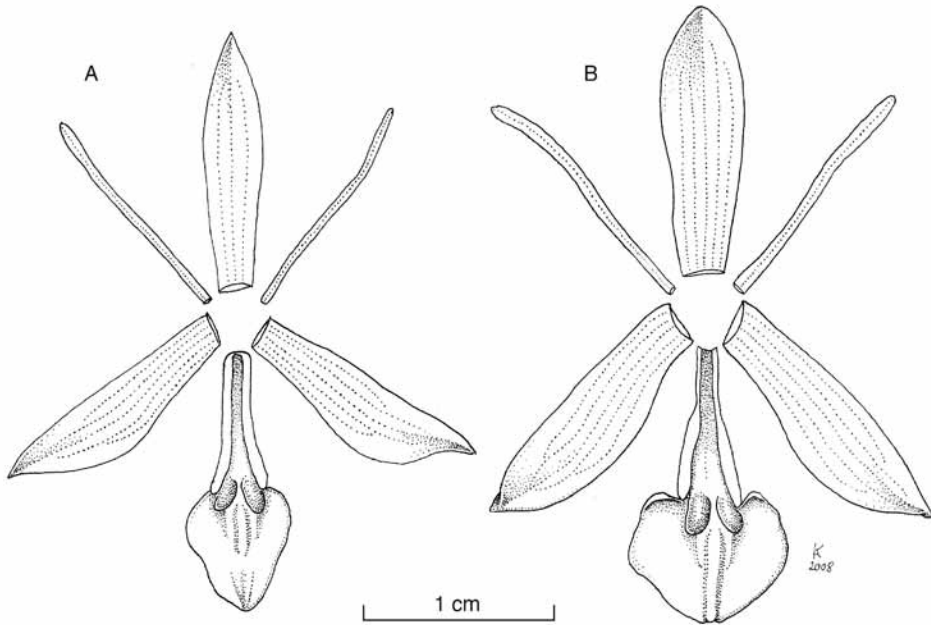


FIGURE 4. Comparison of dissected perianths of *Epidendrum adnatum* (A) and *E. maduroi* (B). ILLUSTRATION VOUCHERS: A, Bogarín 2378 (JBL-spirit); B, Bogarín 601 (JBL-spirit). Drawings by A. Karremans.

L.O. Williams) Pridgeon & M.W. Chase, *Lindleyana* 17: 101. 2002. Type: Nicaragua: Chontales: epiphytic at Pistacho Peak near Babilonia Mine, alt. 650 m, July 1962, *A. Heller 6620* (holotype, F, not seen).

DISTRIBUTION: Nicaragua, Costa Rica, Venezuela, Ecuador.

ETYMOLOGY: from the Latin *lappiformis*, “stone-shaped” or “bur shaped”, in reference to the round and hard consistency of the flowers.

HABITAT IN COSTA RICA: epiphytic in tropical wet forest, premontane belt transition, and premontane wet forest, basal belt transition, along the Caribbean lowlands.

COSTA RICAN MATERIAL STUDIED: Heredia: Sarapiquí, Horquetas, *C. Ossenbach 265* (JBL-spirit!). Limón: Pococí, Guápiles, carretera Braulio Carrillo, ca. 2 km hacia abajo de la entrada del Teleférico del Bosque Lluvioso, en lomas a orilla de la carretera, 520 m, 10°11'33"N 84°54'27"W, bosque muy húmedo tropical transición a premontano, epífitas en árboles caídos en bosque secundario, 9 julio 2004, *D. Bogarín 890* & *F. Pupulin* (JBL-spirit!) (Fig. 3, 15-C).

This species is distinguished by the dark purple, hairy flower, with the tip of the narrow dorsal sepal touching the apex of the synsepal. The sepals are rugose-verrucose in the inner surface. A closely related species, *Brenesia stonei* (Luer) Luer, endemic to Costa Rica, is distinguished by the broad dorsal sepal, free from the synsepal, spatulate, rugose petals and narrowly uncinately lateral lobes of the lip.

4. *Epidendrum maduroi* Hágsater & García-Cruz, *Icon. Orchid. (Mexico)* 3: pl. 352. 1999. Type: Panama: Chiriquí: Norte de Guadalupe, Cerro Punta, Volcán Barú, 2000-3000 m, collected 15 March 1981, pressed 22 February 1983, *E. Hágsater* & *R.L. Dressler 6468* (holotype, AMO, not seen; isotype, MO, not seen).

DISTRIBUTION: Costa Rica and Panama.

EPONYMY: dedicated to Andrés Maduro, owner of Finca Dracula, Panama, where the collectors were based when collecting the type.

HABITAT IN COSTA RICA: epiphytic in premontane

and montane wet forests in the Central Cordillera at elevations of 1400-1800 meters.

COSTA RICAN MATERIAL STUDIED: Alajuela: San Ramón, Piedades Norte-Zapotal, camino entre el Cerro Azahar hacia Los Bajos y San Antonio de Zapotal, Finca de Don Guillermo, 10°10'07.9"N 84°35'50.3" W, 1423 m, bosque pluvial premontano, epífitas en bosque secundario, 24 marzo 2005. *D. Bogarin 1465*, *F. Pupulin*, *A.C. Rodríguez* & *E. Salas* (JBL-spirit!). Heredia: San Rafael, camino del Monte de La Cruz hacia el Refugio de Vida Silvestre Cerro Dantas, a orillas del Río Nuevo y la Quebrada Cabra, Reserva Forestal Cordillera Volcánica Central, 1800 m, 10°5'45"N 84°02'02"W, bosque pluvial premontano, epífitas en bosque secundario, 7 enero 2004, *D. Bogarin 601*, *D. Lobo* & *A. Vargas*. (JBL-spirit!) (Fig. 4, Fig.15-D).

Epidendrum maduroi belongs to the *E. albertii* group (Hágsater 1999a). Plants of *E. maduroi* have probably been confused as both *E. adnatum* and *E. lankesteri*, described from Costa Rica. *Epidendrum maduroi* can be distinguished from both species by the wider, 8 mm vs. 4-5 mm, unlobed, widely ovate-subchordate vs. slightly lobed, narrowly ovate lip (Ames 1923, Ames & Schweinfurth 1925).

5. *Epidendrum orthodontum* Hágsater & L.Sánchez, Icon. Orchid. 3: t. 361. 1999. Type: Panamá: Provincia Chiriquí: Cuesta de Las Palmas, southern slopes of Cerro de La Horqueta, humid forest, 1700-2100 m, 17 March 1911, *H. Pittier 3220* (holotype, US-677617, not seen; isotype, AMES-22677, photo).

DISTRIBUTION: Costa Rica and Panama.

ETYMOLOGY: from the Greek *ortho*, "erect" and *odonto*, "tooth" in reference to the erect tooth at the apex of the column.

HABITAT: plants of this species were found growing in montane wet forest at around 2500 m elevation in the Cordillera de Talamanca.

COSTA RICAN MATERIAL: Alajuela: La Palma de San Ramon, 1250 m, 11 octubre 1922, *Brenes 337* (CR); La Palma, 24 de octubre 1922, *Brenes (7) 337* (AMES,

photo; CR); La Palma de San Ramon, 1250 m, 4 de noviembre 1924, *Brenes (1114) 256* (NY, not seen). Cartago: El Guarco, San Isidro, Madreselva, Tres de Junio, Carretera Interamericana Sur, km 67, 9°40'27.4" N 83°51'66.5" W, 2530 m, bosque pluvial montano, en bosque secundario a orillas de la carretera, 20 de enero 2008, *A. Karremans 2255*. (JBL-Spirit!) (Fig. 5).

Epidendrum orthodontum is similar to *E. nutantirhachis* Ames & C. Schweinf., but it can be distinguished by the trilobed lip, the larger flowers (sepals 10-12 mm vs. 8-9 mm long; petals 9-10 mm vs. 6-8 mm long), and the erect mid tooth of the column, forming a 90° angle with column (vs. semierect, forming a 45° angle with the column) (Hágsater 1999b).

6. *Epidendrum scharfii* Hágsater & Dodson, Icon. Orchid. 2: t. 185. 1993. Type: Ecuador. Pichincha: along river and hillside opposite town of Tandapi at km 55 Santo Domingo to Quito road, 31 December 1986, *C. Dodson* & *T. Dodson 16757* (holotype, RPSC, not seen).

DISTRIBUTION: Costa Rica, Colombia and Ecuador. This species may well occur in Panama.

EPONYMY: dedicated to Colonel Paul Scharf, bird watcher and occasional orchid collector in Quito, Ecuador.

HABITAT IN COSTA RICA: plants of this species grow on both the Atlantic and Pacific watersheds of the Talamanca range, in premontane wet forests at elevations between 700 to 1200 m.

COSTA RICAN MATERIAL STUDIED: Cartago: border between Turrialba and Jiménez, La Suiza, Pejivalle, road to Esperanza, on hills close to Quebrada Puente, 9°48'46.0"N 83°39'10.0"W, 750 m, premontane wet forest, epiphytic in secondary vegetation along the sugar cane plantations, 5 February 2007, *F. Pupulin 6500*, *D. Bogarin* & *R.L. Dressler* (JBL-spirit) (Fig. 6, 15-E). 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. Bogarin 4835*, *A. Karremans*, *Y. Kisel* &

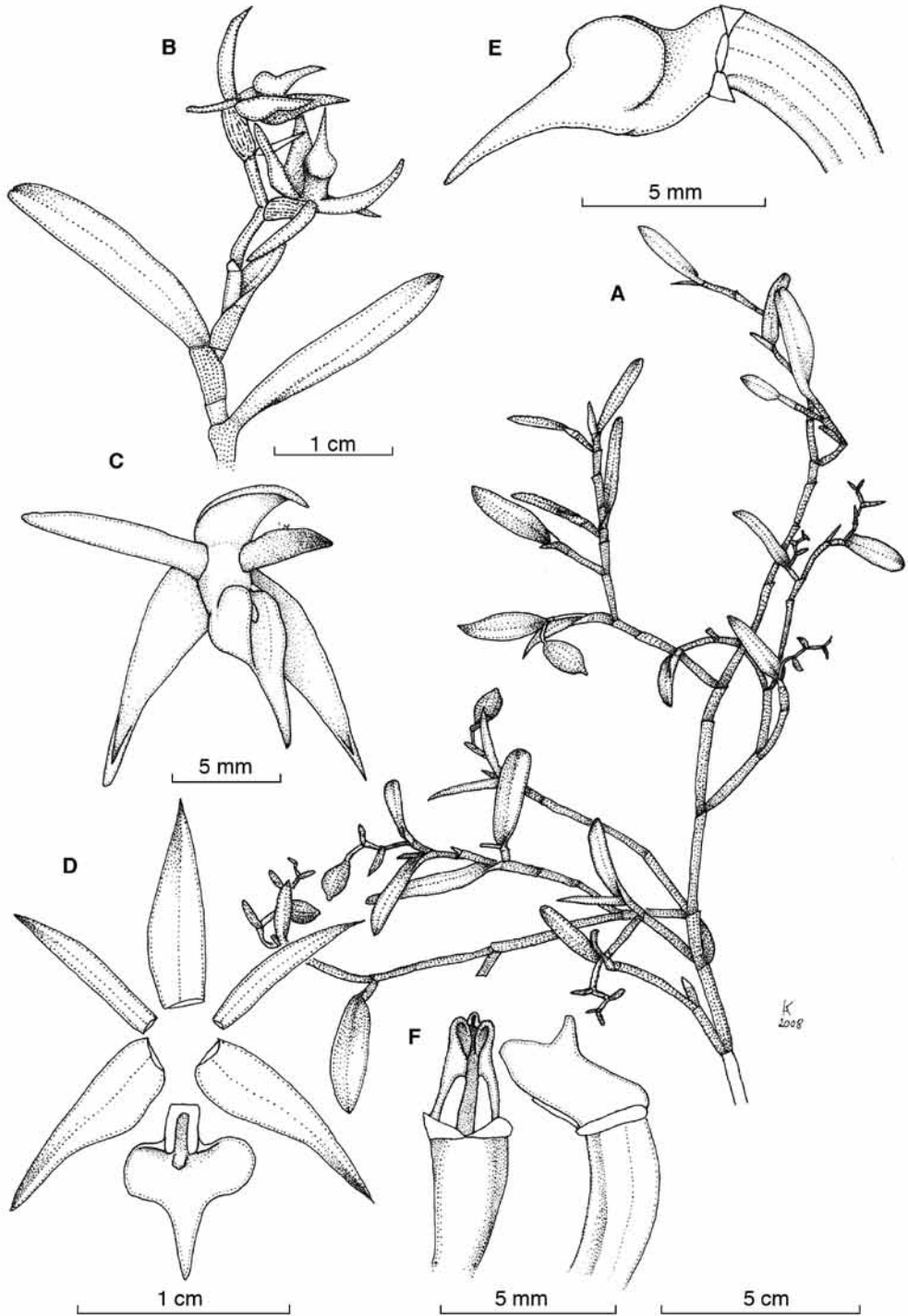


FIGURE 5. *Epidendrum orthodontum* Hágsater & L.Sánchez. A. Habit. B. Inflorescence. C. Flower. D. Dissected perianth. E. Column and lip, lateral view. F. Column, frontal and lateral view. Drawing by A. Karremans based on Karremans 2255 (JBL-spirit).

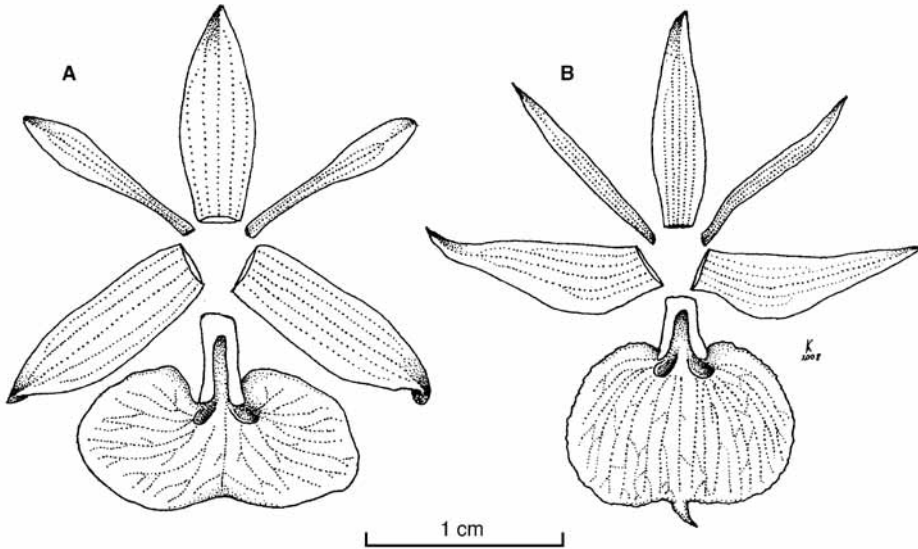


FIGURE 6. Comparison of dissected perianths of *Epidendrum scharfii* (A) and *E. dentiferum* (B). ILLUSTRATION VOUCHERS: A, *Pupulin 6500* (JBL-spirit); B, *Karremans 1485* (JBL-spirit). Drawings by A. Karremans.

R. Phillips (JBL-Spirit). Puntarenas: Coto Brus, Las Cruces (entrada a Concepción), 1212 m, 8°46'55.68"N 82°57'51.36"O, 29 abril 2006, *C. Ossensbach 570 & P. Casasa* (JBL-spirit).

Epidendrum scharfii belongs to the *Epidendrum difforme* group. It is closely related to *Epidendrum dentiferum* Ames & C. Schweinf., but the latter has white-green flowers, acuminate segments, linear petals and lateral sepals forming a 90° angle with the dorsal sepal (vs. green flowers, obtuse segments, elliptic petals, and sepals forming a 120° angle in *E. scharfii*). It is also similar to *E. gregorii* which has shorter and wider sepals and petals and a bilobed lip, with each lobe obliquely notched on the distal margin.

7. *Epidendrum stellidifforme* Hágsater & Dodson, *Icon. Orchid. (Mexico)* 4: t. 487. 2001. Type: Ecuador: Carchi: Maldonado, 1500 m, 2 October 1981, *L. Werling & S. Leth-Nissen 147* (holotype, AMES, photo; isotype, QCA, not seen).

DISTRIBUTION: Costa Rica, Colombia and Ecuador. This species may well occur in Panama.

ETYMOLOGY: from the Latin *stella*, "star", in reference to the shape of the dry flowers and *difforme* for the group to which the species belongs.

HABITAT IN COSTA RICA: epiphytic in tropical wet forest, premontane belt transition, on the eastern slope of the Miravalles Volcano at 650-700 m of elevation.

COSTA RICAN MATERIAL STUDIED: Alajuela: Upala, Bijagua, Zapote, desvío a la izquierda después del puente sobre Río Zapote en sentido Bijagua-Pueblo Nuevo, ladera este del Volcán Miravalles, siguiendo la margen del Río Zapote, 10°44'37.4"N 85°05'14.9"W, 650-700 m, bosque muy húmedo tropical, transición a premontano, epífitas en bordes de potreros y árboles aislados, 30 abril 2006, *D. Bogarín 2814, F. Pupulin, A. Rambelli & J. Rambelli* (CR, JBL-Spirit) (Fig. 7, 15-F).

Epidendrum stellidifforme belongs to *Epidendrum difforme* Jacq. group. It is similar to *Epidendrum hunterianum* Schltr., from which it can be distinguished by the larger (16 x 16 mm vs. 14 x 14 mm), shallowly three lobed, mucronate lip, the acute-acuminate sepals and petals, and the narrower (2.5-3 mm vs. 3.5-4 mm), narrowly elliptic (vs. elliptic) petals. The type species differs from the Costa Rican material in the acuminate, flat lip, and the smaller plants with shorter and narrower leaves (Hágsater 2001). The Colombian *Epidendrum killipii* Hágsater & L. Sánchez, is very similar to this species, and may prove to be the same. According to the protologue, the ovary of *E. killipii* is not inflated, but the drawing of the type shows both a cylindrical,

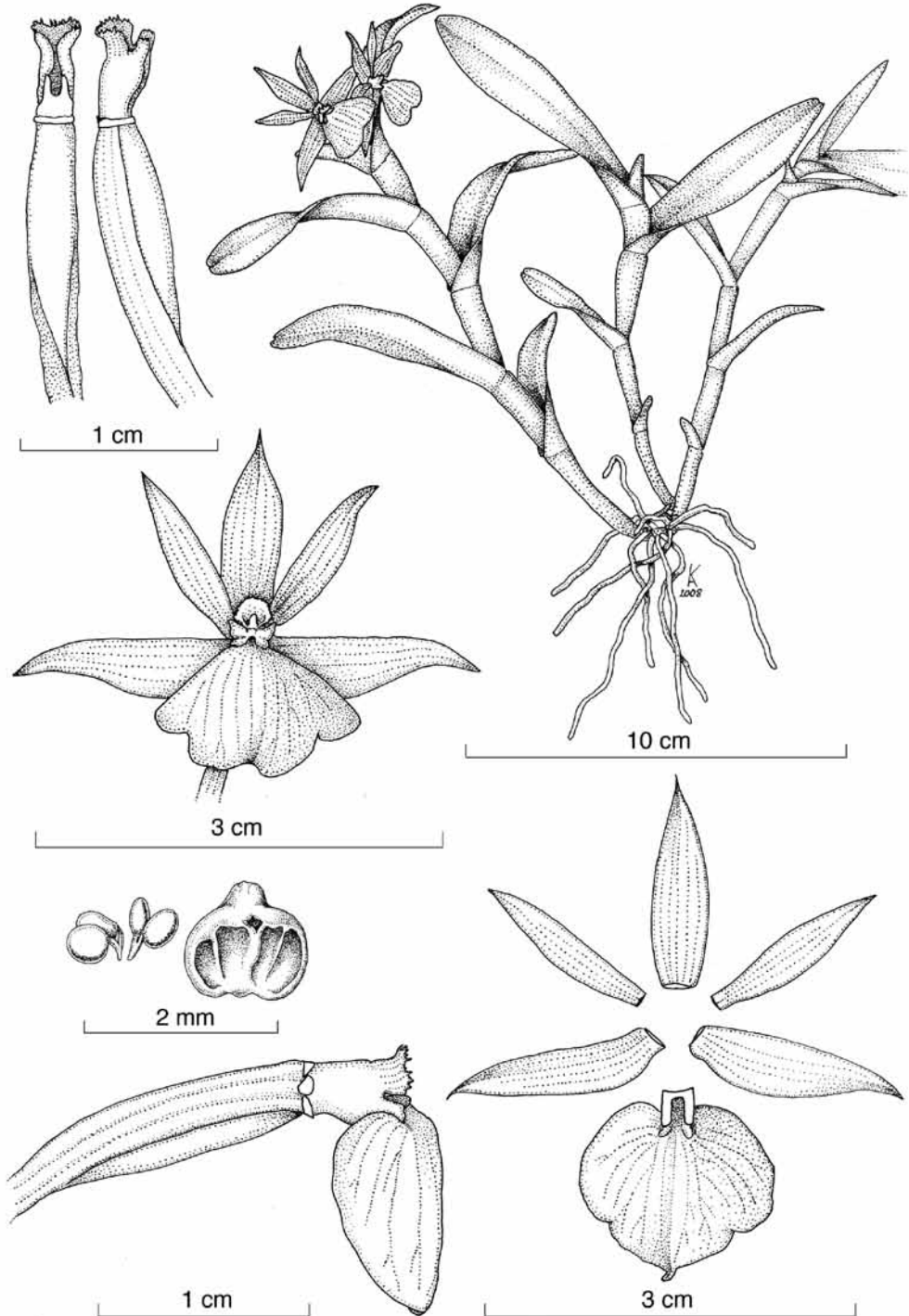


FIGURE 7. *Epidendrum stellidiforme* Hágsater & Dodson. A. Habit. B. Flower. C. Dissected perianth. D. Column and lip, lateral view. E. Column, frontal and lateral view. F. Pollinarium and anther cap. Drawing by A. Karremans based on Bogarín 2814 (JBL-spirit).

narrow ovary in lateral view, and an inflated ovary in longitudinal section (Hágsater 1999c). If conspecific, the name *E. killipii* has priority.

8. *Epidendrum zunigae* Hágsater, Karremans & Bogarín, *sp. nov.*

TYPE: COSTA RICA. Puntarenas: Osa, Sierpe, Mogos, alrededores de Quebrada Porvenir, ca. 3 km norte de Alto de Mogos, 8°46'36.5"N 83°21'23.6" W, 126 m, bosque muy húmedo tropical, epífitas bosque secundario, 30 marzo 2006, D. Bogarín 2680, J. Zúñiga & Curso de Botánica Forestal-UCR (holotype, JBL-spirit) (Fig. 8, 15-G).

Species *Epidendro guanacastensi* Ames & C. Schweinf. similis, floribus majoribus viridulis, labello acuto bicalloso, apice columnae purpurea, clinandrium albo differt.

Plant epiphytic, monopodial, pendent, branching herb. *Roots* basal, from the main stem, fleshy, filiform, thin. *Stems* terete, somewhat flexuous, incipiently branched near the base of the main stem. *Leaves* numerous, distributed throughout the stems; sheath tubular, minutely rugose; blades linear-lanceolate, acuminate, short mucronate, coriaceous, slightly carinate, those on the main stem ca. 12, similar in size. *Inflorescence* apical, produced from the main stem, and presumably from the secondary branches; peduncle reduced. *Floral bracts* longer than the ovary, amplexicaul, imbricating, ovate-oblong, rounded. *Flowers* 3, distichous, greenish, the lip creamy yellow, column green at base, the apical half purple, clinandrium-hood white. *Ovary* terete, smooth, thin. *Sepals* partly spreading, narrowly elliptic, acute, 5-veined, margin slightly revolute, entire. *Petals* partly spreading, linear-elliptic, acute, 5-veined, margin entire, spreading. *Lip* entire, cordiform, acute, spreading, slightly convex in natural position, margin entire, spreading; bicallose, the calli thickened at the base and ending in low keels, with a prominent median keel stretching from the base of the lip to the apex. *Column* somewhat arching upwards above the middle, short, internally provided with a pair of lateral thickenings at the height of the rostellum, and forming a narrow channel; clinandrium hood prominent, funnel-shaped, fleshy, margin entire; rostellum at the middle of the column, slit. *Anther* obovate, 4-celled.

DISTRIBUTION: Known only from the lowlands in front of the Osa Peninsula, near the Pacific coast of southern Costa Rica.

EPONYMY: named in honor of José Daniel Zúñiga Delgado, research assistant at Jardín Botánico Lankester, who participated in the type collection. He photographed and preserved flowers in alcohol thus permitting its classification.

HABITAT AND ECOLOGY: epiphytic in secondary tropical wet forest at 100-150 m of elevation in the southern Pacific lowlands in Peninsula de Osa. Flowering in cultivation in November.

Epidendrum zunigae belongs to the *Epidendrum ramosum* group, which is characterized by the monopodial, branching stems, the spike-like, distichous inflorescence, and to the *Epidendrum isomerum* subgroup, which has long, pendent plants, very narrow, acute leaves, and 1- (rarely 3-) flowered inflorescences. *Epidendrum zunigae* is recognized by the narrow, lanceolate leaves, the greenish flowers with sepals to 11 mm long, the creamy yellow lip, the apical half of the column marked with purple, with a white clinandrium, and the cordiform, acute lip, somewhat convex in natural position. It resembles *E. isomerum* Schltr., which has 3-11 x 0.1-0.3 cm leaves, a single-flowered inflorescence produced from short flowering branches, green to yellowish green flowers, with very narrow floral segments, sepals 15-16 mm long, the lip rhombic-triangular, acute, with a "V" shaped callus. It is also similar to *E. guanacastense* Ames & C. Schweinf., which has thicker stems, and a zigzag inflorescence with 2-3 flowers, sepals 8-10 mm long, a cordiform, rounded lip, and the callus "Y" shaped.

9. *Lockhartia chocöensis* Kraenzl. in H.G.A. Engler (ed.), Pflanznr., IV, 50(83): 19. 1923. Type: Colombia: Choco, Triana s.n. (holotype, W).

DISTRIBUTION: Costa Rica, Colombia, Ecuador, Venezuela and Peru.

ETYMOLOGY: named from the Choco region in Colombia, the place from where the type specimen was collected.

HABITAT IN COSTA RICA: epiphytic in secondary forest in tropical wet forest premontane belt transition in the Caribbean watershed of Tilarán range.

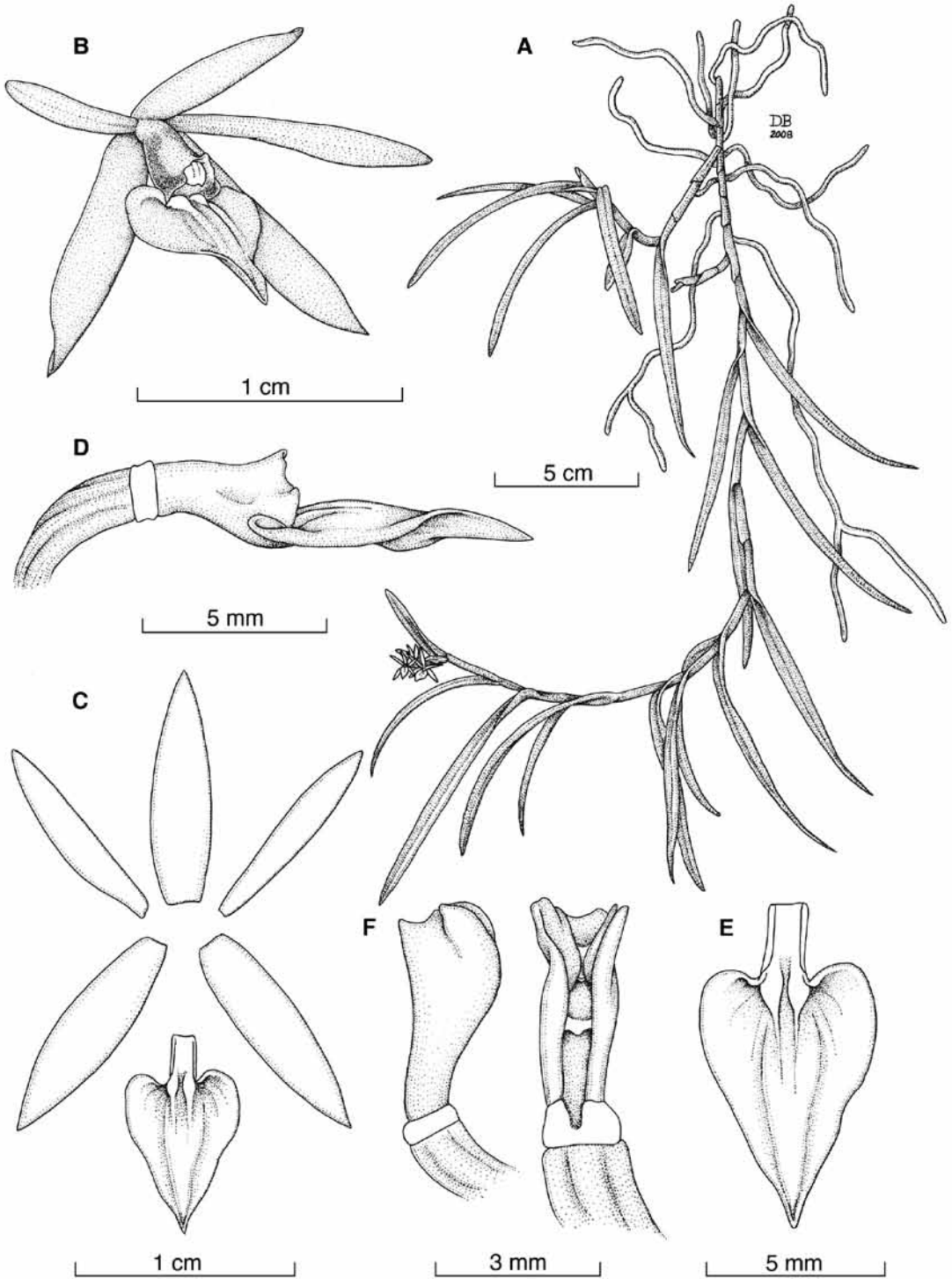


FIGURE 8. *Epidendrum zunigae* Hágsater, Karremans & Bogarín. A. Habit. B. Flower in natural position. C. Dissected perianth. D. Column and lip, lateral view. E. Lip. F. Column, lateral and frontal view. Drawn by D. Bogarín from the holotype.

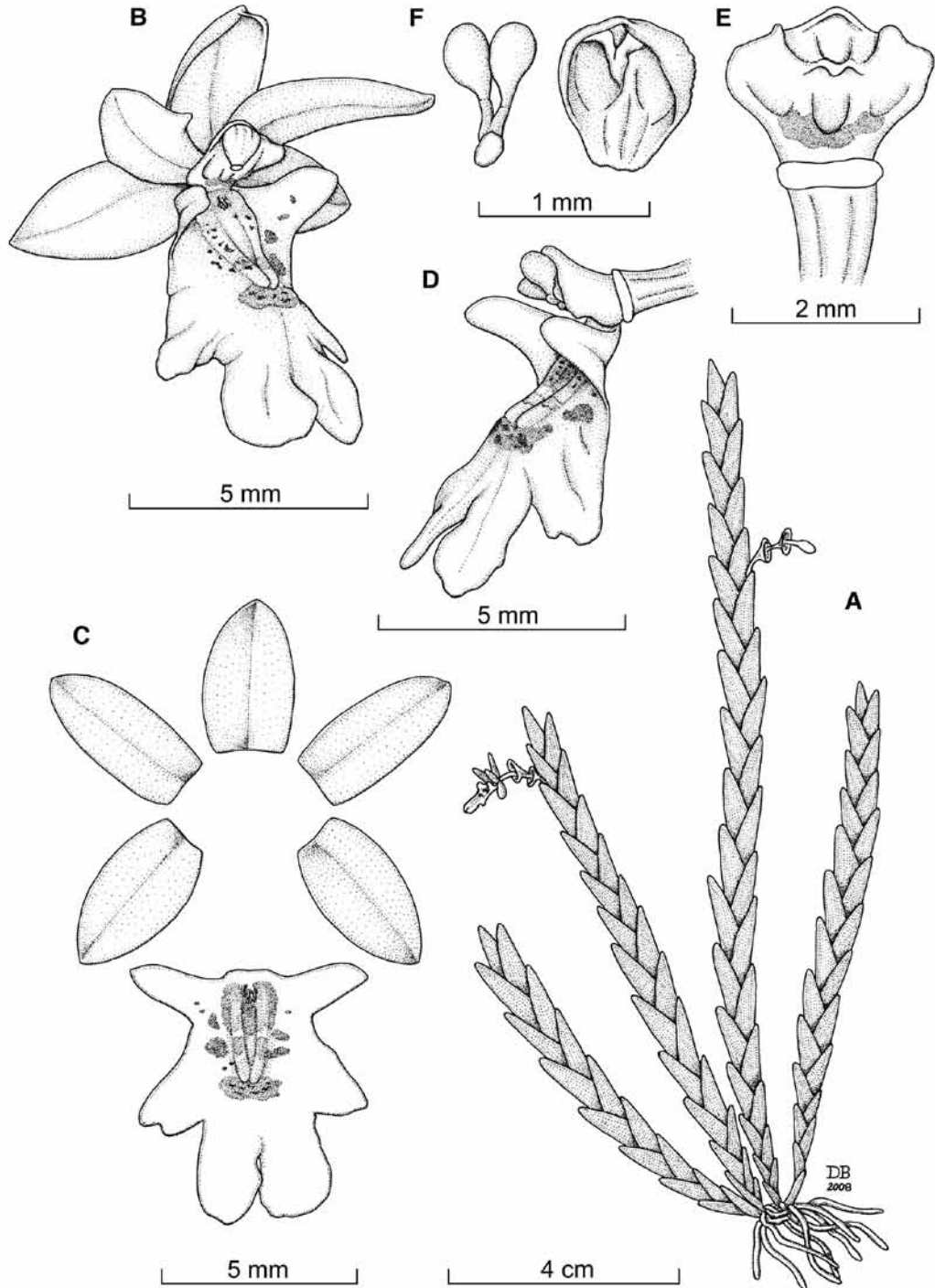


FIGURE 9. *Lockhartia chocöensis* Kraenzl. A. Habit. B. Flower in natural position. C. Dissected perianth. D. Column and lip, lateral view. E. Column, frontal view. F. Pollinarium and anther cap. Drawing by D. Bogarín based on *Bogarín 2352* (JBL-spirit).

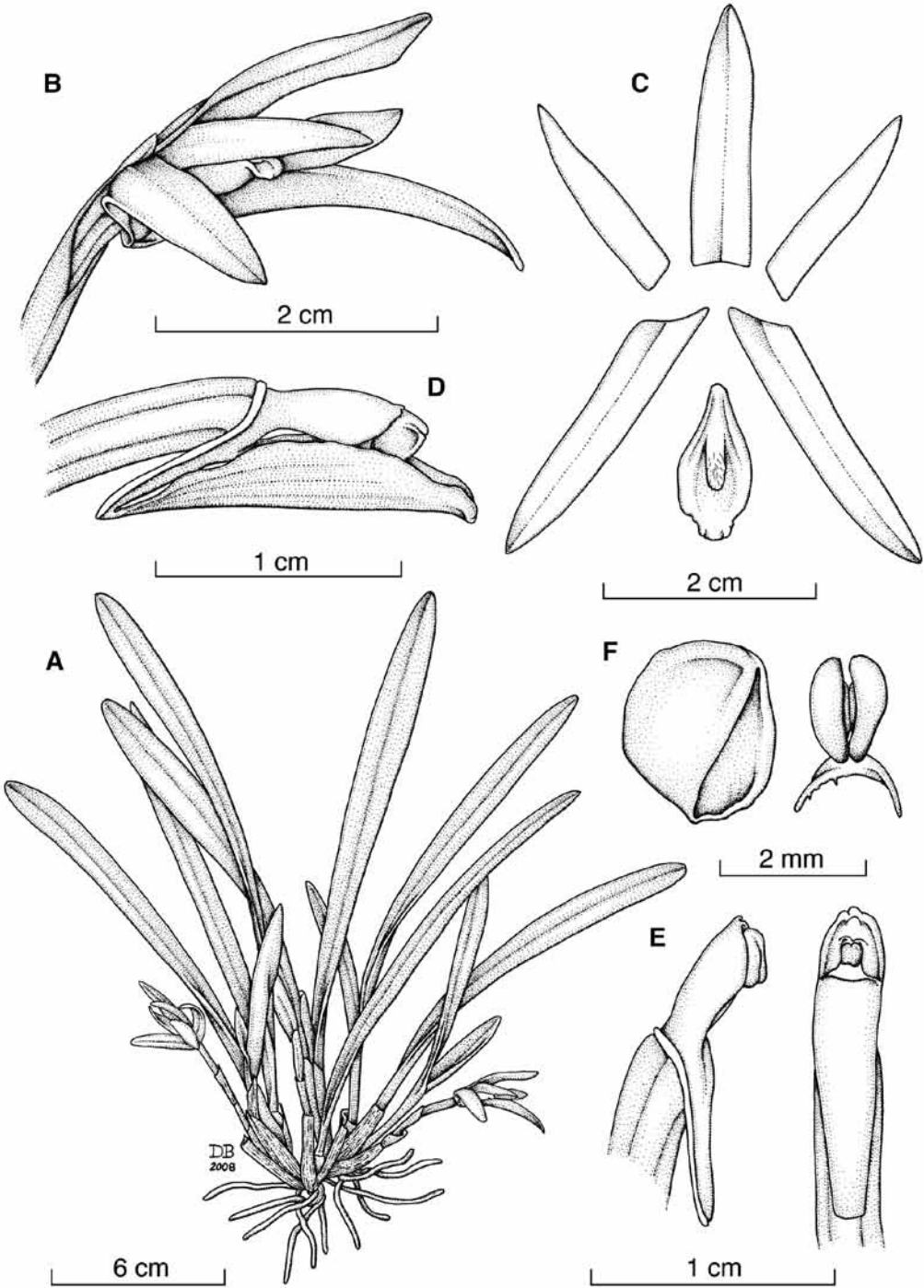


FIGURE 10. *Maxillaria bolivarensis* C.Schweinf. A. Habit. B. Flower in natural position. C. Dissected perianth. D. Column and lip, lateral view. E. Column, lateral and frontal view. F. Pollinarium and anther cap. Drawing by D. Bogarín based on Whitten 2030 (JBL-spirit).

COSTA RICAN MATERIAL STUDIED: Alajuela: Upala, Aguas Claras de Buenos Aires, Hotel Termales Azules, camino por la ladera del Volcán Rincón de La Vieja, hasta las cataratas, 700-2000 m, 6 abril 2004, *A. Karremans 271* (JBL-spirit!). Upala, Bijagua, Zapote, desvío a la izquierda después del puente sobre Río Zapote en sentido Bijagua-Pueblo Nuevo, ladera este del Volcán Miravalles, siguiendo la margen del Río Zapote, 10°44'37.4"N 85°05'14.9"W, 650-700 m, bosque muy húmedo tropical, transición a premontano, epífitas en bordes de potreros y árboles aislados, 1 febrero 2006, *D. Bogarín 2352, R.L. Dressler, R. Gómez & A. Rojas* (JBL-spirit!) (Fig. 9, 15-H).

This species is similar to *Lockhartia micrantha* Rchb.f., but the lip is six-lobulate with a pair of narrow basal lobules folding upward, two acute lobules placed at the middle, and two apical, rounded lobules. The callus is made up by two parallel keels running to the middle and convergent at apex. The illustration shown in Garay and Dunsterville (1966), and identified as *L. chocöensis*, is consistent with the specimens studied from Costa Rica. *Lockhartia lankesteri* Ames, based on a collection by C.H. Lankester from Aguas Zarcas, San Carlos, in the Atlantic lowlands of Costa Rica, has been reduced into the synonymy of *L. micrantha*. With the discovery of *L. chocöensis* populations in Upala, close to the San Carlos region, it is now probable that *L. lankesteri* is a later name for *L. chocöensis*. The drawing of the lip from the holotype of *L. lankesteri* at AMES (AMES-101030) is somewhat schematic however it shows two small lobes at the middle of the lip. A careful rehydration of the flowers of the type should clarify the status of *L. lankesteri*.

10. *Maxillaria bolivarensis* C.Schweinf., Bot. Mus. Leaf. 20: 22. 1962. Type: Venezuela. State of Bolívar, Region of Urimán, forest mesa of Apradatepú, at 950 m, August 13, 1953, *L. Bernardi 780* (holotype, MER, not seen; isotype, AMES-69561, photo).

DISTRIBUTION: Costa Rica, Venezuela, Ecuador and Peru. The Costa Rican records are not so far away from Nicaraguan boundary. This species may well occur in Nicaragua, Panama and Colombia.

ETYMOLOGY: from the State of Bolívar, Venezuela where the type specimen was collected.

HABITAT IN COSTA RICA: epiphytic in tropical wet forest along the Caribbean lowlands.

COSTA RICAN MATERIAL STUDIED: Heredia: Sarapiquí, Horquetas, above Horquetas, Terra Folia Reserve, near Rara Avis, wet premontane forest, epiphytic, 10°18' 14" N 84° 01' 36" W, 500 m, 21 July 2003, *M. Whitten 2030 & M. Blanco* (JBL-Spirit!); Sarapiquí, Magsasay, ribera del Río Peje, 180 m, 31 diciembre 2005, *C. Ossensbach 507 & J.F. Casasa* (JBL-Spirit!) (Fig. 10, 15-I).

This species is easily recognized by the inconspicuous pseudobulbs, the linear-oblong, coriaceous leaves less than 1.5 cm wide, and the smooth clinandrium and anther cap. In Costa Rica, *Maxillaria confusa* Ames & C.Schweinf. is superficially similar to *M. bolivarensis*, however its conspicuous pseudobulbs, broader subcoriaceous leaves (up to 3 cm wide), fringed clinandrium and ciliate anther cap are useful features to recognize this species.

11. *Myoxanthus speciosus* (Luer) Luer, Selbyana 7: 51. 1982. *Pleurothallis speciosa* Luer, Selbyana 3: 392. 1977. Type: Panama: Chiriquí: epiphytic in cloud forest above Guadalupe, ca. 2000 m, 13 September 1976, *C. Luer & H. Butcher 1371* (holotype, SEL).

DISTRIBUTION: Costa Rica and Panama.

ETYMOLOGY: from the Latin *speciosus*, "splendid", in reference to its showy flowers.

HABITAT IN COSTA RICA: epiphytic in lower montane rain forest at 2450 m of elevation in Talamanca range.

COSTA RICAN MATERIAL STUDIED: San José-Cartago: Dota-El Guarco, Jardín, entre La Chonta y Cañón, km 56 carretera Interamericana, Finca Santa María de La Selva, 9°41'27.5"N 83°55'20.3" W, 2450 m, epífita en bosque pluvial montano bajo, en árboles de potreros principalmente sobre *Drymis winteri*, *Alnus acuminata* y *Quercus* sp, 19 febrero 2005, *D. Bogarín 1420, C. Ossensbach & F. Pupulin* (JBL-spirit!) (Fig. 11).

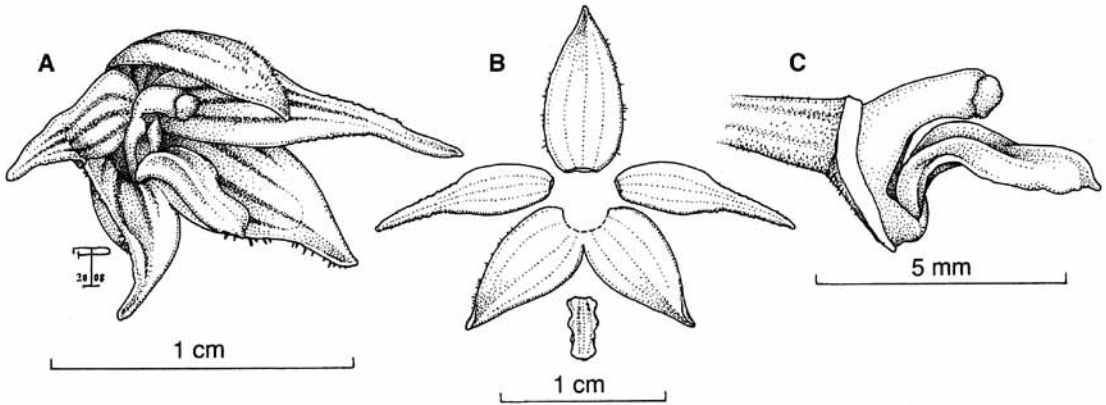


FIGURE 11. *Myoxanthus speciosus* (Luer) Luer. A. Flower in natural position. B. Dissected perianth. C. Column and lip. Drawing by F. Pupulin based on *Bogarín 1420* (JBL-spirit).

Pupulin (2002a) and Luer (2003) cited this species for Costa Rica based on a plant cultivated in Switzerland and collected in “Cordillera de Talamanca, Sierra Hills near Corazón de Jesús, alt. 2100 m” in Puntarenas Province (*Jenny P-25*, MO). Luer (2003c) stated that its origin is doubtful in all the collection details including the country. However, material collected near Cerro de La Muerte, along the Panamerican Highway and flowered in the living collections at Lankester Botanical Garden confirms the presence of this species in Costa Rica.

12. *Scaphyglottis robusta* B.R.Adams, *Phytologia* 64: 253. 1988. Type: Panama. Panama: El Llano-Carti-Tupile road, 10-12 km N of Inter-Am. Highway, 9 January 1975, *Luteyn & Wilbur 4679* (holotype, DUKE, not seen).

DISTRIBUTION: Costa Rica and Panama.

ETYMOLOGY: from the Latin *robustus*, “stout” in reference to the robust and strong appearance of this species compared with other members of the genus.

HABITAT IN COSTA RICA: epiphytic in tropical wet premontane forest to 1150 m of elevation in the Caribbean watershed of the Talamanca range.

COSTA RICAN MATERIAL STUDIED: Cartago: Jiménez, La Esperanza, floreció en cultivo en la colección de Julio Carmona, La Suiza de Turrialba, 22 marzo 2006, *D. Bogarín 2662* (CR, JBL-Spirit) (Fig. 12,

15-J). Turrialba, Pacayitas, calle a La Suiza, ca. km 8, 9°52'29.9"N 83°35'03.6"W, 1150 m, bosque húmedo premontano, 4 de marzo 2007, *A. Karremans 1661 & D. Karremans* (JBL-Spirit).

This species is similar in habit to *Scaphyglottis modesta* (Rchb.f.) Schltr.; however, it can be distinguished by the larger habit, the yellow-greenish to bright green flowers (vs. white with reddish-purplish stripes in *S. modesta*). Antillean plants have dull, yellow-greenish to brownish-green, the spatulate lip (vs. 3-lobed) and the prominent wings of the column. *Scaphyglottis anneliesae* Brieger, a *nomen nudum* published without a description or any indication of the type, has been attributed to Costa Rica. Adams (1993) studied Brieger’s accompanying photographs and suggested that it is referable to *S. robusta*. However in describing *S. robusta*, he only cited Panamanian material. Here, we report the presence of *S. robusta* in Costa Rican based on two collections.

13. *Sobralia bouchei* Ames & C.Schweinf., *Schedul. Orchid.* 10: 4. 1930. Type: Panama. March-April 1930, 2200 feet, terrestrial and epiphytic, *A.M. Bouché s.n.* (holotype, AMES-35595, photo).

DISTRIBUTION: Nicaragua, Costa Rica and Panama.

EPONYMY: in honor of Adrien M. Bouché, who collected the type specimen.

HABITAT IN COSTA RICA: epiphytic or terrestrial in

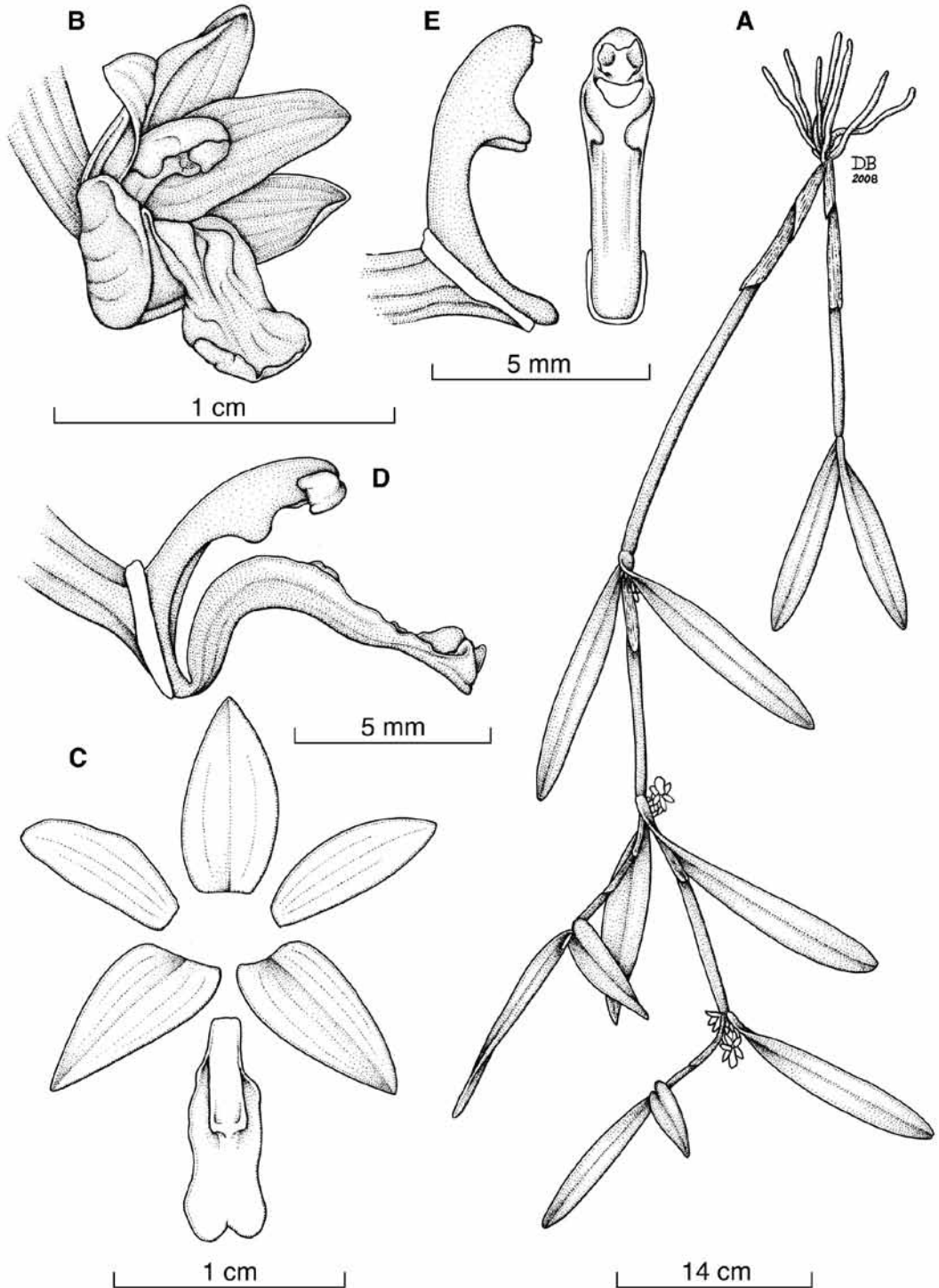


FIGURE 12. *Scaphyglottis robusta* B.R. Adams. A. Habit. B. Flower in natural position. C. Dissected perianth. D. Column and lip, lateral view. E. Column, lateral and frontal view. Drawing by D. Bogarín based on *Bogarín 2662* (JBL-spirit).

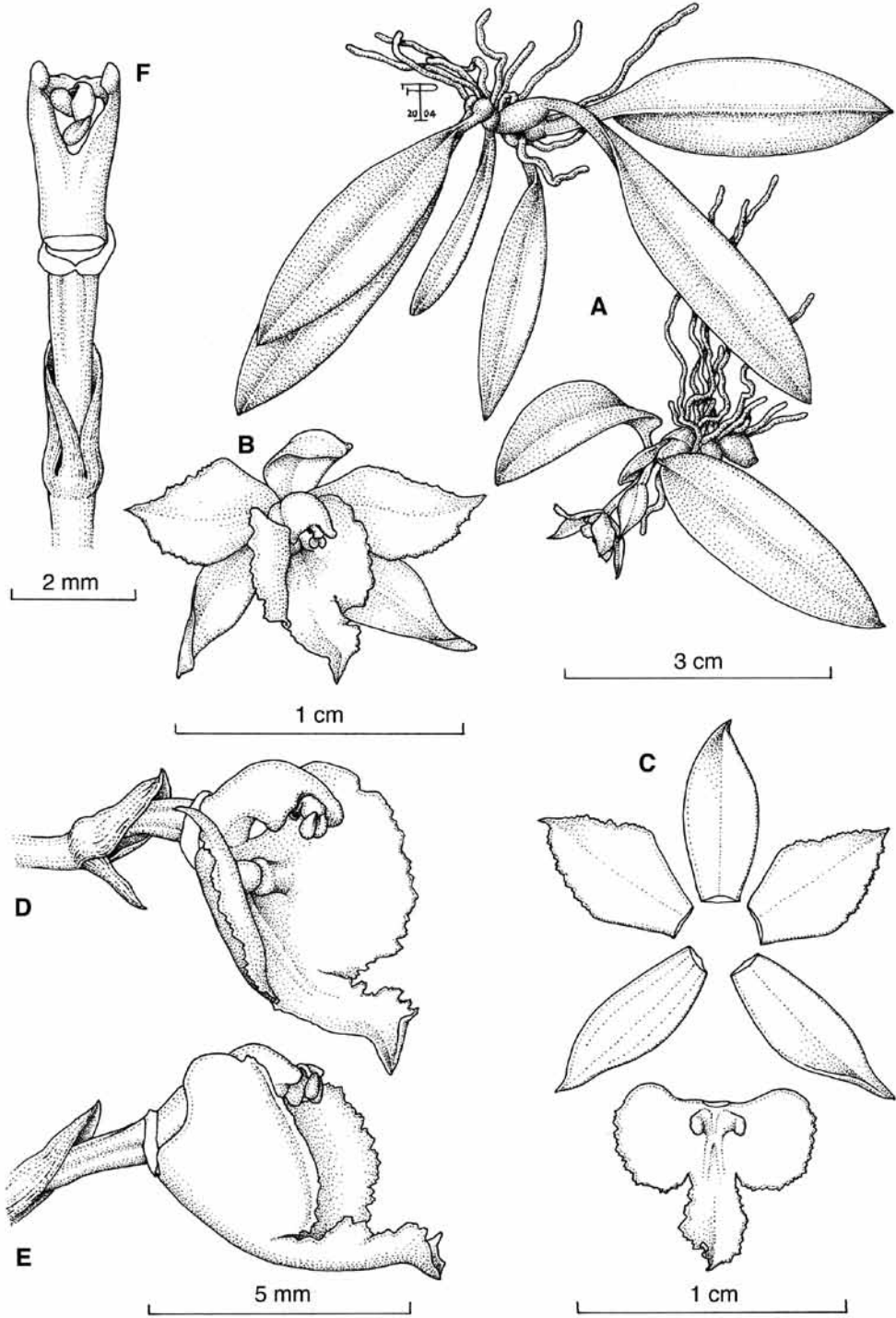


FIGURE 13. *Warmingia zamorana* Dodson. A-B. Habit. C. Flower. D. Dissected perianth. E. Column and lip, three-quarter view. F. Column and lip, lateral view. G. Column, ventral view. In E-G the pollinarium is bending toward the stigma, whereas the viscidium is still in place. Drawing by F. Pupulin based on *Karremans 452* from Costa Rica (JBL-spirit).

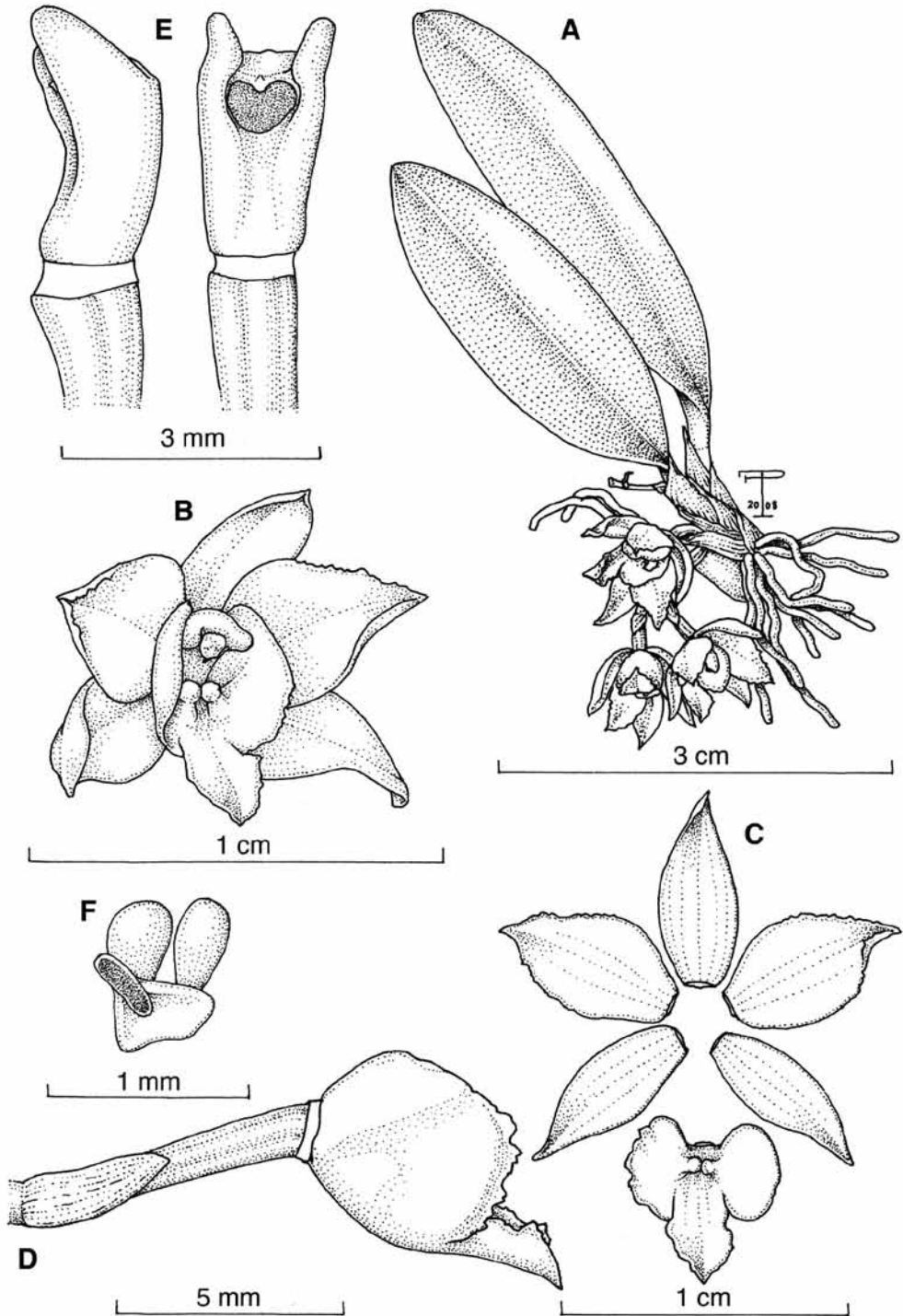


FIGURE 8. *Warmingia zamorana* Dodson. A. Habit. B. Flower in natural position. C. Dissected perianth. D. Column and lip, lateral view. E. Column, lateral and ventral view. F. Pollinarium. Drawing by F. Pupulin based on *Medina s.n.* from Ecuador (CIOA-spirit).

roadcuts in tropical wet premontane forest to 900 m of elevation in the Caribbean watershed of the Talamanca range.

COSTA RICAN MATERIAL STUDIED: Cartago: Turrialba, Tayutic, carretera entre Tayutic y Jicotea, Platanillo, laderas del Río Platanillo, siguiendo la margen del río, 9°49'27.46"N 83°33'13.29"W, 878 m, bosque muy húmedo premontano, 1 abril 2008, *D. Bogarín 4201*, *A. Russell & R. Samuel* (JBL-Spirit).

This species is easily recognized by the pink flowers and the strongly ruffled purple lip with 7 crisped golden-yellow keels. The leaves are bright green and smooth. Plants from Panama and cultivated at Lankester Botanical Garden produce fully opened flowers. Nevertheless, the plant collected in Costa Rica has flowers self-pollinated and developing fruits. This condition has been also observed in Nicaraguan material (Dressler, pers. comm. 2008). *Sobralia triandra* A.H.Heller & A.D.Hawkes described from Nicaragua could be conspecific with *S. bouchei*.

14. *Warmingia zamorana* Dodson, Icon. Pl. Trop., II, 6: t. 599. 1989. Type: Ecuador. Zamora-Chinchipec: Zamora, 1000 m, August 1968, *C. H. Dodson 3842* (holotype: SEL). *Warmingia margaritacea* B. Johans., Lindleyana 7: 194. 1992, **syn. nov.** Type: Costa Rica. [Cartago]: Turrialba, C.A.T.I.E., epiphytic on *Hibiscus* sp. forming hedge, 600 m, 19 November 1988, *B. Johansen & M. Sørensen 138* (holotype: C, not seen).

DISTRIBUTION: Costa Rica and Ecuador.

ETYMOLOGY: named from the city of Zamora in southern Ecuador, the locality of the type specimen.

HABITAT IN COSTA RICA: epiphytic in premontane wet forest on garden trees and bushes in Turrialba region.

MATERIAL STUDIED. COSTA RICA. Cartago: Turrialba, frente al edificio principal del Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) en cerca viva a la par de un tubo de agua, 2 a 3 flores pendientes, 3 noviembre 2003, *A. Karremans 452*. (JBL-spirit) (Fig 13, 15-K). Turrialba, CATIE. Frente al Edificio Principal del CATIE, sobre una cerca viva de *Hibiscus* sp., al lado de un tubo de agua. 9°53'22"

N - 83°39'12" W, 600 m, 4 noviembre 2005, *A. Karremans 1123* (JBL-spirit). ECUADOR. Zamora-Chinchipec a lo largo del Río Zamora entre 600 a 800 m, *H. Medina s.n.* (CIOA). Morona-Santiago: cerca de Patuca, *H. Medina s.n.* (CIOA-spirit) (Fig. 15-L).

This species was first recorded from Costa Rica in 1992 by Johansen as a new species named *W. margaritacea*. The plant was collected at CATIE campus in Turrialba, Costa Rica, growing in *Hibiscus* sp. fences (Johansen 1992). After its description, the species had been long known only by the type collection (Atwood 1999, Dressler 2003). Fifteen years later, in November 2003, botanical exploration carried out at CATIE revealed more populations of this species growing in *Hibiscus* sp. (Pupulin 2004, 2005).

With a careful analysis of the type specimen of *W. zamorana* as well as of Ecuadorian material cultivated from the Zamora-Chinchipec region, we conclude that the characters used to separate *W. margaritacea* from *W. zamorana* are inconsistent, and both species should be considered conspecific. Johansen (1992) stated that *W. margaritacea* can be distinguished from *W. zamorana* by the coriaceous, lanceolate, subfalcate leaves, the pauciflorous inflorescence, the rhombic petals, the rigid column appendices and the self-pollinated flowers. However, this set of features were also observed in living specimens of *W. zamorana* from Ecuador. Moreover, Johansen stated that the flowers of *W. margaritacea* are pure ivory and pearly appearance, contrasting *W. zamorana* as having a yellow lip callus (Dodson 1989), but the callus of all the examined Costa Rican records is bright yellow in color (a photograph is given in Pupulin 2005). The serrate petals and the three-lobed lip with a bilobate yellow callus were also observed in both Ecuadorian specimens from Zamora and Costa Rican material collected at CATIE. Although we have still not found a wild population of this species outside of CATIE, some plants have been collected growing in *Cupressus lusitanicus* trees.

Warmingia zamorana has not been recorded yet in the orchid floras of Panama and Colombia, the two countries in the middle of its distribution. Nevertheless, that disjunction may be attributed to undercollection of these small and easily overlooked epiphytes. It is remarkable that similar examples of disjunction in the orchid floras of Costa Rica

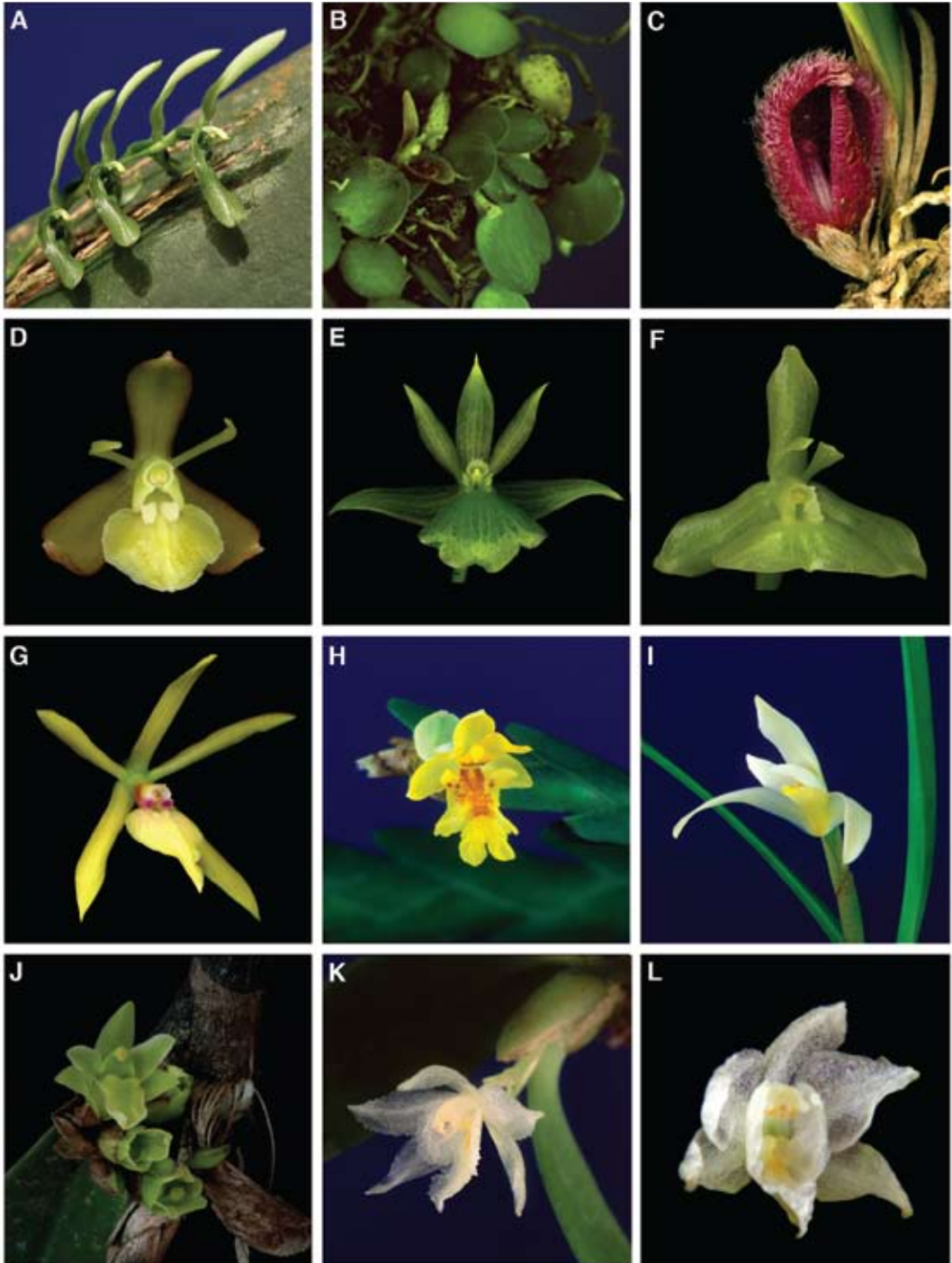


FIGURE 15. Pictures of: A. *Acianthera aberrans*. B. *Barbosella orbicularis*. C. *Brenesia lappiformis*. D. *Epidendrum maduroi*. E. *Epidendrum stellidiforme*. F. *Epidendrum scharfii*. G. *Epidendrum zunigae*. H. *Lockhartia chochoensis*. I. *Maxillaria bolivarensis*. J. *Scaphyglottis robusta*. K. *Warmingia zamorana* (Costa Rica). L. *Wamingia zamorana* (Ecuador).

and Ecuador were documented in the case of *Ornithocephalus montealegrae* Pupulin, originally described from the Turrialba region in Costa Rica (Pupulin 2002b) and recorded in Ecuador by Dodson (2003), and in *Epidendrum scharfii*, *E. stellidiforme*, *Lockhartia chocoensis* and *Maxillaria bolivarensis*, discussed in this paper.

ACKNOWLEDGEMENTS. We want to thank Robert L. Dressler and Eric Hágsater for their invaluable support and their useful comments on the paper. Hugo Medina and José Daniel Zúñiga who assisted part of this study. The scientific services of Ministerio del Ambiente y Energía de Costa Rica (MINAE) and its Sistema Nacional de Áreas de Conservación (SINAC) for issuing the Scientific Passport N. 1281 under which wild species treated in this study were collected, and the Ministerio del Ambiente of Ecuador, for the permits issued for the managing of the *ex-situ* orchid collections at Gualaceo and El Panguí, Ecuador. To the Vicerrectoría de Investigación of the University of Costa Rica for providing support under the project N. 814-A7-015 "Inventario y taxonomía de la flora epífita de la región Mesoamericana".

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